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A  Introduction  
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   Mental Math  
   Contents of Workbook 1

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N  Ontario Curriculum Correlation
O  WNCP Curriculum Correlation
In this unit, students will add and subtract using a variety of strategies and models (e.g., base ten materials, number lines). They will skip count, solve word problems, and write number sentences. They will also learn to recognize Canadian coins and count money.

Materials
Number Cards (0–20) and Number Word Cards (zero–twenty)
Write each numeral from 0 through 20 and each number word from zero through twenty on an index card or piece of construction paper. Each student will also need a set of these cards, and you can use BLM Numbers Template (p M-11) to make them. You will use these cards throughout the unit for demonstrations; students will use them as manipulatives (e.g., for sorting and ordering activities, to play Memory). The same numbers, in both forms, should be posted or displayed in the classroom for student reference.

Hundreds Charts and Base Ten Materials
Make a copy of BLM Hundreds Chart (p M-14) for each student, and laminate it if possible. Use additional photocopies of this BLM as required. Students will often need to use this hundreds chart with 1-cm connecting cubes and tens and ones blocks. If you do not have such cubes or blocks, or if your students need larger manipulatives, they can use BLM Hundreds Chart—Five Rows (p M-15) with paper ones and tens blocks from BLM Base Ten Materials (p M-16). Copy and laminate as many tens and ones blocks as required. Also available: a slightly larger hundreds chart on BLM A Larger Hundreds Chart (p M-13).

A Hundreds Chart for Whole-Class Teaching
For whole-class discussions and demonstrations, use a pocket hundreds chart, a hundreds chart poster, or an overhead projector. You could also create a large hundreds chart on the board or on chart paper.

Vocabulary and Word Problems
Note the words and phrases that repeat in word problems, such as joined, altogether, in total, (how many) more, are left, more... than, are not. Circle or underline them in problems on the board. Ask students to identify them on their completed worksheets or BLMs. Write them on cards and post them. Students will focus on the vocabulary used in word problems in lessons NS1-31 through NS1-33.

Coins. To meet the Ontario curriculum expectations, students will need play money to do some of the activities in sections NS1-57 to NS1-60. If you do not have play money, cut out coins from BLM Coins to Cut Out (p H-168).

Recurring Games
Many of the games students learned in Number Sense Part 1 (see pp B-1–B-3) appear again in Part 2. New games and activities are as follows:
**Catch.** You will need a small ball or paper object that students can catch in one hand. Throw the ball to a student while saying a number. The student catches the ball with one hand and repeats the number. The student then throws the ball back to you and says whatever number you have asked for (e.g., the next number counting backwards, the next number when skip counting by 5). Ensure that everyone gets a chance to play.

**Adding or Subtracting Machine.** Prepare an adding-3 machine as follows. First, make a strip with the squares marked from 1 to 20:

```
1  2  3  ...
```

Make a rectangle of length 3 squares and make two slots with distance 2 squares between them:

```
            
          /
```

Between the slots. Pull the strip through the slots so that two numbers are covered:

```
... 3 + 3 = 6 ...
```

The machine inputs the number to the left and outputs the number to the right. This machine can be used after students are comfortable adding on a chart or on a number line. You could challenge students to make their own adding machines for various numbers, such as an adding-4 machine. Some students may choose to make a number line for adding 3 to larger numbers by making a number line from, say, 80 to 100. Students can do the same activity when subtracting by either reading the input on the right and the output on the left or by writing the numbers from 20 down to 1 in order from left to right. This can also be used when students are learning about the connection between adding and subtracting.

**Electrical Matching Game.** If older students in your school are studying electricity (Grade 6 in Ontario), invite them to design electrical matching games in which a circuit is completed only if objects are matched correctly depending on the concept you are teaching (e.g., a numeral is matched to the correct number word, or to the correct addition sentence). Pair up older students with Grade 1 students, and let the Grade 1 students play their buddy’s game. If the older students create different games, change the pairings so that the Grade 1 students play more than one game.

Although each variation is mentioned in the most appropriate lesson to use it, you could also combine all variations in a cumulative activity at the end of the unit.
Meeting Your Curriculum. Ontario students should cover all lessons in this unit.

For students using the WNCP curriculum, lessons NS1-57 to NS1-60 on money are optional, as are lessons NS1-63 on introducing fractions and NS1-64 on ordinal numbers.
NS1-24
Reading Number Words (Zero to Ten)
Pages 1–2

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m5, 1m12
WNCP: 1N4, [R, CN]

VOCABULARY
zero, one, two, … , ten

Goals
Students will learn the number words from zero to ten and match them to the corresponding numerals.

PRIOR KNOWLEDGE REQUIRED
knows the letters of the alphabet and the sounds associated with each one

MATERIALS
number cards and number word cards (0–10)
BLM Match Pictures to Number Words (p H-87)

Use sound to match numerals to number words. Write on the board the numbers 0, 1, 2, 3, 4, 5 on the board and their words, but not in order – two, four, zero, three, five, one. Have students say each number out loud. Together, use sound to match the numerals to the corresponding number words, in this order:

4: What sound does it start with? What other words do you know that start with the same sound? What letter does it start with? (f) What letter do you think it ends with? (r) Match 4 to four.

0: Repeat the questions above to match 0 to zero. Then ASK: The word zero has an “r” in it—does this make sense? Emphasize that students can check the answer to a question by using information that they didn’t use to solve it in the first place—in this case, a sound in the middle of the word.

5: There are two ways to match five to 5: it’s the only word left that begins with the “f” sound and it’s the only word that has a “v” sound.

3: ASK: What sound do you hear at the beginning of 3? What other words do you know that start with this sound? (EXAMPLES: think, throw, thank you) Write some of these words on the board. Circle the “th” in each word and remind students that sometimes two letters together can make one sound. ASK: Which word in our list starts with “th”?

2: It starts with a “t” sound (not a “th” sound).

1: It has an “n” sound in it… and it’s the only word left!

Do the same for six through ten. Use the “t” sound at the end of “eight” to help students match it to 8.
Find number words in sentences. Write the number words from zero to five on the board along with the sentence “Four friends played together.” Ask students to find the number word in the sentence. Which number is it? Write the number above the number word (see margin).

Repeat with more such sentences but have volunteers write the number above the number word. Then erase the number words and have students identify them in sentences without referring to a list. Repeat with six through ten, again starting with a list on the board and then removing it. Finally, use sentences that include all the number words from zero to ten. Start with simple sentences (see margin) and gradually work up to more complex sentences (EXAMPLES: Rita bought two tennis rackets and three tennis balls. I have eight fingers and two thumbs.) As an intermediate step for extra guidance underline the number word in a sentence before having students write the number above it.

**ACTIVITIES 1–2**

1. Give each student a card with a number word from zero to ten. Call out a number at random or write the numeral on the board and ask students with the corresponding number word to hold up their cards. Conversely, give each student a card with a number on it and write a number word on the board. Students with the corresponding numeral hold up their card.

2. Give each student number word cards for zero to ten, shuffled. Ask students to put their cards in order.

**Extensions**

1. On BLM Letter Sounds in Numbers (pp H-88–H-89), students colour numbers in which they hear specific letter sounds, specific colours. Read the instructions to the class and encourage students to say the numbers out loud to themselves. Students should colour the numbers using pencil crayons.

   **Bonus** Make extra copies of the second page (6–10) and have students colour numbers with a “t” sound red and an “n” sound yellow.

2. Students can demonstrate their knowledge of number words and subtraction on BLM More Than (p H-90).

   **Bonus** Write the number word above the number in the blank.

3. On BLM Stars (p H-91), students join dots in order according to the number words.

4. The code on BLM Reading Numbers (p H-92) assigns a letter to each number from 0 to 10. Students use it to decode a message written using number words. (**ANSWER:** I CAN READ NUMBERS!)
NS1-25
Writing Number Words to Ten
Pages 3–4

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m5, 1m6, 1m7, 1m12
WNCP: 1N4, [R, CN, C]

VOCABULARY
zero, one, two, …, ten

Goals
Students will read and write the number words from zero to ten.

Prior Knowledge Required
- can write the alphabet
- knows the sounds associated with each letter of the alphabet

Materials
- number word cards (zero to ten)
- BLM Finish the Number Word (p H-93)
- BLM Writing Number Words (p H-94)

Finish writing number words by sounding out. List the number words from zero to five on the board (or post number word cards), then write: z__r__. ASK: What sound does “z” make? What sound does “r” make? Which number word has those sounds and letters in it? Circle the correct word and have students finish writing it. Repeat with other number words, always providing the consonants and replacing the vowels with blanks. Repeat with six through ten. Then use all the number words to ten.

Finish writing number words by using logic. Now provide the vowels and make the consonants blanks. This time, students should use the positions of the letters in the words to fill in the blanks. Write: __ e __ o. ASK: How many letters does this word have? Which number words have 4 letters? (Point to each word one at a time and ASK: Does this word have 4 letters?) Write the words with 4 letters in a separate list: zero, four, five. Go back to the first list and ASK: Which number words end with “o”? Write them on the board: zero, two. ASK: Which words are in both lists? What is the word we are looking for? (zero) Since it fits in the blanks (even the e works out, information that we haven’t used yet), it must be right. Repeat with the remaining number words to five, then with six through ten, and finally with all number words to ten in random order, always providing the vowels.

Write the word given the numeral. Write numerals on the board and have first volunteers, then everyone individually, write the corresponding number word, for numbers 0 to 10.

For extra practice writing number words, students can complete BLMs Finish the Number Word and Writing Number Words.

Read number words and add. Write addition sentences using number words on the board. EXAMPLES:
Reflecting on the reasonableness of an answer.

Using an organized list

Solve some of these problems together. Demonstrate an incorrect answer. For example, SAY: I think two + three is six. Then try to write “six” in the blanks. Does it fit? Explain that when the answer doesn’t fit (you have extra blanks or letters left over), you know it’s wrong. Invite students to solve some questions individually and then check their answers with a partner.

Write on the board:

\[
\begin{align*}
\text{\underline{3 letters}} & \quad \text{\underline{3 letters}} & \quad \text{\underline{5 letters}} \\
\text{one} & \quad \text{one} & \quad \text{three} \\
two & \quad \text{two} & \quad \text{seven} \\
six & \quad \text{six} & \quad \text{eight} \\
ten & \quad \text{ten} & \\
\end{align*}
\]

Challenge students to find a solution and then find a classmate who came up with a different solution. Can they find a third solution? ANSWERS: one + two = three (or two + one = three), one + six = seven, two + six = eight.

Then write on the board:

\[
\begin{align*}
\text{\underline{3 letters}} & \quad \text{\underline{5 letters}} & \quad \text{\underline{4 letters}} \\
\end{align*}
\]

This time, students have to list all the possible number words that fit the blanks before solving the problem. Since all the words from zero to ten have 3, 4, or 5 letters, every one should be used. As a class, check to make sure you didn’t miss any numbers by finding the numbers in order from zero to ten. Then have students do the puzzles. ANSWERS: one + three = four, one + eight = nine, two + three = five, two + seven = nine, six + three = nine.

Review modelling to add or subtract. First add and subtract numerals using the model on the worksheet. EXAMPLE: 7 – 3. Then add and subtract number words. EXAMPLE: seven – three.

Extension

BLM Number Word Search 1-5 (pp H-95–H-99). Remind students to refer to the posted list of number words as they work on the BLM.

Bonus Which two number words are not used on the fourth page? (zero and eight)
Reading Number Words to Twenty

Pages 5–8

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m5, 1m7, 1m12
WNCP: 1N4, [R, C, CN]

VOCABULARY
eleven, twelve, … , twenty

Goals
Students will read number words to twenty.

PRIOR KNOWLEDGE REQUIRED
can count to 20
can read and write number words to ten

MATERIALS
number cards (11 to 20) and number word cards (zero to twenty)
BLM I Have —, Who Has —? Number Words (pp H-100–H-102)
BLM Game Cards (p M-10)
domino cards

Look for sounds and letters in common. Write on the board: 4  5  6. ASK:
Which two numbers start with the same sound? Do those numbers start
with the same letter, too? Write the number words to check. Repeat with
different sets of numbers. EXAMPLES: 2  3  10;  6  7  8.

Compare sounds in numbers to 20. Write the numbers 6 and 16 on the
board and ask students to say them. How do they sound the same? How
do they sound different? How do they look the same? How do they look
different? Repeat with 7 and 17, 9 and 19, 8 and 18, 4 and 14. Then SAY: Do
1 and 11 have any sounds in common? What about 2 and 12—what sound
do they have in common? Repeat for 3 and 13, then 5 and 15. (5 and 15
have only the first sound in common)

Write groups of three numbers on the board and ask volunteers to circle
those that start with the same sound. EXAMPLES: 6  7  9; 3, 4,13.

Number words for 14, 16, 17, 18, 19. Now tell students they are going to
learn the number words for 11 to 20. Write “nineteen” on the board. Ask a
volunteer to guess which number that is. ASK: What one-digit number word
that you already know is hidden in that word? What do you think the digit
after the 1 is? Why? Repeat with fourteen, sixteen, seventeen, eighteen.
Emphasize that we hear the second digit in each one.

Number words for 13, 12, 15. Write “thirteen” on the board. Point out the
first two letters (th). ASK: What number word that you already know starts
with the same two letters? What number is this word? Repeat with twelve
and fifteen. Eleven does not sound at all like its second digit, “one”.

The number word for 20. Write on the board: two    twelve    twenty.
ASK: What’s the same in these words? (the first two letters, tw) Then have
volunteers write the numerals for two and twelve (2, 12). ASK: What do
More practice writing numbers with BLM Write the Numbers.

these numbers have in common? (the digit 2) **ASK:** What number do you think the last word says? (20) Write the answer on the board. **ASK:** Does that number also have a 2?

**Reading number words for 11–20 out of context.** Give each student a card with a number word from eleven to twenty. Write a numeral on the board. All students with that number word should hold up their card. Repeat several times.

**Number words in sentences.** Write sentences with number words (as in the workbook) and invite volunteers to identify the number word and write the numeral above it. Start with sentences using only eleven through twenty, then include all numbers to twenty. **(EXAMPLES:** A year has twelve months. Helen played fourteen games of soccer. Tony has eleven hamsters, one dog, and one cat.) Students can identify the number word individually by writing the associated numeral.

**ACTIVITIES 1–5 (For game rules: NS Part 1 – Introduction)**

1. Give students cards with number words on them (e.g. using BLM Numbers Template) and have students organize them in order.

2. **Peace.** Use number words cards for 1 to 20 instead of numerals (e.g. using BLM Numbers Template); the larger number wins. Copy the cards onto red paper and then again onto white paper. Students play for white against red.

3. **I Have —, Who Has —?** Make your own cards from BLM Game Cards, or use the cards on BLM I Have —, Who Has —? Number Words 1–3. There are two sets of 6 cards, so students can play in groups of 6.

4. **Dominoes.** Make domino cards (eg. from BLM Blank Domino Cards). Use numerals on one end and number words on the other end.

5. **Memory.** Play with number cards (11 to 20) and number word cards (eleven to twenty).

**Extensions**

1. Have students underline common last letters in number words like thirteen and seventeen. Write the corresponding numerals next to each word and circle the digits that are the same. What do students notice?

2. **Electrical Matching Game.** (See NS Part 2—Introduction) The circuit should be completed only if a numeral is matched to the correct number word.

3. Introduce students to other words that start with “tw” and are connected to the number 2: twice (twice means two times) and twin.
Count orally to 30. Review counting to 20. Then display the numbers from 20 to 30. Point to each number and say it aloud. Repeat, but this time emphasize the last part of the word while underlining the ones digit. ASK: Which two numbers end with the same digit? (20 and 30 both end with 0) Do the words for these numbers sound the same in any way? (they both end with a “tee” sound) Look at the other numbers—how does the way you say them tell you the last digit? On the board, write the numbers 30 and 13. Have students listen carefully while you say the numbers, then ASK: What part sounds the same? (“thir” or “thirt” or “thirtee”) Emphasize that for numbers in the “teens”—thirteen, fourteen, fifteen, and so on—we hear the last digit first: thirteen = 13. For numbers in the 20s, we hear the 2 first (2 and 20-something start with the same sound) and then the last digit: twenty-one = 21.

Continue counting orally to 100. Write 31 on the board and say it aloud. Then write 32 and ASK: How do we say this number? Continue through the 30s in numerical order, then repeat in random order. Repeat with the 40s, 50s, 60s, 70s, 80s, 90s. Emphasize the connection between how we say 40 and 14, 50 and 15, and so on (just take the “n” sound off the “teen” number to get the other number). Ask students to say 20, 30, 40, 50, 60, 70, 80, and 90, first in numerical order and then in random order.

ACTIVITY 1

Catch (NS Part 2—Introduction). Ask for the next number. Do not include numbers ending in 9.

Explain that the numbers that come after 29, 39, and 49 are the hardest to remember. Once students remember that 30 comes after 29, then they can easily count to 39. (Do this as a class.) What comes after 39? Look at a large hundreds chart together or have students look at individual copies. SAY: We know that the 20s start with the same sound as 2 (“t”). Well, the 30s start with the same sound as 3, but it sounds more like 13 than 3 (just take off
We count by grouping in tens. Tell students that you heard someone counting to 40 like this: one, two, ..., twenty-nine, twenty-ten, twenty-eleven, ..., twenty-twenty. **ASK:** Is this right? What’s wrong with this counting? Explain that it’s not wrong to group numbers in twenties the way this person did—some other languages do—it’s just not how we do it in English.

**ACTIVITIES 2–3**

2. **Have students stand in a line.** The first person says “one,” the next person says “two,” and so on to 100, with one catch: when students say a number that has the sound “four” in it (EXAMPLES: 24, 40–49), they move to the front of the line, but play continues from where they were. (EXAMPLE: I say “fourteen” then move; the person standing next to me before I moved says “fifteen.”) Repeat with the sound “five” and note that this does not include numbers 50–54 and 56–59 (the sound here is “fif”). **VARIATION:** Students stand in a circle and whisper the next number to the next person. Numbers with the sound “four” are said aloud.

3. **Catch.** Now include many two-digit numbers ending in 9.

Display a hundreds chart and ask students to say numbers as you point to them. **EXAMPLES:** 45, 54, 19, 16, 60. Say various numbers and have students write them down individually. **EXAMPLES:** 27, 70, 17, 8, 48, 84, 99, 100.

**Count by keeping track.** Count letters as you did in NS1-11 but use longer words and sentences. **SAMPLE:** John likes to bake chocolate chip cookies with his father. (Subtotals: 4, 9, 11, 15, 24, 28, 35, 39, 42, 48) As before, discuss how counting letters in this way gives students an opportunity to check their work and identify mistakes. Where were more mistakes made? (with larger words) Why? (because it’s harder to keep track)

**EXTRA PRACTICE:** BLM Mixing Colours. Have students use pencil crayons.

**Extensions**

1. Students can write the number words twenty to twenty-nine on BLM The Twenties (p H-104) and they can use patterns to read number words higher than 20 on BLM Number Words Past Twenty (p H-105).

2. Teach students to count to 200, or even 1000.

3. Which is longer—100 paper clips (all the same size, either large or small) or the height of one school floor? Students count the paper clips, make a chain, then hang the chain from the stairs.
Goals
Students will use patterns to find numbers in a hundreds chart.

Prior Knowledge Required
- can count to 10 using a hundreds chart
- knows how to use the reading pattern

Materials
- the first row of a hundreds chart or BLM Hundreds Chart—One Row (p M-12)
- tokens
- BLM A Larger Hundreds Chart (p M-13)—at least 1 copy per student
- BLM Hundreds Chart Pieces (p H-106)
- number cards for 1 to 100 to create parts of a hundreds chart on the board

Review finding numbers in the first row of a hundreds chart. Give each student ten tokens and a large strip of paper with the first row of a hundreds chart (or copy and cut rows from BLM Hundreds Chart—One Row). Say the numbers 1 to 10 in random order. Ask students to find each number you say and place a token on it.

Review finding numbers in the second row of a hundreds chart. Draw the first two rows of a hundreds chart on the board and review how to find numbers in the second row using the first row (e.g., to find 17, find 7 and move down a row). Have volunteers use this method to find more numbers in the second row. Then ask each student to find and point to the first two rows on their own hundreds chart. (Students can colour the first two rows lightly or trace around them. Ensure that all students have identified the correct rows.) Have students place a token on various numbers to 20 as you say them. Emphasize that all the numbers you say will be in the first two rows. Verify that each student identifies the correct numbers.

Finding numbers in the entire hundreds chart. Tell students to look at the third row. ASK: How can we find 27 if we know where 7 is? (First find 7 and then move down until you find 27.) How can we find 57 if we know where 7 is? (move down from 7 until you find 57) Then have students place a token on various numbers that you say: 35, 75, 95, 15, 65, 25, 55; then 17, 67, 87, 97, 47; then 30, 60, 50, 90, 10, 80, 20; then 53, 46, 81, 75, 90, 45, 33, 77.

Point to the number 64. ASK: How can I find 84? Should I move up or down? Students might show a thumbs up for moving up and a thumbs down for
moving down. **ASK:** How can I find 34? Should I move up or down? How do you know? Repeat with similar **EXAMPLES:** find 30 from 50; find 23 from 13; find 45 from 75; find 80 from 50.

**Use the reading pattern to find the next number.** Tell students to find the number 37 and place a token on that square. **ASK:** What is the next number? Write on the board 37 ___ and have a volunteer fill in the blank. Repeat with various numbers. Then repeat again, but have students write the number that comes next in their notebooks or on a separate sheet of paper.

**Use the reading pattern to find the previous number.** Repeat the above exercise with numbers that come before a given number.

**Find groups in a hundreds chart.** Arrange number cards in the form of “pieces” of a hundreds chart on the board. (Make sure the pieces don’t overlap!) Label each piece with a colour and ask students to find and colour these groups of numbers on a hundreds chart. **EXAMPLES:**

```
  blue   red   yellow  green  purple  orange
  12  13  27  28  29  35   41  42  67  68  69  70  92  93  94
  22  23  37  38  39  45   51  52  77  78  79  80
  55   61  62  87  88  89  90
   71  72
```

**ACTIVITY 1**

Students can cut out the pieces of a hundreds chart from **BLM Hundreds Chart Pieces** and glue them in the correct places on **BLM A Larger Hundreds Chart**.

**PROBLEM SOLVING**

Looking for a pattern.

**Find missing numbers in a hundreds chart.** Create part of a hundreds chart with three numbers missing. **EXAMPLE:**

```
  15   16   18   19
  25   26   27   29
  35   37   38   39
```

Give each missing number to a volunteer and ask the volunteers to put their cards in the correct places. Then remove different cards and repeat (shuffle the cards first!). Change the part of the hundreds chart shown on the board and repeat. If students are engaged, you could show pieces that have different shapes, such as L-shapes, crosses, or X-shapes. Leave more numbers out each time. Finally, have students write the missing numbers without looking at the cards. Eventually, you should have no more cards on the board—only the numbers written by students.
Tens and Ones Blocks

Goals
Students will use tens and ones blocks to represent numbers and to find numbers on a hundreds chart.

PRIOR KNOWLEDGE REQUIRED
- can count to 20 using a hundreds chart

MATERIALS
- a hundreds chart with ones and tens blocks for whole class teaching
- lots of ones and tens blocks for students
- BLM Hundreds Chart (p M-14)—at least 1 copy per student
- BLM Hundreds Chart—Five Rows (p M-15)
- BLM Base Ten Materials (p M-16)
- BLM Tens Digits (p H-107)
- BLM Game Cards (p M-10)

Counting past 20 using a hundreds chart. Review the reading pattern and counting to 20 using the first two rows of a hundreds chart. Then give each student at least 30 ones blocks and BLM Hundreds Chart. Ask students to count their blocks using the chart. ASK: How many blocks did you count? How many full rows did your blocks cover? How many blocks did you have in the last row? Record these answers on the board. (EXAMPLE: 35 blocks, 3 full rows and 5 more blocks) Have students predict how many full rows and how many more blocks they would need to make other two-digit numbers in the first four rows of a hundreds chart. Verify their predictions as a class on an enlarged hundreds chart.

Tens blocks. ASK: How many full rows and how many more blocks would we need to show 74? Record the students’ prediction. To verify the prediction, begin placing ones blocks in order on the hundreds chart. After you finish a few rows, SAY: I’m tired of placing so many blocks one at a time. ASK: What could I use instead of ten blocks to fill a row? (a tens block) Show students a tens block. Count again the individual ones blocks that are visible within a tens block to verify that there are ten. Then cover one full row with the tens block and ASK: Do we need to cover another full row or is 74 in the next row? Repeat until 74 is in the next row. Then ASK: How many ones blocks do we need to cover in this row? How many full rows did we cover? Record this on the board: 74 is 7 full rows and 4 more blocks. Repeat with various numbers, using tens blocks for full rows.

Finding numbers in a hundreds chart. Explain to students that using tens and ones blocks is another way to find specific numbers in a hundreds chart.

NOTE: You could use 1-cm connecting cubes if you don’t have enough ones blocks.

NOTE: Join ten connecting cubes to make tens blocks if you don’t have enough.
chart. **ASK:** How many full rows do I have to fill before I get to 63? (6) Where is 63 in the next row? (it’s the third one) Count 6 rows using tens blocks and then count 3 in the next row using ones blocks to demonstrate finding 63. Repeat with various numbers, then have students find numbers on their own hundreds chart. Write on the board: 32 = ____ tens blocks and ____ ones blocks. Have a volunteer solve this problem using tens and ones blocks on an enlarged hundreds chart. Repeat with similar examples.

**PROBLEM SOLVING**

Reflecting on other ways to solve a problem.

Compare two methods of finding numbers on a hundreds chart. Review finding a number in the first row and then moving down the rows. For example, to find 32, they can look for 2 in the first row (because 2 is the second digit) and then move down until they find 32. Another solution is to move down the number of full rows you would fill (3, the first digit) and then count the number of squares in the next row (2, the second digit). Point out to students that they are doing the same two steps but in a different order. (across then down or down then across)

**PROBLEM SOLVING**

Representing

Show numbers using tens and ones blocks only. Explain to students that you can use the blocks without the hundreds chart to represent a number. Show students a set of 3 tens blocks and 7 ones blocks. Draw a T-chart on the board and label the columns “tens” and “ones.” **ASK:** How many tens blocks do I have? (write 3 in the tens column) Repeat with ones blocks. **ASK:** If we placed the blocks on the hundreds chart, what number would we get? (37) Check by counting the cubes, including the 10 in each tens block. Then place the blocks on the hundreds chart and emphasize that 37 is the last square covered. Repeat with various numbers, this time having students fill in the chart and write the number. Finally, have students show various numbers using tens and ones blocks only. Do not give students more than 9 ones blocks so that they use the fewest blocks possible.

**Tens digits and ones digits.** Write on the board: 17. **ASK:** Which digit tells me the number of tens blocks I need to make 17—the 1 or the 7? (the 1) Repeat with ones blocks. Explain that the 1 is called the tens digit and the 7 is called the ones digit. Ask students to identify the tens digit and the ones digit in various numbers. Then give students lists of numbers and ask them to circle the two with the same tens digit. **EXAMPLES:** 23 34 35; 74 89 84. **Bonus:** 51 12 35 48 50 84 25.

**EXTRA PRACTICE**

BLM Tens Digits

**ACTIVITIES 1–2**

1. Assign each student a number to 49 and give them a copy of BLM Hundreds Chart—Five Rows and BLM Base Ten Materials. Students make their number on the hundreds chart by cutting and gluing the correct number of blocks onto the chart.

2. **I Have —, Who Has —?** Use BLM Game Cards to make cards with numerals and base ten models. **SAMPLE:** 38 on the top, 2 tens blocks and 5 ones blocks on the bottom (I have 38, who has 257).
**Goals**

Students will compare and order numbers to 50.

**PRiOR KNOWLEDGE REQ uiRED**

can count to 20 using a hundreds chart
knows how to use the reading pattern
can find numbers in a hundreds chart

**MATERIALS**

BLM Which Number is Bigger? (p H-108)
BLM The Largest Number (p H-109)
BLM A Larger Hundreds Chart (p M-13)

**Use grids to compare two numbers.** Draw on the board two grids of 5 rows and 10 columns. Write two numbers to compare, such as 25 and 31. Demonstrate colouring 25 squares in the first grid—because there are 10 squares in each row, you can colour two full rows and then five squares in the next row. Emphasize the use of the reading pattern. Then have a volunteer colour 31 squares in the second grid. **ASK:** Which number covers more of the grid? Which number is larger? (31 is larger because it covers more of the grid) Repeat with various pairs of numbers. **EXAMPLES:** 43 and 32; 46 and 37; 20 and 25; 38 and 40; 45 and 42; 23 and 32; 41 and 14.

Asks students to use grids to compare two numbers by colouring to show the first number and then placing tens and ones blocks directly on the grid to show the second number. Are any coloured squares still visible? Which number covers more of the same grid?

**Use tens and ones blocks to compare two numbers.** Write two numbers on the board, say 36 and 43. Ask students to predict which number is bigger. Have a volunteer draw the base ten representation for that number on the board. Then have another volunteer try to make the other number by colouring the picture on the board. For example, if students predict that 43 is bigger, they will colour 3 tens block and 6 ones blocks:
If students predict that 36 is bigger, they will not be able to colour 4 tens blocks and then 3 ones blocks—they won’t have enough! Repeat this exercise with various numbers. Then have students answer similar questions individually, by drawing with tens and ones blocks the number they think is bigger (between two numbers you give them) and then trying to colour in the other number.

**Ordering numbers to 50 using a number line.** Draw a number line from 0 to 50 and challenge students to find these numbers: 38, 12, 25. Then **ASK:** Which is the smallest number? How do you know? Which is the largest number? Discuss how ordering numbers using a number line is harder or easier than using blocks (It is harder to find the numbers in the first place, but once we do, it is easier to compare many numbers). Repeat with more groups of three numbers: 28, 24, 31; 41; 39, 40; 48; 29, 36.

**Bonus**

42, 14, 24, 32, 23.

**Ordering numbers to 50 using a hundreds chart.** Review finding numbers on a hundreds chart using the reading pattern. Students can then compare many numbers at a time by first finding each number on a hundreds chart and then writing the numbers in order using the reading pattern. Give each student a copy of **BLM A Larger Hundreds Chart.** Have students place tokens on the numbers and then write them in order on a separate sheet of paper.

**Examples:**

34, 21, 26, 19, 7, 45; 21, 12, 33, 9, 41, 14, 50; 31, 62, 77, 80, 43, 52.

**ACTIVITIES 1–3**

1. **Go to page —.** Have students open their **JUMP Math** workbooks to page 1. Then have them turn and point to page numbers in the following order: 24, 29, 26, 21, 28, 20, 25, 27, 30, 34, 31, 38, 36, 39, 35, 37, 41, 48, 46, 45, 49, 42, 47, 44.

2. **Message booklet.** Make booklets with 50 pages. Each page has a word or letter and a page number. Give students various messages to find. The same book can be used for several different short messages, as long as the instructions “Go to page —” are given orally instead of written on each page.

3. **Have students stack as many ones blocks as they can in a given time interval.** Then **ASK:** Did you stack more than 10 or less than 10? How can you tell? (compare the stack to a tens block) More than 20 or less than 20? (compare the stack to two tens blocks) How many tens blocks do you need to equal your stack? Have students determine how many ones blocks they stacked by counting the number of tens blocks and then the number of extra ones blocks. Repeat several times.
Addition Word Problems

Goals
Students will solve word problems involving addition by drawing a model.

PRIOR KNOWLEDGE REQUIRED
- can add
- can read number words to twenty
- can write numerals

MATERIALS
- counters
- BLM Addition Practice (pp H-110–H-112)
- dice

Review using pictures to add. Draw a vase with 4 flowers and a hand holding 3 flowers. Write the words “four flowers” and “three more flowers” above the pictures. Have a volunteer write the numbers above the number words. **ASK:** How many flowers are there altogether? Count together as a class. Have a volunteer write the addition sentence: 4 + 3 = 7.

Gradually simplify the pictures. Solve more such partial word problems using simpler pictures: draw only flowers with stems (no vase or hands).

**EXAMPLE:** four flowers / six more flowers / How many altogether? More examples (use flowers and words): 3 + 5, 4 + 9, 5 + 5, 7 + 8.

**Bonus** (use three terms): 3 + 5 + 4; 2 + 7 + 4; 6 + 5 + 6.

**ASK:** Which picture do you think is easier to draw—the picture with the vase or the picture with just the stems? Was the addition harder to do without the vase in the picture? Explain that when drawing less doesn’t make it harder to solve the problem, students might as well use the picture that’s easier to draw. Then draw two groups of flowers without stems, one with 5 flowers all in a row and the other with 8 flowers all in a row. Have a volunteer write the addition sentence. Explain that you drew even less this time (flowers only, no stems). **ASK:** Could you still tell they were flowers? Did it make the addition any harder to do? Did it make the drawing easier to do? Emphasize again that if they can draw less without making the problem harder to solve, students might as well use simpler pictures. Then have students individually solve many word problems of the same form by drawing only flowers.

**EXAMPLES:** 5 flowers, 4 more flowers (5 + 4); 4 + 6; 5 + 7; 6 + 6.

**Bonus** 7 + 3 + 2; 4 + 5 + 6.

**Draw only circles.** Tell students that you’re tired of drawing, so instead of drawing flowers you are just going to draw circles. Draw on the board:

```
○ ○ ○ ○ ○ ○ ○ ○ ○ ○
5 flowers 2 more flowers
```
Have a volunteer write the addition sentence \((5 + 2 = 7)\). **ASK:** Is it easier to draw circles or flowers? Do you find it harder to count the circles than to count pictures of flowers? Do you find it harder to think of the circles as flowers? Suggest that students think of representing the flowers with counters—by drawing circles, they are drawing counters. Demonstrate this by counting out 5 counters to represent the group of 5 flowers and counting out 2 counters to represent the group of 2 flowers.

Give students counters and ask them to solve more such problems by drawing only circles. **EXAMPLE:** 4 flowers, 7 more flowers \((4 + 7)\).

**Bonus** 4 + 4 + 4; 5 + 5 + 5; 6 + 7 + 3.

**Solve word problems.** Write this word problem on the board (leave room above and next to each sentence):

Four flies were buzzing. Five more joined them. How many flies in total?

Have one volunteer write the numbers above the number words and another volunteer draw the correct number of circles underneath the first two sentences. Then have a third volunteer count the total number of circles and write the addition sentence. Repeat with more such addition word problems, using different words to describe the sum (how many in total, how many altogether, how many now). **EXAMPLE:** Tom has five marbles. Ray has two marbles. How many marbles altogether?

**Bonus** There are eight red marbles. There are four blue marbles. There are three green marbles. How many marbles in total?

**Act out word problems.** Invite volunteers to act out a word problem. **EXAMPLE:** Three flies were buzzing. (3 students start buzzing) Four more joined them. (4 students start buzzing) How many are buzzing altogether? (Ask the rest of the class to count and have a volunteer write the number sentence on the board.) Repeat with more addition problems. Use activities students can act out. **EXAMPLES:** eating, jumping, walking, sleeping.

**ACTIVITIES 1–2**

1. Students create word problems using the numbers they roll on two dice. Encourage students to illustrate their problems and to say them aloud or act them out.

   **Bonus** Use three dice.

2. **Electrical Matching Game.** (see NS Part 2—Introduction) Match word problems to the number sentence that solves it.
Goal
Students will solve word problems involving subtraction by drawing a model.

Prior Knowledge Required
- can subtract
- can read number words to twenty
- can write numerals
- understands one-to-one correspondence

Materials
- BLM Reading Subtraction Sentences (p H-113)
  - counters
  - dice
  - sheets of legal paper
- BLM Subtraction Practice (pp H-114–H-116)

Review. Remind students of all the different ways to write subtraction sentences, i.e., with the answer on the left, right, or bottom. Write some subtraction sentences on the board. Have students write in their notebooks the number of objects that were taken away. Repeat for the number of objects that were there at first and finally the number of objects that are left.

The word “left” means… Write this word problem on the board:
Five children were at the park. Two of them left. How many are left?

Discuss the different meanings of the word left in each sentence. Then draw a picture to illustrate the problem on the board and have a volunteer write the subtraction sentence.

Subtraction word problems. Start with point form subtraction problems which students solve by drawing simple pictures, such as stick people (see worksheet). Example: nine children, four went away.

Then provide full sentence word problems. Example: Nine children are at the park. Six left. How many are still at the park? Include word problems that involve 0, either as the amount taken away or the amount left, e.g., “0 children left” or “nobody left” or “There was none left”. Make sure all students understand that nobody or none means 0.

Now vary the situations and events in the word problems. Examples: John has seven crayons. Four of them are red. How many are not red? John has seven marbles. Four of them are red. How many are not red?

Students could use counters to model these problems and then record their model (draw circles, cross out the number taken away). Draw a picture to illustrate the relationship between crossing out the crayons that are taken away and crossing out the marbles that are not red. In both cases, you are
counting the objects that are not crossed out to find the answer. Discuss other ways to model the taking away, such as circling and drawing an arrow (see worksheets) or colouring. Finally, have volunteers act out subtraction problems. See examples in margin.

**How many more/longer?** Start by having students determine whether there are more boys or girls in the class, and how many more, by pairing themselves up. Then write this problem on the board:

There are nine apples. There are seven grapes. How many more apples are there than grapes?

Emphasize that the question is not asking how many apples or how many grapes there are, but how many more apples than grapes. Draw nine circles for apples and seven circles for grapes underneath. Pair up apples with grapes. **ASK:** How many apples are paired up with a grape? How many apples are not paired up? Explain that the apples not paired up are the extras, so there are 2 more apples than grapes.

\[
\begin{array}{c}
\text{Apples} \\
\text{Grapes}
\end{array}
\]

\[
\begin{array}{c}
\circ \circ \circ \\
\circ \circ \circ \circ
\end{array}
\]

\[9 - 7 = 2\]

Write on the board: Rosa’s pencil is 6 connecting cubes long and Tom’s pencil is 4 connecting cubes long. How many more connecting cubes long is Rosa’s pencil than Tom’s? Rephrase the question: How many connecting cubes longer is Rosa’s pencil than Tom’s? Underline the words “more” and “than” and “longer” and “than.” Emphasize that both questions are asking “how much longer” but in different ways. Draw a picture on the board to illustrate the problem. Repeat for similar problems but have volunteers draw the pictures.

**Identify incorrect subtraction.** Write on the board:

\[
\begin{array}{cccc}
2 - 5 = 3 & 5 - 2 = 3 & 2 - 7 = 5 & 7 - 5 = 2 \\
7 - 2 = 5 & 5 - 2 = 7
\end{array}
\]

**ASK:** Which subtraction sentences don’t make sense? Can you take away 5 things if you only have 2? If you start with 5 things and you take some away, can you end up with 7? Repeat with examples where the answer is on the left or on the bottom and stress the same points.

**EXTRA PRACTICE**

**BLM Subtraction Practice**

**ACTIVITIES 1–2**

1. Students create subtraction word problems using the numbers they roll on two dice. Encourage students to illustrate their problems and to say them aloud or act them out.

2. Give each student each half a sheet of legal paper (cut lengthwise) folded or divided in thirds. Students write and illustrate subtraction stories: one part of the problem goes in each section (e.g., 7 birds sat in a tree. / 3 flew away. / How many are left?)
Adding or Subtracting
Pages 25–27

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m6, 1m7, 1m25
WNCP: 1N9, [R, V, C]

VOCABULARY
how many     and
joined        altogether
in total      more
take away     are left
not           left/went away
still         more/longer...
than

ASSOCIATE VOCABULARY WITH ADDITION OR SUBTRACTION. Look at the vocabulary you used and read in word problems in the last two lessons. Which words and phrases make students think more of addition and which make them think more of subtraction? Ask students to discuss with a partner, then debrief as a whole group. Tell students that they are going to sort the words into two groups, addition words and subtraction words. Create a T-chart with the headers + and −. Take each word or phrase, one at a time, and have students tell you if they think it belongs in the + column or the − column. They might make a plus or minus sign with their hands to show their answer. Place the cards where the majority thinks they belong.

Use vocabulary in context. Have students use the vocabulary in word problems, according to how they were sorted. Students can share their problems orally. EXAMPLE: “Joined” was placed in the + column; a corresponding word problem could be “Four of us were playing on the monkey bars but three more joined us: 4 + 3 = 7.” You could also use as examples the problems on the worksheets for the last two lessons. Re-sort the words if necessary as students give examples.

NOTE: The word more can indicate both addition and subtraction. (How many more are there? How many more... than...? Four more joined.) If a student gives a word problem in which more denotes addition, prompt for one that uses it to denote subtraction, and vice versa. Put the word in both columns. Do the same with other vocabulary as necessary.

ACTIVITIES 1–2
1. Students can draw picture stories to match given addition or subtraction sentences in their journals or on separate sheets of paper.
Add or subtract? Write these word problems on the board and have students circle the correct way to find the answer:

John had seven candies. He ate three of them. How many are left? 7 + 3 7 − 3

John has five red candies and four yellow candies. How many candies altogether? 5 + 4 5 − 4

John has five red candies and four yellow candies. How many more red than yellow? 5 + 4 5 − 4

John had seven candies. He gave five of them away. How many does he have left? 7 + 5 7 − 5

Match word problems to number sentences. Write three number sentences on the left and three word problems on the right. As a class, read the word problems together and match them to the appropriate number sentences. Begin with problems that use different numbers. EXAMPLE:

Match 5 – 3 = 2, 5 + 1 = 6, and 6 + 3 = 9 to:

- Five dogs were playing in the park. One other came to join them. How many dogs in total?
- Peter’s brother has six toy cars. Peter has three toy cars. How many toy cars do they have altogether?
- Five cats sat on the windowsill. Three are black. How many are not black?

Gradually work up to problems that use the same three numbers. EXAMPLE: Match 5 + 2 = 7, 7 − 2 = 5, and 7 − 5 = 2 to:

- A full week has seven days. Two days are not school days. How many days are school days?
- Gillian had seven cookies. She gave five to her friends. How many cookies does she have left?
- Stuart read five pages yesterday. Today he read two pages. How many pages did he read altogether?

Extension

On BLM The Score (p H-119), students will have to determine when to add and when to subtract to find the scores.
Adding Using a Chart

NS1-34

Pages 28–31

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m6, 1m25, 1m26
WNCP: 1N9, [R, V]

VOCABULARY
reading pattern
left
right
top
bottom

Goals
Students will add using cubes and then a chart.

PRIOR KNOWLEDGE REQUIRED
- can add
- can read a hundreds chart
- can count using a hundreds chart and otherwise

MATERIALS
- 1-cm connecting cubes in two colours and BLM Hundreds Chart
  (p M-14) [or BLM Hundreds Chart—Five Rows (p M-15) and BLM Base Ten Materials (p M-16)]
- paper ones and tens blocks (in two colours) to use on a large hundreds chart
- BLM Hundreds Chart—Three Rows (p M-17)
- BLM Hundreds Chart—One Row (p M-12)
- BLM Add Larger Numbers (p H-120)

Add using blocks. Give each student several red and blue 1-cm connecting cubes. Ask them to find 3 red blocks and 4 blue blocks. Ask: How many blocks is that altogether? Write on the board: 3 + 4 = 7. Repeat with various numbers and have volunteers write the addition sentences on the board.

Add using a chart and blocks. Draw the first two rows of a hundreds chart on the board (or use a large hundreds chart if available). Demonstrate how to find 3 + 4 by placing 3 red paper ones blocks and then 4 blue paper ones blocks on the chart in order, so that the last block is on square 7. Count as a class how many ones blocks there are altogether. Do several examples like this, until someone notices that the last number with a block is always the number of blocks. As a class, check the prediction on several examples. Ask students how putting the pieces on, in order, makes it easier to tell how many there are. Demonstrate putting 3 red and then 4 blue blocks on the chart randomly, and then count them. Then put them on in order and count again. Emphasize that when the blocks go on in order, the chart does the counting for you—the answer is under the last block.

Have students find 4 + 5 on their own hundreds charts (see BLM Hundreds Chart). Repeat using pairs of one-digit numbers that add to more than 10.

Use colouring and circling instead of blocks. Draw the first row of a hundreds chart on the board. Tell students that you want to add 3 + 5. Have a volunteer do so using the red and blue paper ones blocks. Then
tell students that, instead of putting the 3 red paper blocks on, you are just
going to shade the first 3 squares. (Remove the paper blocks and shade the
squares.) Instead of putting the blue paper blocks on, you are just going
to circle the next 5 numbers. (Remove the paper blocks and circle the next
5 squares.) Now we see that 3 + 5 = 8 since 8 is the last square circled.

Practise. Draw the first two rows of a hundreds chart on the board. Add
several pairs of one-digit numbers whose sum is more than 10. Invite
volunteers to come to the board and shade the first number of squares and
then circle the second number of squares, then have students do problems
individually using BLM Hundreds Chart—Three Rows. Some students may
need to do the two steps (shade the first number of squares and then circle
the second number of squares) separately.

Bonus 2 + 7 + 6; 4 + 4 + 4; 6 + 5 + 6.

Compare the two methods. Ask how the colouring and circling method
is different from the first method of adding on the hundreds chart. How is
it the same? (Similarities: you are still adding in order; you only have to
count the 3 and the 5, not the 8 at the end. Differences: the first method
requires blocks or squares, the second you can do on a sheet of paper.)

Shade only the square showing the first number. Draw the first row of
a hundreds chart on the board. Tell students that you want to add 4 + 3,
but instead of colouring in the first four squares you’re just going to colour
the fourth one. Count to the fourth square and ASK: What number is in it?
How can I tell what the fourth square is without counting? (It has a 4 in it.)
Emphasize that once you’ve coloured the fourth square, you know where
to start circling. Have volunteers colour the square showing the first number
and then circle the second number of squares to add: 4 + 5; 7 + 2; 2 + 6.
Some students may need to practise doing each step separately.

Add a second row to the hundreds chart on the board and have volunteers
solve 3 + 8 and 5 + 9. Then distribute another copy of BLM Hundreds
Chart—Three Rows and have students solve: 7 + 6; 8 + 4; 9 + 5.

Bonus 8 + 14; 5 + 8 + 12; 7 + 14 + 6.

ACTIVITY 1

Adding Machine. (See NS Part 2—Introduction)

Extensions

1. BLMs Add Larger Numbers (p H-120) and Adding to the Number 10 (p H-121)

2. BLM Adding and Order (p H-122) has the same questions as Workbook
p. 31 but students shade the square showing the second number and then
circle the first number of squares to add. Students can then compare their
answers to their worksheet answers.
Goals
Students will add 1 or 2 by counting on.

PRIOR KNOWLEDGE REQUIRED
- can count to 20, orally and in writing
- can order numbers to 20
- can add
- knows that “next” means “right after”

MATERIALS
BLM Next (p H-123)

NOTE: In NS1-10, students learned to determine how many more objects are in a group by counting on. In this lesson, students begin making the connection between counting on and adding. Students who need to review or practice counting what comes next in a linear model can complete BLM Next.

Adding 1 by finding the next number. Draw three circles on the board. Count the circles one at a time and write the numbers above the circles as you count:

1 2 3

Then add one more circle and ASK: Now how many circles are there? Erase the numbers above the circles and count again, rewriting 1, 2, and 3 and adding 4 above the last circle. Repeat for several examples. Then do another example, but instead of erasing the original counting, explain that you might as well leave it there and just write the next number above the new circle.

Draw 5 circles on the board and count them, writing the numbers above the circles as you go:

1 2 3 4 5

Then add another circle and ASK: What is the next number after 5? Have a volunteer write it over the last circle:

1 2 3 4 5 6

Write the corresponding addition sentence (5 + 1 = 6).

Repeat with several examples where students add one to a number. Emphasize that the answer is just the next number you say when counting.
Write on the board the sequence of numbers from 0 to 10. Emphasize that the numbers are written in order and have students add 1 to more one-digit numbers by referring to the numbers only (without drawing pictures).

**EXAMPLES:**

\[
4 + 1 \quad 8 + 1 \quad 5 + 1 \quad 6 + 1 \quad 0 + 1 \quad 2 + 1
\]

Have students do similar problems individually in their notebooks. You can repeat any of the problems done previously, but erase the answers from the board first. **EXAMPLES:**

\[
3 + 1; \quad 1 + 1; \quad 9 + 1; \quad 7 + 1.
\]

**Bonus**

Continue the sequence of numbers on the board to 20 and have students add:

\[
15 + 1; \quad 18 + 1; \quad 12 + 1; \quad 10 + 1; \quad 17 + 1.
\]

Count the number of boys in the class together. Tell students to pretend that there will be a new boy in the class. **ASK:** Then how many boys would there be in the class? Repeat for girls. (Begin with the gender having the fewest students.)

**Adding 2 by finding the next two numbers.** Draw the following picture on the board:

\[
\begin{array}{cccc}
1 & 2 & 3 \\
\cdot & \cdot & \cdot & \cdot & \cdot & \cdot \\
\end{array}
\]

Repeat the lesson for adding 1 with adding 2, to guide students to discover that we can add 2 by finding the next two numbers. **ASK:** What are the next two numbers after 3? What is 3 + 2? Repeat with different examples until all students are comfortable saying the next two numbers to add 2. Then write the sequence of numbers from 0 to 10 and have volunteers find:

\[
4 + 2 \quad 8 + 2 \quad 5 + 2 \quad 6 + 2 \quad 0 + 2 \quad 2 + 2
\]

Have students do similar problems individually in their notebooks. **EXAMPLES:**

\[
3 + 2; \quad 7 + 2; \quad 1 + 2; \quad 9 + 2.
\]

**Bonus**

Continue the sequence of numbers to 20 and have students add:

\[
13 + 2; \quad 16 + 2; \quad 11 + 2; \quad 18 + 2.
\]

**Two Too Many** by Jo Ellen Bogart. After reading each page, **ASK:** How many [wheels does a tricycle have]? **SAY:** We have two too many. How many should that be? Check the answer in the picture. Some of the objects pictured may be unfamiliar, so have additional reference pictures on hand. For example, if students do not know how many antlers a moose has, show pictures of moose.

**One Monkey Too Many** by Jackie French Koller. Adding by 1, from 1 to 7. Students can predict what one more is each time and then count the monkeys in the picture to verify their answers.
Adding by saying the next numbers. Start by adding 5. Draw the following picture on the board:

```
1   2   3
○  ○  ○  ○  ○  ○  ○  ○
```

Tell students that the first 3 circles are already counted and ask a volunteer to say the next 5 numbers to add 3 + 5. Emphasize that 5 is a lot of numbers to keep track of, and ensure that the problem is posed as a challenge. (Students need to count on from 3 aloud while simultaneously keeping track of how many numbers they say.) Check the volunteer’s answer by writing the next 5 numbers above each of the white circles. If the answer is incorrect, ask another volunteer to add 5 to a number using this method, and repeat until someone is successful. If the volunteer was correct, have another volunteer add 4 + 7 using the same method. SAY: Seven is a lot of numbers to keep track of. Who thinks they can keep track of 7 numbers to find 4 + 7? Repeat with other volunteers, all adding 7 to a number. Discuss any strategies you observe volunteers using (Students might, for example, write a mark for each number they say, use their fingers to keep track, or add the numbers one at a time: 5 is 4 + 1, 6 is 4 + 2, and so on until 11 is 4 + 7.)

Review counting on your fingers. Have students count to 10 on their fingers, starting with the thumb of their left hand. Then ask students to tell you how many fingers you are holding up. Hold up several fingers as though you counted this way and ask students what number you counted to.

Using your fingers to keep track. Tell students that you would like to add 6 + 8, but 8 numbers is a lot to keep track of, so you will use your fingers to help you. Explain that you will hold up one finger for every number you say after 6. ASK: What is the first number that comes after 6? (hold up your
thumb when they say 7) And the next number? (hold up your thumb and
forefinger when they say 8) Continue in this way. After they say 10, ASK:
How many numbers have I said after 6 so far? (4) How do you know? (you’re
holding up 4 fingers) Have students tell you when you have said 8 numbers
after 6. ASK: How do you know we said 8 numbers? (You are holding up
8 fingers—1 for each number you said after 6.) ASK: What was the last
number I said? (14) Write on the board: 6 + 8 = 14. Draw 6 coloured circles
and 8 uncoloured circles in a row. Write 6 above the last coloured circle and
then write the next 8 numbers above each of the uncoloured circles. Count
to verify that there are 8 numbers after the 6. Then write similar problems on
the board for students to solve individually using their fingers. (EXAMPLES:
4 + 5, 8 + 7, 8 + 5, 5 + 8)

**ACTIVITY 1**

Catch (see NS Part 2—Introduction). The first student you throw to
adds 1, the second adds 2, the third adds 3, and so on to 10. Repeat.

**Bonus** 14 + 7, 13 + 6, 11 + 8, 14 + 6.

For students comfortable counting past 20, use larger sums. EXAMPLES:
15 + 8, 14 + 9, 21 + 6, 34 + 8. Students can verify their answers by using
counters or models they draw.

Correcting mistakes. Model incorrect ways of counting on, such as
counting more quickly or more slowly than you hold up fingers (e.g., hold
up 2 fingers while adding 3 or vice versa), skipping or repeating numbers,
saying some numbers in the wrong order. Challenge your students to tell
you what you are doing wrong each time. Then ask volunteers to add by
counting on: 7 + 3, 6 + 5, 8 + 3, 9 + 6, 7 + 7, 10 + 5.

Counting objects when some are hidden. Have ready a pencil case with
5 pencils in it. Tell students that you have 5 pencils in your pencil case
(hold it up). Then show students 4 pencils outside the pencil case. How
many pencils do you have altogether? Count on as a class to add: Hold up
the pencil case and say 5, then hold up each pencil outside the case and
say, one at a time, 6, 7, 8, 9. Write on the board: 5 + 4 = 9. Verify this by
removing the 5 pencils from the case and counting all the pencils together.
Repeat with various examples. Emphasize that as long as we know how
many pencils are in the pencil case we don’t have to count them; we can
add by counting on.

Compare adding by counting on to adding with a hundreds chart. For
example, to add 5 + 3, colouring only square 5 is similar to saying 5 with
your fist closed and circling the next 3 is similar to saying 6, 7, 8 while raising
three fingers, one at a time.

**Bonus** Students who finish the worksheets early can complete
BLM Apples.
Goals

Students will discover that adding by counting on is easier when you start from the larger number.

PRIOR KNOWLEDGE REQUIRED

can add by counting on
knows that numbers can be added in any order
\[(3 + 5 = 5 + 3)\]

MATERIALS

10 circles on a long sheet of paper (see below)
a paper domino (see below)

**Compare 8 + 2 and 2 + 8.** Have a volunteer solve 8 + 2, and then challenge another volunteer to solve 2 + 8. What do students notice about the answers? (they are the same) Why did that happen? (we added the same numbers in two ways) Draw the following on a long sheet of thick paper and stick it to the board:

![Diagram of 8 white circles and 2 dark circles]

Write 2 + 8 below the sheet and solve the problem by counting the white circles, starting at 3:

3 4 5 6 7 8 9 10

Then write the answer: 2 + 8 = 10.

Now turn the sheet around:

![Diagram of 8 dark circles starting at 9]

Write 8 + 2 and solve the problem by counting the dark circles starting at 9. **ASK:** How do I know to start at 9? (9 comes right after 8) How many numbers do I count after 8? (2) How do you know? (because there are 2 dark circles) Have a volunteer show the counting on the board. **ASK:** How does 8 + 2 compare to 2 + 8? Why did that happen? **PROMPT:** Did we change the total number of circles by turning the sheet around? (no) What did we change? (We only changed which number we counted first, the 2 or the 8.)

**Order doesn’t matter in addition—review with another model.** Repeat the above with a paper domino:
2 + 7 = 9 7 + 2 = 9

Demonstrate counting on from each number and emphasize what changes and what stays the same.

Choosing which number to count on from. Write on the board:

2 + 9 = _____ 9 + 2 = ______

ASK: Will these problems have the same answer? (yes) How do you know? (they are adding the same numbers) Which problem is easier to solve?

PROMPT: How would I solve 2 + 9? How many numbers would I count? What number would I start at? (count 9 numbers starting at 3) How would I solve 9 + 2? (count 2 numbers starting at 10) What is easier—to count 9 numbers starting at 3 or to count 2 numbers starting at 10? (Demonstrate doing both.) Which would be faster? (counting 2 numbers starting at 10) Emphasize that when mathematicians see two problems that they know have the same answer, they can be smart and pick the easier one to do.

Write many addition problems on the board. (EXAMPLES: 3 + 7; 8 + 4; 2 + 10; 1 + 9; 7 + 2; 5 + 1; 9 + 2; 8 + 3) Point to the first number in each problem and
ASK: Is this number the bigger number? Is it less work to add (for example) 3 + 7 or 7 + 3? Verify their prediction by trying both ways.

Challenge volunteers to add more numbers both ways and to decide which they find easier. EXAMPLE: 6 + 3 or 3 + 6? At first, give volunteers the numbers to count from and the number of blanks:

6 ____ _____
3 ____ _____ _____ _____

Then have volunteers do this themselves, and discuss how they know how many blanks to draw (start at the first number and draw the second number of blanks or vice versa). Have students do similar questions individually in their notebooks. EXAMPLES: 3 + 8 or 8 + 3; 9 + 1 or 1 + 9; 14 + 2 or 2 + 14.

Bonus → 23 + 4 or 4 + 23.

ASK: Which is easier—to count starting from the bigger number or the smaller number? Why do you think that is? (from the bigger number because there are fewer numbers to count)

ACTIVITY 1

Electrical Matching Game. Match addition sentences to their answers.
NS1-38
Using Number Lines to Add
Pages 39–43

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m5, 1m6, 1m7, 1m25
WNCP: 1N9, [R, CN, V, C]

VOCABULARY
number line

Goals
Students will use number lines to add.

PRIOR KNOWLEDGE REQUIRED
- can count to 10
- understands the concept of more

MATERIALS
BLM Blank Number Lines (pp M-18–M-19)
BLM Word Problems (p H-126)
BLM Addition Sentence Memory (pp H-127–H-129)
BLM Adding Cards (pp H-130–H-132)
dice

Adding 1 with a number line. Remind students that to find 3 + 1, they can find the number they say after three; it is the number that is one more than three. Draw a number line on the board and tell students that instead of counting on from 3 and saying the next number, they can draw a leap from 3 to the next number. Tell them to picture a frog jumping from 3 to the next number. Tell them to picture a frog jumping from 3 to the next number.

The frog ends up at the next number after three, or 3 + 1. You might have a picture of a frog that you can move. Repeat several times, adding one to other numbers. You could have volunteers move the frog each time. Review the connection with more: 3 + 1 is one more than 3 because you need one more leap to get from 3 to 3 + 1.

Adding 2 with a number line. Students can draw two leaps in order to add two. Demonstrate adding 3 + 2 on a number line and ask a volunteer to demonstrate 1 + 2. You can put a big dot at the 1 so that the volunteer knows where to start. Repeat, adding two to other numbers.

Knowing where to start on the number line. Draw a number line from 0 to 10 on the board and tell students that you want to add 5 + 4. ASK: What number should I put the big dot at to start? How is this like counting on to add? How many leaps should I draw starting at the 5? What part of counting on is this like? Emphasize that putting the big dot at 5 is like saying 5 with your fist closed and drawing 4 leaps is like saying the next four numbers after 5. Write the addition sentence below the number line.
Relate leaps to addition sentences. Point out that the leaps start and end at numbers that we see in the addition sentence—5 is where the leaps start and 9 is where they end. Join the numbers with lines:

\[ \begin{array}{c}
0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array} \]

\[ \begin{array}{c}
5 & 4 & \; 9 \\
\end{array} \]

Repeat with several examples and let volunteers join the numbers themselves, to emphasize that the first number you are adding is where the leaps start and the total is where they end. Then draw these number lines and have have students fill in the missing numbers in the addition sentences:

\[ \begin{array}{c}
0 & 1 & 2 & 3 & 4 & 5 & 6 \\
\end{array} \]

\[ \begin{array}{c}
\_\_\_ & + & 3 & = & \_\_\_ \\
\_\_\_ & + & 2 & = & \_\_\_ \\
\end{array} \]

Complete number lines and fill in blanks. Draw more number lines that show addition but leave out the second number in the addition sentence. Students should fill in the number of leaps. Then draw number lines and have volunteers write out the entire addition sentence. Finally, write addition problems and have students draw the leaps to model and solve them (use BLM Blank Number Lines).

**Activity**

- **Picking Pairs** and **Addition Memory** You will need **BLMs Addition Sentence Memory** and **Adding Cards**. Choose 12 cards from each BLM (be sure they match!). Play Memory as a class or in small groups. **VARIATION:** Include cards with numerals on them and allow the addition sentence to match either the number line or the answer.

**Extension**

- Provide **BLM Models of Counting On** (p H-133).
Subtracting 1 or 2

Pages 44–46

**Goals**

Students will subtract 1 or 2 by finding the previous 1 or 2 numbers and by drawing leaps on a number line.

**Prior Knowledge Required**

- can count to 10
- understands the concept of more

**Materials**

- a strip of paper with squares marked 1–20

**Review Subtraction.** Draw 7 squares on the board and cross out 3 of them. **Ask:** How many are left? Write on the board: $7 - 3 = 4$. Then draw 8 triangles on the board, in no particular order or arrangement, and cross out 5 of them. Have a volunteer write the subtraction sentence. Then write a subtraction sentence (say, $7 - 2 = 5$) and have each student draw a picture to show the subtraction. Finally, write many subtraction problems on the board and have students draw pictures in their notebook to solve them. **Examples:** $5 - 2; 6 - 4; 8 - 3; 9 - 2; 9 - 6; 8 - 7; 8 - 1; 6 - 1$. Discuss differences in students’ pictures. Emphasize that it doesn’t matter what objects students drew or how (e.g., close together on the page or spread out), as long as they had the right number.

**Draw Circles in a Row to Subtract.** Draw 7 circles in a row (explain that you find circles easiest to draw) and count them by writing the numbers above the circles. Cross out the fourth circle and then count the remaining (leftover) circles by writing the numbers underneath the circles:

```
1 2 3 4 5 6 7
1 2 3 4 5 6
```

Write the subtraction sentence: $7 - 1 = 6$.

**Taking Away the Last Circle(s) Makes It Easier to Count the Leftovers.**

Draw several rows of 7 circles on the board with a different circle crossed out in each row:

```
1 2 3 4 5 6 7
1 2 3 4 5 6 7
1 2 3 4 5 6 7
```

Have volunteers count the remaining circles by writing the numbers underneath. **Ask:** Did we get the same answer every time? (yes, there are always 6 circles left) Where are the numbers under the circles the same as the numbers above the circles? (before the crossed out circle) Why did that happen? How is counting the leftover circles easier when you take away the
last circle? (You just have to look at the numbers above the circles; you don’t even have to write the numbers underneath because they’ll be the same as the numbers above.)

Have students count how many circles are left over:

1 2 3 4 5 6 7 8

ASK: How did you count the leftover circles? Emphasize that when students take away one circle, they just have to move back one number to find the number of leftover circles:

1 2 3 4 5 6 7 8 1 2 3 4 5 6 1 2 3 4 5 6 7 8 9

Subtract 1 using a number line. Draw a number line from 0 to 8 and circles under the numbers from 1 to 8. Discuss how we can subtract 1 using the number line by drawing a leap going backwards from the 8. Emphasize that we don’t even need to draw the circles; we can just use the number line. If you have a large number line available, have students act this out.

Show students several number lines with a leap drawn backwards, and ask them to solve the subtraction problems. **EXAMPLES:**

5 − 1 = ______

3 − 1 = ______

6 − 1 = ______

Students can write the answer individually first and then volunteers can share their answers. Repeat the exercise without the corresponding number line pictures—just show students a blank number line to 10.

Subtract 2. Draw a row of circles and **ASK:** How could we subtract two from this row? Repeat the last part of the lesson using 2 leaps to subtract 2.
Goals
Students will subtract by drawing leaps on a number line.

PRIOR KNOWLEDGE REQUIRED
- can count to 10
- understands the concept of more

MATERIALS
- page 1 of BLM Blank Number Lines (p M-18)
- BLM Subtraction Sentence Memory (pp H-134–H-136)
- BLM Subtracting Cards (pp H-137–H-139)
- BLM Forwards or Backwards? (p H-140)
- BLM Add or Subtract with Number Lines (p H-141)

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**Draw circles in a row to subtract.** Repeat this part of the last lesson, but cross out more circles.

**Subtract on a number line.** Solve 6 − 2 using circles in a row and a number line, to reinforce the connection between crossing out circles and drawing leaps (see margin). Ask students to solve similar problems on number lines from 0 to 6. Start by giving them both circles and a number line and then only a number line. If a large number line is available, students can act out the problems.

**Where to start drawing the leaps.** Draw several blank number lines (0 to 6) and subtraction problems on the board. **EXAMPLES:** 5 − 3, 6 − 1, 4 − 2. For each one, **ASK:** Where should we start drawing the leaps for this problem? How do you know where to start? Which number in the subtraction sentence tells you where to start? **(PROMPT:** Which number tells how many circles there are at first? Emphasize the connection between how many circles there are at first and where to start counting back.) Have volunteers draw a big dot at the right number on each number line.

**Bonus** — Draw the dots for 8 − 4 and 7 − 5 on longer number lines (0 to 9).

**How many leaps to draw.** **ASK:** Which number in the subtraction sentence tells you how many leaps to draw? **PROMPT:** Which number tells you how many circles to take away? Emphasize that we draw a leap for every circle we take away. Every time you remove a circle, you move back one number. Use a picture to illustrate (see Figure 1 for an example). Have volunteers draw the leaps for more problems.
How to find the answer. **ASK:** Which number on the number line tells you how many circles are left? Use the picture in Figure 1 to illustrate the answer. Then have students individually write the answers to the problems on the board and take them up as a class.

**ACTIVITY 1**

Students form a human number line (from 1 to however many students are in the class). Make sure students know their number. Give the player with the highest number a ball. The player says a subtraction sentence starting with his/her number and students use the ball to count off “leaps” on the line and solve the problem. **(EXAMPLE:** Player 17 says 17 – 4. Player 17 throws to 16 and the class says 1, 16 throws to 15 and the class says 2, and so on. When the class says 4, the player with the ball says “17 – 4 is 13 [that player’s number].” Player 13 says a new subtraction sentence (starting with 13, e.g. 13 – 3) and play continues until the ball reaches 1.)

Choose between adding and subtracting. Tell students that you want to find 7 – 3. **ASK:** How can I use a number line? Take their answers and then draw a number line on the board. Invite a volunteer to put a big dot where you should start drawing leaps. Then **ASK:** How many leaps should I draw on the number line? Should I go forwards or backwards? How do you know? What symbol shows us that we should go backwards instead of forwards? Repeat with more subtraction and addition problems. Finally, have students solve problems like the following individually (they can use the blank number lines on **BLM Blank Number Lines**: 6 – 2; 6 + 2; 7 + 3; 7 – 3.

**ACTIVITIES 2–3**

2. Students form a human number line as in **Activity 1** above. Play as before but with the following goal instead: Starting with the middle player, try to make everyone get to hold the ball in as few turns as possible. This time, students choose between adding and subtracting. Students must stay within the limits. E.g if there are 17 players, player 15 can’t say 15 + 3.

3. **Subtraction Sentence Memory.** Play as in **NS1-38** with the cards on **BLMs Subtraction Sentence Memory** and **Subtracting Cards**.

**EXTRA PRACTICE**

**BLM Forwards or Backwards?** and **BLM Add or Subtract with Number Lines**

**BLM Add or Subtract with Number Lines** leaves blank the number of red and blue marbles. This should be filled in with a larger number for blue marbles than for red marbles. Either you or the students can fill this in. You might provide the numbers once and then allow them to provide numbers for an identical sheet.
NS1-41
Counting Back
Pages 57–58

CURRICULUM
EXPECTATIONS
Ontario: 1m1, 1m3, 1m5, 1m22
WNCP: 1N1, 1N8, [R, CN]

VOCABULARY
backwards

Goals
Students will count backwards from numbers up to 100.

PRIOR KNOWLEDGE
REQUIRED

<table>
<thead>
<tr>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>can read numbers and count forwards</td>
</tr>
<tr>
<td>can finding missing numbers in a list</td>
</tr>
<tr>
<td>understands conservation of number</td>
</tr>
<tr>
<td>understands the correspondence between</td>
</tr>
<tr>
<td>numbers and objects when counting</td>
</tr>
<tr>
<td>understands the concepts of more and less</td>
</tr>
</tbody>
</table>

At Home
Games, activities, and real-life connections for counting backwards.

Prior Knowledge Required
- can read numbers and count forwards
- can finding missing numbers in a list
- understands conservation of number
- understands the correspondence between numbers and objects when counting
- understands the concepts of more and less

Problem Solving
Connecting, changing into a known problem, reflecting on the reasonableness of an answer.

Counting back from 5 to 0. Write the numbers 0 to 5 in order on the board and tell students to say the numbers out loud together, but backwards. Point to each number as students say it: 5, 4, 3, 2, 1, 0. Then erase the number 2 (0 1 3 4 5) and ask students to count backwards from 5, remembering to say 2. Point to the numbers from right to left again, including the space where 2 should be. Repeat this several times with a different number missing. EXAMPLES: 0 1 3 5; 0 2 3 4 5; 1 2 3 4 5.

Repeat with more numbers missing, in this sequence, until students can count back from 5:

- 2 non-consecutive numbers missing (EXAMPLE: 0 1 3 5)
- 2 consecutive numbers missing (EXAMPLE: 0 1 4 5)
- 3 or more numbers missing (EXAMPLES: 0 2 5; 1 5; 3)

Always point to each number or space, starting from the right.

Counting back from 10 to 0. Repeat the sequence of exercises above for 0 to 7, then 0 to 9, and finally 0 to 10.

Counting back from 20 or any number less than 20. Repeat the sequence of exercises above to count back from higher numbers, starting with 13, then 15, then 18, and finally 20.

Make the connection between counting forwards and counting backwards. For example, if students are not sure if 8 comes after 9 when counting backwards, they can count forwards from 8 and check to see if 9 comes right after 8.

Counting backwards between any two given numbers from 0 to 100. Count forwards from 40 to 49 together, as a class, and then backwards from 49 to 40. Repeat for 70 to 79 and 79 to 70, 60 to 69 and 69 to 60, 90 to 99 and 99 to 90. Now have students count forwards from 38 to 42 and then...
Ask students when people count backwards. Examples may include traffic lights (the number of seconds before you have to finish crossing the street) or countdowns (space shuttle launch, New Year’s Eve, time left in a sporting event, time left on a microwave oven, and so on).

**ACTIVITIES 1–2**

1. "1 less than" Catch (see NS1 Part 2—Introduction). Use numbers 0–4, 0–9, 0–19, or 0–99 depending on how far your class has come with counting backwards.

2. Use number cards for 0 through 10. Shuffle and place the cards face down in two rows. Turn over a card. If the card is a 10, keep it. If not, turn it face down again and choose another card; continue until you get 10. Then repeat with 9, 8, 7, and so on until 0. The goal is to turn over all the cards in reverse order as soon as possible.

**Extension**

This extension will help students develop focus and memory. Challenge students to spell familiar 2- and 3-letter words backwards. **EXAMPLES:** of, to, in, is, he, on, at, bat, hat, lip, bit, pit, top, mop, the. If students are having trouble, ask them to spell the word as usual first and then backwards. Encourage students to refer to word walls or vocabulary lists posted in the room. When one person has correctly spelled a word backwards, you can ask other students to spell the same word backwards, to allow more students to participate.

**ONLINE GUIDE**

More literature connections, and an interactive website for counting back.
Counting Back to Subtract

Page 59

CURRICULUM EXPECTATIONS
Ontario: 1m2, 1m5, 1m6, 1m7, 1m22
WNCP: 1N1, 1N8, 1N10, [R, CN, V, C]

VOCABULARY
subtract
minus
take away

Goals
Students will subtract by counting back.

PRIOR KNOWLEDGE REQUIRED
understands subtraction as “take away”
knows the minus sign (−)
understands that 5 – 3 is always 2, not matter how you solve it
understands that quantity is the last number you say when counting
can identify the first and last items in a group or list
can identify leftovers
can count on using fingers

MATERIALS
BLM In the Bag (p H-142)
BLM Models of Counting Back (p H-143)

Subtracting 2 is like subtracting 1 twice. Remind students how they subtracted 1 on a number line (see NS1-39) by finding the number that comes before it. Explain that to subtract 2, you can draw circles and cross out 2 of them. But how do you cross out 2 circles? You cross out one circle and then another one. So when you subtract 2, you are really just subtracting 1 and then subtracting 1 again. Show this on the board by drawing 5 circles. Cross out 1, write 5 – 1, then cross out another one and write 5 – 1 – 1 = 5 – 2. If you want to find 5 – 2, you have to find the number that comes before 5 (to subtract 1) and then the number that comes before that (to subtract another 1). To subtract 2, we say the two numbers that come before.

ACTIVITY
“2 less than” Catch (see NS Part 2—Introduction). Emphasize that to find two less than a number, you need to find one less than the number and then one less than that.

Subtract any number by counting back. Write the numbers from 1 to 10 on the board for reference. Then write: 7 ___ ___ ___ 7 – 3 = ___

Guide students to fill in the blanks with the next 3 numbers they would say when counting back from 7 and the answer to the subtraction problem (which is the last number you say when counting back). Emphasize that in the subtraction problem, the first number (7) tells them what to subtract from and the second number (3) tells them how many numbers to say when counting back. Have students do more problems individually. (see examples
Then have students draw the correct number of blanks before solving the problem. Finally, have students decide both which number to start counting back from and how many blanks to draw.

**Does it matter which number you count back from?** Remind students that when adding 6 + 2, they can start at 6 and draw 2 blanks or they can start and 2 and draw 6 blanks: 6 7 8 or 2 3 4 5 6 7 8.

**ASK:** Does it matter which number you subtract from and how many blanks you draw for 6 – 2? Have students explain their answers. Then draw on the board: 6 5 4 or 2 1 0 ? ? ? ? Explain that we can’t count back 6 starting at 2 because there aren’t 6 numbers less than 2 (using the grade 1 definition of number). We have to start at the bigger number (6) and draw the smaller number of blanks (2).

**Subtracting by counting back on your fingers.** **SAY:** I am going to count back from 8 and I want you to tell me to stop when I have 2 fingers up. Then say “eight” with a closed fist, “seven” with 1 finger up, and “six” with 2 fingers up. If students don’t tell you to stop, ask how many fingers you are holding up. Tell them that since you are holding up 2 fingers, you can stop counting, so 8 – 2 = 6. Subtract more numbers from 8 this way. Repeat problems if necessary, until all students are actively identifying when you have enough fingers up.

Tell students that you want them to find 9 – 4. **ASK:** How many fingers will you be holding up when you get to the answer? Remind students to concentrate on both the numbers they say when counting back and the number of fingers they are holding up. Then ask a volunteer to count back from 9 to find 9 – 4. Repeat with several examples starting at 9. Ask how the volunteers knew to start at 9.

Finally, ask volunteers to subtract from different numbers (to 10). Then have students solve similar problems individually in their notebooks. (You can repeat examples done in class.)

**Correcting mistakes.** Model incorrect ways of counting back, such as counting more quickly or more slowly than you hold fingers up (**EXAMPLE:** hold up 2 fingers while subtracting 3 or vice versa), skipping or repeating numbers, saying some numbers in the wrong order, or counting forwards to start (**EXAMPLE:** 8 9 8 7 6 5 4 3). Challenge your students to tell you what you are doing wrong each time. Then ask volunteers to subtract by counting back: 7 – 3; 6 – 1; 8 – 3; 9 – 2; 7 – 4; 10 – 5.

**Extension**

Look for a pattern in the answers to these questions: 7 – 1, 8 – 2, 9 – 3, 10 – 4, 11 – 5, 12 – 6. **ASK:** Why did that happen? Find another subtraction problem that will have the same answer.
**Goals**

Students will add 5 to any number up to 5 and 10 to any number up to 10.

** PRIOR KNOWLEDGE REQUIRED**

- can count on to add
- can read numbers in a chart using the reading pattern
- knows ordinal numbers to 10th

**MATERIALS**

BLM 2-cm Grid Paper (p M-20) or BLM Ten-Frames (p M-21)

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Add 5 by moving down a row in a ten-frame. Draw the chart, shown in the margin, on the board. Have a volunteer circle the next 5 numbers after 3 using the reading pattern. Then point to each circled number and say, in turn, 3 + 1, 3 + 2, 3 + 3, 3 + 4, 3 + 5. Then **ASK:** What is 3 + 5? Draw another such chart, shade the 1, and ask a volunteer to find 1 + 5 by circling the next 5 numbers. Repeat with 4 + 5. Ask your students to look at the shaded number and the number they get by adding 5. Compare their locations in the chart. **ASK:** If you know where 2 is, how can you find 2 + 5? (look directly underneath the 2) Have a volunteer verify this by circling the next 5 numbers. Discuss why this happened. (There are 5 numbers in each row, so to add 5 you move down a row.)

Challenge students to make their own chart. Have students draw their own ten-frame using BLM 2-cm Grid Paper and fill it in with the numbers from 1 to 10. (If students are not comfortable drawing rectangles on grid paper, they can use BLM Ten-Frames.) Explain to students that they have created a machine for adding 5: students can move down a row to add 5 to any number from 1 through 5.

**Bonus** Add a row with numbers 11 to 15 to build a machine for adding 5 to any number from 1 through 10.

**Add without the first row.** Erase any charts on the board and draw the second row of a ten-frame (five squares numbered 6 through 10). Explain to students that they don’t need the first row because it’s easy to remember—the numbers in the first row are 1, 2, 3, 4, and 5, in that order. Since 6 is the first number in the second row, it is 1 + 5; since 9 is the fourth number in the second row, it is 4 + 5. **ASK:** What is 3 + 5? 1 + 5? 4 + 5? 2 + 5? 5 + 5?

Continue asking such questions in random order until all students can answer quickly. Ensure that each student has answered at least once.
Add without the chart. Challenge students to remember where each number is in the second row, then erase it entirely and repeat the same questions in random order.

Add 10 by moving down a row in a hundreds chart. Draw the first two rows of a hundreds chart on the board and shade the 7th square. Have a volunteer circle the next 10 numbers to find 7 + 10. Draw new charts (or prepare them ahead of time) and repeat for 10 + 10, 3 + 10, and 6 + 10. Then challenge students to find 5 + 10 from 5. Check their prediction as a class. As before, erase the first row and repeat, then erase the second row and add without a chart. (How do you remember the numbers in the second row this time? The first digit is always 1 and the second digit is the same as the numbers in the first row, e.g., the 8th number in the second row is 18.)

Extra Practice
Teach students to use their fingers to add 5. For example, to find 5 + 3, hold up 5 on one hand and 3 on the other hand.

Online Guide
Students can add 10 a different way on BLM Adding 10.

Problem Solving
Changing into a known problem.

Problem Solving
Looking for a similar problem for ideas, making a table/chart.

Problem Solving
Looking for a pattern.

1. Teach students to add 5 to 6, 7, 8, 9, or 10. Draw a chart with 3 rows of 5, numbered 1 through 15. Have students add 5 to different numbers by moving down a row. Start with the first row, then erase it and repeat with other rows, as in the lesson.

2. Draw a chart with 4 rows of 5, numbered 1 through 20. Challenge students to use this chart as a machine for adding 10. ANSWER: Move down 2 rows.

3. ASK: How did we make the machine for adding 5? For adding 10? How could I make a machine for adding 6? (make a chart with 6 numbers in each row) Demonstrate doing this:

Have a volunteer circle the next 6 numbers to check that, indeed, 3 + 6 can be obtained by moving down a row. Repeat for various numbers from 1 through 6. Challenge students to make a machine that will help them answer all of the following questions: 15 + 7; 23 + 7; 9 + 7; 14 + 7; 26 + 7; 4 + 7.

4. Compare hundreds charts to calendars. Show an example of each side by side. To move down a row in a hundreds chart you add 10 to the number. To move down a row in a calendar you add 7 to the number. (Both answers are due to the number of squares in each row.)
Goals
Students will find many combinations of numbers that add to 5 or 10.

PRIOR KNOWLEDGE REQUIRED
knows that we have 5 fingers on each hand and 10 fingers in total can complete addition problems when one addend is missing

MATERIALS
BLM Pairs Adding to 5 (p H-144)
BLM Five-Dot Dominoes (p H-145)
BLM Cubes (p M-22) to make dice (details below)
playing cards
BLM Pairs Adding to 10 (p H-146)
BLM Ten-Dot Dominoes (p H-147)

Use your fingers to make numbers less than 10. Tell students to hold up 5 fingers. (They can use both hands or just one hand.) Record the combinations students hold up in a chart like the one in the margin.

Encourage students to find as many combinations as possible. Then repeat with at least two of 6, 7, 8, or 9 fingers. Challenge students to find combinations that they cannot show on their fingers. (EXAMPLE: Students can’t show 6 = 6 + 0 or 7 = 6 + 1 because they do not have 6 fingers on one hand.)

Find missing addends (to 5) using the fingers on one hand. Hold up all your fingers on one hand. ASK: How many fingers do I have up? Then hold up 3 fingers and SAY: How many fingers do I have up? How many are not up? What is 3 + 2? How do you know? Repeat with several examples, including examples where either all or no fingers are held up. Then SAY: I want to know what number with 4 makes 5. Write on the board: 4 + ___ = 5. SAY: How could I use my 5 fingers? How many fingers should I hold up? What does the number of fingers I’m not holding up tell me? Add labels to the number sentence and have a volunteer fill in the blank:

Complete more addition sentences this way, including sentences with 0 as an addend. Then write similar sentences on the board for students to complete individually. EXAMPLES: 3 + ___ = 5; 4 + ___ = 5; 0 + ___ = 5.

Bonus 5 = 2 + ___; 5 = 5 + ___; 5 = 4 + ___; 5 = 0 + ___.
Then give students problems where the first addend is missing, so that the number of fingers “not up” is given. **EXAMPLES:** __ + 4 = 5; __ + 2 = 5.

**Bonus**

5 = __ + 3; 5 = __ + 2; 5 = __ + 5.

### ACTIVITIES 1–2

1. Use **BLM Cubes** to make dice (one for each student) with top and bottom numbers adding to 5. (You might have your students make the cubes before you add the numbers. If so, demonstrate how to carefully cut out and fold the net without cutting the tabs.)

First, guide students to discover the “magic number” on the dice. Ask pairs to roll their dice at the same time. They record a win each time they roll a total of 5. Students can keep score by taking a red counter if they win and a yellow counter if they lose. Then tell students to play with only one die, and to add the top and bottom numbers. What do they notice? (They win every time!) Students can use the die to practise finding what makes 5 with the number they roll (they can check their answers by turning the die over).

2. A **solitaire game**. Start by removing all cards 5 and up from a deck of cards. Shuffle the cards and turn over the first eight, putting them face up in 2 rows of 4 cards. Pull a card from the pile—if it makes 5 with any of the cards that are face up, place it on that card; otherwise discard it. Continue until you go through all the cards, then repeat with the cards in the discard pile, adding them, where possible, to any of the piles that are face up. Go through the discard pile as many times as you can, and try to use up all the cards.

### Find missing addends to 10 the same way.

Teach students to complete addition sentences such as 7 + ____ = 10 by holding up 7 fingers and using the fact that they have 10 fingers altogether, so the number of fingers not up goes in the blank. **EXAMPLES:** 4 + __ = 10; __ + 5 = 10; 7 + __ = 10.

**Bonus**

10 = 2 + __; 10 = __ + 9.

### ACTIVITIES 3–4

3. Repeat Activity 1 above with magic number 10. Since there are more pairs that make 10 than will fit on one die, you can make many different dice for students to share and work with.

4. Repeat Activity 2 above, but remove the cards 10 and up and make 10 with the top number instead of 5.
**NS1-45**

**One More, One Less**

Pages 65–67

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**CURRICULUM EXPECTATIONS**

Ontario: 1m1, 1m6, 1m7, 1m26

WNCP: 1N10, [R, V, C]

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**VOCABULARY**

one more than

one less than

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**Goals**

Students will use combinations of numbers that add to 5 or 10 to find sums that are one more or one less than 5 or 10.

**PRIOR KNOWLEDGE REQUIRED**

- can find pairs that add to 5 and 10

**MATERIALS**

- counters

---

**Review “one more than.”** Have student volunteers determine numbers that are “one more than” various numbers to 10. You could do this by playing Catch (see NS Part 2—Introduction); have each student throw back the number that is one more than the number you threw to them).

**One more than 5 or 10.** Give each student at least 11 counters. Tell students to make a pile of 4 and another pile of 6. **ASK:** How many counters do you have now? How do you know? Have a student write the addition sentence on the board: 4 + 6 = 10. Then tell students to take one more counter and put it in one of their piles. **ASK:** How many counters do you have now in the two piles? (11) How do you know? (I had 10 and then added one more, and one more than 10 is 11.) Some students might count out the 11. If so, **ASK:** Could you have predicted that? You had 10 and added one more—what number is always one more than 10? Have different volunteers write the addition sentence to show their new piles. (4 + 7 = 11 or 5 + 6 = 11) **ASK:** How many people have 4 + 7 = 11? How many have 5 + 6 = 11? Did anyone get anything else? (no) Explain that if students added a counter to the second pile, they would get 4 + 7 since 7 is one more than 6; if they added a counter to the first pile, they would get 5 + 6 because 5 is one more than 4. Repeat with various pairs of piles that have either 5 or 10 counters in total so that the new piles have either 6 or 11 in total.

**One less than 5 or 10.** Repeat the above exercise, but ask students to remove a counter from one of the piles instead of adding to the piles.

---

**Using a model.** Draw on the board a model for 5 + 5 = 10 and have students identify the corresponding addition sentence:

\[
\begin{array}{cccc}
\text{○ ○ ○ ○ ○} & + & \text{○ ○ ○ ○ ○} & = 10 \\
5 & & 5 & \\
\end{array}
\]
Then add a circle to one of the groups and ask a volunteer to write the new addition sentence:

\[
\begin{array}{cccccc}
& & & & & \bullet \\
6 & + & 5 & = & 10 \\
\end{array}
\]

Repeat, but add the circle to the other group. Emphasize that it doesn’t matter which group you add the circle to—you are still increasing the total number of circles by one. Repeat for \(8 + 2 = 10\) and \(4 + 1 = 5\), allowing volunteers to draw the models and write the sentences. Then do examples of taking away 1 circle (by erasing or crossing it out):

\[
\begin{array}{cccccc}
& & & & & \times \\
6 & + & 5 & = & 10 \\
\end{array}
\]

One more or one less. Write on the board: \(7 + 3 = 10\). Have students use this fact to solve the following problems \(6 + 3; \ 7 + 4; \ 8 + 3; \ 7 + 2\). Prompt students as required. (EXAMPLES: Is \(6 + 3\) one more or one less than \(7 + 3\)? How do you know? How much is \(6 + 3\)?) Then write \(8 + 2 = 10\) and have students solve these problems: \(8 + 1; \ 9 + 2; \ 8 + 3; \ 7 + 2\). Now write \(3 + 2 = 5\) and ask students to write and then solve all the addition problems that are one more or one less than the given problem. Repeat with \(5 + 5 = 10\). Finally, have students solve problems by first determining numbers that add to 5 or 10. EXAMPLES: \(5 + 6\) (that’s one more than \(5 + 5\) or \(4 + 6\), so \(5 + 6 = 11\)), \(4 + 2; \ 3 + 3; \ 7 + 4; \ 2 + 7; \ 9 + 2; \ 2 + 2; \ 3 + 1\).

Extension

Two more and two less. Teach students to find “two more than” by adding 1 to each of two piles, or 2 to one pile. (EXAMPLES: If \(6 + 4 = 10\), then \(8 + 4 = 12\). If \(7 + 3 = 10\), adding 1 to each pile gives \(8 + 4 = 12\).) Similarly, remove 1 from each pile or 2 from one pile to find “two less than.” Now challenge students to list all the sentences that are one more than, one less than, two more than, or two less than this sentence: \(6 + 4 = 10\). (ANSWERS: \(7 + 4 = 11; \ 6 + 5 = 11; \ 5 + 4 = 9; \ 6 + 3 = 9; \ 8 + 4 = 12; \ 6 + 6 = 12; \ 7 + 5 = 12; \ 4 + 4 = 8; \ 6 + 2 = 8; \ 5 + 3 = 8\)
NS1-46
Patterns in Adding
Pages 68–69

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m5, 1m6, 1m7, 1m18, 1m25, 1m26
WNCP: 1N4, [R, CN, V, C]

VOCABULARY
pair
addition sentence

Goals
Students will discover ways to find all the pairs of numbers that add to a given number.

PRIOR KNOWLEDGE REQUIRED
knows pairs that add to 5
can add using a number line
can draw models to add pairs of numbers

MATERIALS
counters and empty cups
BLM Colouring Stars (p H-148)

Review finding pairs that add to 5 by using your fingers. Have students hold up 2 fingers on one hand. ASK: How many fingers on that hand are not up? How many fingers are there in total? Have a volunteer write the number sentence for this. If a student says 2 + 3 = 5 explain to the class that the student is counting the number of fingers up first. ASK: What would we get if we counted the number of fingers that are not up first? (3 + 2 = 5)

Use fingers to find all pairs that add to 5. Write on the board: 5 = ____ + ____.
ASK: What are the possible numbers for the first blank? Can 6 be a first number? Can we hold up 6 fingers on one hand? 9? 3? 7? 4? List all the numbers that could be in the first blank. You may need to prompt for 0 or 5 (Can I hold up no fingers? What number is that? Can I hold up all my fingers? How many is that?). Then tell students that you want to write all the number sentences in an organized way. Write six number sentences that add to 5 with blanks (see margin). ASK: What is the smallest number of fingers you can hold up on one hand? (0) What’s the next smallest? (1) Continue to 5, then fill in the first blanks. ASK: How many fingers do I hold up for 5 = 0 + ____? Demonstrate doing this and ask how many you are not holding up. Then ask a volunteer to show how they would use their fingers to fill in the blank in the next number sentence: 5 = 1 + ____. Repeat for all remaining number sentences. ASK: Have we found all the pairs that add to 5? How do you know? How did writing the numbers in order help?

Use colouring to find pairs adding to 5. Draw 5 squares on the board and a chart with the headings Coloured, Not Coloured, and Addition Sentence. ASK: How many squares are coloured? How many are not coloured? How many squares are there in total? Fill in the first row in the chart together: 0, 5, 0 + 5 = 5. Have volunteers colour one square at a time and repeat the questions to complete the chart together as a class. (Volunteers can colour the squares in any order.)
**Practise.** Repeat the above exercise with 8 hearts in a row. Then have students draw 7 objects in a row on a separate sheet of paper. Have students colour one at a time (starting with 0) to find all the pairs that add to 7.

**Bonus** Find all the pairs that add to 13.

**Use number lines to find pairs adding to a given number.** Draw a number line from 0 to 6 on the board. Ask students for two numbers that add to 6, and then write the addition sentence. Model the number sentence on a number line. Then draw 7 number lines from 0 to 6, one below the other. Challenge students to show all the pairs that add to 6 (don’t miss any!) in an organized way. Start by drawing the big dots on each number line. **ASK:** Where’s the very first place we can put a big dot? Then next place? The next place after that? Have a volunteer finish adding all the big dots. Then draw the leaps on the first number line and **ASK:** How many leaps did I draw? How many leaps do you think I will draw for the next one? Do you think I will need more leaps or fewer leaps? How many fewer? (1 fewer each time) Continue in this way, drawing the leaps and writing the number sentence for each number line. Then have students draw 8 number lines from 0 to 7. Ask students to again show all the pairs of numbers that add to 7 in an organized way, this time using number lines.

**Compare methods.** Look at the number sentences that add to 7. The first number starts at 0 and goes up by 1 each time. The second number starts at 7 and goes down by 1 each time. When you hold up one more finger, you add 1 to the number of fingers up and subtract 1 from the number of fingers that are not up; when you colour one more square, you add 1 to the number of squares that are coloured and subtract 1 from the squares that are not coloured.

### ACTIVITIES 1–2

1. Give each student a pile of counters and a cup. Students move 1 counter at a time into the cup and write number sentences of the form *Number in Cup + Number Not in Cup = Total Number*.

2. All students stand up. Students sit down one at a time, As the students sit down, they write the addition sentence based on *Number Standing + Number Sitting = Total*, on a card, Then collect the cards and display them as pairs adding to [total number of students].

### Extension

Make more dice (see Activity 1, NS1-44, p H-45) with magic numbers anywhere from 6 to 16 to have students practise finding the missing addend. Notice that a regular die has magic number 7.
Models for Adding

Curriculum Expectations
Ontario: 1m1, 1m5, 1m6, 1m7, 1m18
WNCP: 1N4, 1N7, [R, CN, C]

Vocabulary
equal

Goals
Students will represent a given number as a sum of equal groups with and without leftovers.

Prior Knowledge Required
- can add
- can make a model to add pairs
- knows the equal sign (=)

Materials
- connecting cubes in different colours
- counters in different colours
- clothes hangers
- clothespins
- BLM Thirteen in Different Ways (p H-149)

Use concrete materials to find many numbers that add to a given number.

Activities 1–2

1. Use connecting cubes in 2 or 3 different colours to write different number sentences. Students can use 2 colours to make number sentences with more than 2 addends by alternating colours. See pictures in margin.

Then give each student 4 red counters and 1 yellow counter. Challenge students to rearrange the counters to find many other addition sentences. Ensure that students understand that the sum is always 5 because you gave them 5 counters to begin with.

**Bonus**
Use 1 red counter and 4 yellow counters and compare the addition sentences with those from before.

2. Give each student a coat hanger with 2 cards taped to it (to act as dividers) and 5 clothespins.

Challenge students to move clothespins around and make as many addition sentences as they can that add to 5. Do not expect students to find all of the ways of doing so (1 + 1 + 3, 1 + 2 + 2, 1 + 3 + 1, 2 + 1 + 2, 2 + 2 + 1, 3 + 1 + 1) as this requires organizational skills.

**Bonus**
Give students 2 more clothespins to find addition sentences that add to 7.

Example:

Draw models to find many numbers that add to a given number. Draw 5 circles on the board, have students draw 2 lines separating them, and write the corresponding addition sentence.
Ask volunteers to draw similar models for other addition sentences that add to 5. Then ask students to write the number sentences for these models:

- \( \text{○ ○} | \text{○ ○} \)  \( (2 + 0 + 3 = 5) \)
- \( \text{○} | \text{○ ○ ○ ○} \)  \( (0 + 1 + 4 = 5) \)
- \( \text{○ ○ ○} | \text{○ ○} \)  \( (3 + 2 + 0 = 5) \)

**PROMPTS:** How many circles are before the first line? How many are between the two lines? How many are after the second line? Then draw the following on the board and have students write the addition sentence:

- \( \text{○ ○ ○ ○ ○} \)

Encourage students to write and draw models for other addition sentences with 4 addends. Then show the following pictures, write the number sentence for the first one, and have students write the number sentences for the others:

- \( \text{○ ○ ● ○ ● ●} \)  \( (2 + 1 + 1 + 2 = 6) \)
- \( \text{○ ● ● ○} \)  \( (1 + 2 + 1 = 4) \)
- \( \text{● ○ ● ● ●} \)  \( (1 + 1 + 2 + 1 = 5) \)

Have students draw their own models for number sentences that add to 6 or 7. Challenge students to find as many models as they can for each total. **Bonus:** Students might use patterns instead of always alternating black and white (see margin).

**Connect the models to the concrete materials.** **ASK:** Which model is more like the coat hanger with clothespins—the model with lines separating the circles or the model with some circles coloured? Why? (The former—paper separates the clothespins the way lines separate the circles.) Which model is more like the chains of connecting cubes? Why? (The model with some circles coloured—you stop and write a number when the colour changes.)

**Using equal groups to build numbers.** Show students these ways to model the number 8:

- \( \text{○ ○} | \text{○ ○} | \text{○ ○} | \text{○ ○} \)  \( 8 = 4 \text{ groups of 2} \)
- \( \text{○ ○ ○} | \text{○ ○ ○} | \text{○ ○ ○} | \text{○ ○} \)  \( 8 = 2 \text{ groups of 3 and 2 more} \)

Give each student 8 counters and have them make groups of 4. How many groups did they make? Are there any more left over? Write on the board: \( 8 = 2 \text{ groups of 4} \). Then give each student 3 more counters (for a total of 11) and ask them to make groups of 2, 3, 4, and 5. Have volunteers fill in the blanks:

- \( 11 = \_\_ \text{ groups of 2 and } \_\_ \text{ more} \)
- \( 11 = \_\_ \text{ groups of 3 and } \_\_ \text{ more} \)
- \( 11 = \_\_ \text{ groups of 4 and } \_\_ \text{ more} \)
- \( 11 = \_\_ \text{ groups of 5 and } \_\_ \text{ more} \)

Repeat with 17.
Using 5 or 10 to Add
Pages 72–75

Goals
Students will use the equal sign between two addition statements.
Students will use pairs of numbers that add to 5 or 10 to add more than two numbers.

PRIOR KNOWLEDGE REQUIRED
knows pairs of numbers that add to 5 or 10
can complete addition problems when one addend is missing
can add 5 to a number less than 5
can add 10 to a number less than 10

MATERIALS
none

The equal sign between two addition sentences. Explain that the equal sign (=) means is the same number as. For example, having 4 things and adding 1 more is the same number as having 5 things, or \(4 + 1 = 5\). **ASK:** Is \(1 + 1 + 3\) the same number as \(4 + 1\)? (yes) How do you know? (They both add to 5.) Demonstrate with 5 red counters split into piles of 4 and 1 and 5 yellow counters split into piles of 1, 1, and 3. Write on the board:

\[1 + 1 + 3 = 5 \quad \text{and} \quad 4 + 1 = 5 \quad \text{so} \quad 1 + 1 + 3 = 4 + 1\]

The analogy with language. Explain that saying "my pencil is yellow and your shirt is yellow" is just like saying "4 + 1 is 5 and 1 + 1 + 3 is 5." Just as we can say "my pencil is the same colour as your shirt"—without saying which colour that is—we can say "4 + 1 is the same number as 1 + 1 + 3," without saying the total. We write this as \(4 + 1 = 1 + 1 + 3\). Have students come up with more number sentences where both sides add to 5.

**EXAMPLES:**

\[1 + 1 + 1 + 1 + 1 = 2 + 3 \quad 4 + 1 = 3 + 2 \quad 3 + 2 = 2 + 3\]

Chains of equal signs. Explain to students that instead of writing \(4 + 1 = 3 + 2\) and \(2 + 3 = 3 + 2\), we can take a shortcut and write \(4 + 1 = 3 + 2 = 2 + 3\). Then have volunteers continue the chain to make it as long as they can. Read the number sentence aloud (read the equal signs as "is the same number as").

Find two numbers that make 5 in a list. Start with three numbers on the board: 1 2 4. **ASK:** Does 1 make 5 with either of the next two numbers? Which one? Circle the numbers that make 5:
Then try 1 2 3 and ask if 1 makes 5 with any of the other numbers. What number not in the list makes 5 with 1? (4) (PROMPT: Hold up 1 finger. How many are you not holding up?) Cross out the 1 to emphasize that it’s not one of the numbers we have to circle. Then look at the last two numbers—do they make 5? (yes; circle them).

Repeat with more lists of numbers, first having volunteers work at the board and then having students work individually. **EXAMPLES:** 0 1 4; 0 2 5; 2 3 4; 4 3 1.

**Bonus** 0 1 3 4; 1 2 4 5; 1 2 3 5; 2 3 4 5; 0 1 3 5; 5 3 1 0; 4 2 3 5.

Find missing addends when one addend is 5. Write on the board: 4 + 1 + 3 = 5 + ____. Make three piles of counters (4, 1, and 3) and ask students how the number sentence on the board relates to the three piles. Ask a volunteer to circle the two numbers that make 5 and combine the piles that correspond to those numbers. **ASK:** What is left over? Write the number left over in the blank. Ask volunteers to help you solve more such problems.

**EXAMPLES:** 3 + 4 + 1 = 5 + ____; 2 + 1 + 3 = 5 + ____;
3 + 4 + 2 = 5 + ____.

Adding 5 to any number at most 5. Review adding 5 to any number less than 5. For students who missed that lesson, you could hold up all the fingers on one hand and 4 on the other and have students identify the number of fingers you are holding up and the corresponding addition sentence (5 + 4 = 9 because you are holding up 9 fingers altogether). Continue adding 5 to numbers less than 5 until students can answer automatically.

**Adding three numbers by using pairs that add to 5.** Write on the board: 4 + 1 + 3 = 5 + ____ = ______. Students now have to combine the two steps above: circle the numbers that add to 5 and write the remaining number, then add the remaining number to 5.

Repeat the lesson for pairs adding to 10.

- Find **two numbers** that make 10 in a list of three. **EXAMPLES:** 4 6 7; 3 5 8; 1 4 9; 2 4 6. Bonus: 3 4 6 9; 2 5 7 8; 2 3 8 9; 3 9 8 4 5 2.
- Find the leftover number in a sum of three numbers, two of which add to 10. **EXAMPLES:** 4 + 8 + 6 = 10 + ____; 2 + 3 + 7 = 10 + ____;
5 + 5 + 4 = 10 + ____; 9 + 8 + 2 = 10 + ____.
- Review adding 10 to any number less than 10. **EXAMPLES:**
10 + 7 = ____ ; 10 + 4 = ____ ; 10 + 1 = ____ ; 10 + 6 = ____.
- **Finally, combine all the steps to find the sums.** **EXAMPLES:**
4 + 8 + 6 = 10 + ____ = ____ ; 2 + 3 + 7 = 10 + ____ = ____;
9 + 8 + 2 = ____ ; 7 + 3 + 4 + 1 = ____ ; 8 + 4 + 2 + 1 = ____.

**ONLINE GUIDE**

Extension—Other ways to use the equal sign, such as “the same colour as”, e.g., my shirt = your pencil.
NS1-49
Number Lines and Number Sentences
Pages 76–78

CURRICULUM
EXPECTATIONS
Ontario: 1m2, 1m5, 1m7, 1m25, 1m26
WNCP: 1N10, [R, CN, C]

VOCABULARY
leaps
forwards
backwards
number line
plus sign (+)
minus sign (–)

Goals
Students will use number line representations to compare addition and subtraction sentences from the same fact families.

PRIOR KNOWLEDGE REQUIRED
- can read a number line
- can draw number line representations for number sentences and vice versa
- knows the plus sign (+) and minus sign (–)
- can add and subtract
- can add by counting on

MATERIALS
BLM Extras (pp H-150–H-151)

Compare the number lines representing subtraction sentences. Draw on the board:

\[
\begin{align*}
0 & \quad 1 & \quad 2 & \quad 3 & \quad 4 & \quad 5 & \quad 6 & \quad 7 & \quad 8 & \quad 9 & \quad 10 \\
\text{\textcolor{red}{8}} & \quad \text{\textcolor{red}{3}} & \quad \text{\textcolor{red}{2}} & \quad \text{\textcolor{red}{1}} & \quad \text{\textcolor{red}{0}} & \quad \text{\textcolor{red}{1}} & \quad \text{\textcolor{red}{2}} & \quad \text{\textcolor{red}{3}} & \quad \text{\textcolor{red}{4}} & \quad \text{\textcolor{red}{5}} & \quad \text{\textcolor{red}{6}} & \quad \text{\textcolor{red}{7}} & \quad \text{\textcolor{red}{8}} & \quad \text{\textcolor{red}{9}} & \quad \text{\textcolor{red}{10}} \\
8 - 3 &= 5 \\
8 - 2 &= 6 \\
8 - 7 &= 1 \\
\end{align*}
\]

ASK: What is the same about all three number lines? (They all go from 0 to 10; they are the same length; the big dot is always at the 8; the leaps all go back, or the arrows point backwards.) What is different about them? (The number of leaps changes; the number where the arrows/leaps stop is different.)

Compare the subtraction sentences. ASK: What is the same about all three number sentences? (They all include 8, 8 is always the first number, 8 is always the number you’re taking away from, they are all subtraction sentences, they all have three numbers, they all have an equal sign, the answer is always on the right side.) What is different about them? (The answers are different, the number you take away from 8 is different.)

PROBLEM SOLVING
Connecting

Relate the subtraction sentences to their number lines.

- The number sentences all start with 8 and 8 is always the number that you’re taking away from. What’s the same about the number
lines because of this? (the big dot is always at the 8, the leaps start at the 8)

• The arrows point back (left) in all of the number lines (the leaps go backwards). What’s the same about the number sentences because of this? (They are all subtraction.)
• The answers are all different in the number sentences. What’s different about all the number lines because of this? (where the arrows stop)
• The number of leaps is different in all the number lines. What’s different about all the number sentences because of this? (the number you are taking away)

Compare addition and subtraction sentences and their number line representations. Draw on the board:

\[
\begin{align*}
\text{\underline{8 – 3 = 5}} & \quad \text{\underline{5 + 3 = 8}} \\
0 & \quad 1 \quad 2 \quad 3 \quad 4 \quad 5 \quad 6 \quad 7 \quad 8 \quad 9 \quad 10
\end{align*}
\]

First compare the two number lines—how are they the same and different—and then compare the two number sentences.

Relate the number sentences to their number lines.

• On the number lines, the leaps go in different directions. What’s different about the number sentences because of this? (the sign: it’s minus [–] when the leaps go back and plus [+] when the leaps go forwards).
• The number of leaps is the same in each picture. What’s the same about the number sentences because of this? (the second number in each number sentence)
• The big dot is at different places in both pictures. What’s different about the two number sentences because of this? (the first number in each number sentence)
• The leaps go between the numbers 5 and 8 in both pictures. What’s the same about the number sentences because of this? (The same three numbers are in both number sentences.)

Generalize to a different example. Write the number sentences \(3 + 6 = 9\) and \(9 – 6 = 3\). **ASK:** How are the number sentences the same and different? How will the number lines be the same and different? **PROMPTS:** How many leaps will there be? What direction will the arrows point in? What two numbers will the leaps go between? Other than where you put the big dot, what is the only difference between the two number lines? (the direction of the arrows) Draw the two number lines or have a volunteer do so.
Goals
Students will identify and write corresponding addition and subtraction sentences for various models.

PRIOR KNOWLEDGE REQUIRED
- can draw models for addition
- knows the plus sign (+) and minus sign (−)
- can add and subtract
- can count on to add
- can identify different attributes (e.g., shape, size, colour)

MATERIALS
none

NOTE: In this lesson, students use their knowledge of sorting and attributes to create different number sentences from the same pictures.

The same picture can represent different number sentences. Draw:

```
□ □ □ □ □ □ □ □ □
```

ASK: How does this picture show $3 + 6 = 9$? (3 dark squares + 6 white squares = 9 squares altogether) How does it show $6 + 3 = 9$? (6 white squares + 3 dark squares = 9 squares altogether) How does it show $9 – 6 = 3$? (Take away the 6 white squares from the 9 squares and you have 3 dark squares left. You can demonstrate by covering up the 6 white squares.) How does it show $9 – 3 = 6$? (Take away the 3 dark squares from the 9 squares and you have 6 white squares left. Demonstrate by covering up the 3 dark squares.) Draw more pictures and ask volunteers to write a number sentence and explain their choice. Continue prompting for more addition or subtraction sentences until students find all the possibilities for each picture.

Use pictures with different attributes. Have students write individually the 4 number sentences associated with the following pictures and then ask volunteers to explain how the pictures show the number sentences:

```
△ △ △ △ △ △ △ △ △
☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆
```
Write 8 number sentences for this picture:

Tell students to focus on size first (how many big squares, how many little squares) and then colour (how many dark squares, many white squares). Then ask students to write 8 number sentences for the following picture, to see if they know what to focus on.

**Extra Bonus**

How many number sentences can you write for this picture? (3 attributes change)

**Answer:** size: 3 + 6 = 9, 6 + 3 = 9, 9 – 6 = 3, 9 – 3 = 6; shape: 5 + 4 = 9, etc.; colour: 2 + 7 = 9, etc.

### ACTIVITIES 1–2

1. Divide the class into two groups. Group 1 thinks of a number sentence (say, 3 + 6 = 9) where the sum is the number of people in Group 2. Group 2 then finds or makes up a sorting rule for their group that fits the number sentence (EXAMPLE: 3 people wearing sandals, 6 people not; 3 people standing, 6 people sitting). Students in Group 2 sort themselves according to the rule and Group 1 guesses the rule. Groups switch roles. (Groups can work on each other’s number sentences simultaneously.)

2. **Adding and subtracting machine** (see NS1 Part 2—Introduction). Have students make an adding-3 machine and a subtracting-3 machine, then discuss the comparison between the two (the input and output for an adding-3 machine are reversed for a subtracting-3 machine).

### Extension

**How many number sentences can you make?** Draw:

Write one addition sentence for this picture: 1 + 2 + 4 + 2 + 1 = 10.

**ASK:** How does my addition sentence match the picture? Repeat with a subtraction sentence: 10 – 2 – 2 = 1 + 4 + 1. Invite students to find more number sentences for this picture. Repeat with more such pictures.

**Example:**
NS1-51
Counting Forwards to Subtract

Page 82

CURRICULUM EXPECTATIONS
Ontario: 1m4, 1m5, 1m25, 1m26
WNCP: 1N10, [R, CN]

VOCABULARY
none

Goals
Students will use addition to subtract.

PRIOR KNOWLEDGE REQUIRED
- can find the missing addend in addition problems
- knows the plus sign (+) and minus sign (−)
- can add and subtract
- can count on to add
- understands the relationship between addition and subtraction sentences

MATERIALS
- BLM Ten Wins! (pp H-153–H-154)
- BLM Dominoes (p H-152)

Review adding by counting on. Tell students that you want to find 4 + 5 by counting on. ASK: What number tells me the number to start at, the 4 or the 5? What number tells me how many fingers I should be holding up when I stop? Tell students to stop you when you get to that number and count: say “four” with your fist closed, “five” with one finger up, and so on, until you have five fingers up. If students don’t stop you when you have five fingers up, ASK: How many fingers do I have up? Is that the number that I’m supposed to be holding up when I stop? What number did I say when I held up my fifth finger? (If students are having difficulty or don’t remember, SAY: Listen carefully for the number I say when I hold up my fifth finger—that will be the answer to 4 + 5. Then repeat the counting on process.) Repeat with more examples.

Review finding the missing number by counting on. Write on the board:
\[ 4 + \_\_\_ = 9. \]
ASK: How is this problem different from 4 + 5 = ____? How can I use counting forward to solve the first problem? Explain that instead of knowing that you have to have five fingers up when you stop, you know what number you will say when you stop. ASK: Does anyone know what that number is? Tell students to listen carefully as you count on from four and to stop you when you say “nine.” Then count on using your fingers and when students tell you to stop, ASK: How many fingers am I holding up? Then write the number 5 in the blank: 4 + 5 = 9. Repeat with several different questions, always asking students to tell you when to stop. Next, have volunteers write the answer on the board after students tell you to stop. Finally, have volunteers do both steps (count on and write the answer) to find the missing numbers in more addition problems.

ACTIVITIES 1–2

1. Hide 6 counters (e.g., under a sheet of paper) and show students 4 counters. SAY: I have 10 counters altogether but only 4 in my hand. How many are hidden? How do you know? Pairs can then take turns...
**Extra Practice**

On BLM Ten Wins!, students first determine whether a given number wins the game and then determine the number they need to win.

**Problem Solving**

Changing into a known problem.

**Problem Solving**

Selecting tools and strategies.

**Examples:**

- 9\(-\)8 = ___
- 9\(-\)2 = ___
- 8\(-\)1 = ___
- 7\(-\)5 = ___
- 8\(-\)7 = ___
- 10\(-\)1 = ___
- 10\(-\)8 = ___

Subtract by counting on. **Ask:** How does finding the missing number in 4\(+\)__ = 9 help find the answer to: 9\(-\)4 = ___? **Prompt:** Draw this picture:

```
  ___
```

Then ask students how they could use counting on to solve 9\(-\)4. If no one suggests it, tell them that they could count on from 4 and see how many fingers they are holding up when they say "nine." Remind them that they are really finding the missing number in 4\(+\)__ = 9, but that’s okay because 9\(-\)4 = ___ has the same answer. Repeat with more examples.

**Compare counting on and counting back to subtract.** Ask a volunteer to find 10\(-\)1 by counting forwards. Ask another volunteer to find 10\(-\)1 by counting back. **Ask:** Which way is easier—counting forwards or counting back? (answers may vary) Which way is faster? (counting back) Why? (When counting back from 10, you only have to say, "ten, nine" and see that you are holding up one finger, whereas when counting on from 1, you have to count up from “one” to “ten” and see that you are holding up 9 fingers.) Explain that, in math, there are often many ways to solve a problem, so you can pick the best one. Have students solve various problems using both methods, to decide which is faster in each case. (You could also have students predict which method will be faster and then check their predictions.)

**Activity 3**

**Electrical Matching Game.** (see NS Part 2—Introduction) Match subtraction problems to their answers. **Variation:** Match missing addend problems to their answers.
Goals

Students will skip count by 2s from 0 to 100 and from 1 to 19.

Prior Knowledge Required

- Can count
- Can read number lines and hundreds charts

Materials

- Ball
- BLM Patterns in Skip Counting by 2 (pp H-155–H-156)

Introduce skip counting. Tell students that to skip count, you have to skip numbers. If you count every second number, you are skip counting by 2. Demonstrate this by saying “0” loudly, “skip 1” quietly, “2” loudly, “skip 3” quietly, “4” loudly, and so on to 10. Have students do this with you.

Skip counting using a number line. Demonstrate skip counting with a number line by jumping over the numbers you skip (see margin).

Explain that we call this skip counting by 2 because you skip numbers and add 2 instead of 1 to find the next number. Draw a large number line from 0 to 10 and ask a volunteer to show skip counting by 2 on the number line.

Explain how the arrows show skip counting by 2: you say the numbers that the arrows touch and the arrow always points to the number you say next.

Use the number line to skip count by 2 as a class. Point to the numbers as you say them aloud. Then invite volunteers to point to the numbers as the class skip counts.

Activity 1

Draw a number line on the floor. Students skip from 0 to 2, then 4, and so on to 10, saying the numbers as they land on them.

Skip counting using a chart. We can show skip counting by 2 on a hundreds chart by colouring or shading the numbers we say. Have a volunteer show skip counting by 2 on the first row of a hundreds chart.

Ask: How is this like using a number line to skip count? How is it different?

Cover the chart and ask students if 3 is a number they say when counting by 2 (thumbs up = yes, thumbs down = no). Then uncover the chart so that students can see if they were right. Repeat for other numbers at random. Eventually, stop checking the answer and say the numbers more quickly.

Activity 2

Have students form two lines in front of you: the “yes” line and the “no” line. One student from each line steps forward. You say a number from
0 to 10 and toss a ball towards the two students: if the number is one that you say when counting by 2, the “yes” person should catch it; if it isn’t, the “no” person should catch it. The student who caught the ball tosses it to the one who didn’t and he or she tosses it back to the teacher. The two students go to the back of their line and the next two students step forward.

Counting by 2s up to 20. Draw the first 2 rows of a hundreds chart on the board. Ask volunteers to show skip counting by 2 by shading every second square. Repeat with the same numbers (1–20) in different charts: 5 rows of 4, 4 rows of 5, and then 10 rows of 2. Emphasize that the same numbers are shaded no matter how the chart is drawn. Look back at the 2 rows of a hundreds chart. Ask students to compare the numbers that are shaded in each row. **ASK:** If you can skip count by 2 up to 10, how can this help you skip count up to 20? (The shaded numbers from 11 to 20 have the same ones digit as the shaded numbers from 0 to 10.)

**PROBLEM SOLVING**
Looking for a pattern.

**EXTRA PRACTICE**
BLM Patterns in Skip Counting by 2

**ACTIVITIES 3–4**

2. Use a large hundreds chart to skip count by 2s to 100 as a class. Point to each number you chant together, then invite volunteers to do the pointing.

3. If there is a large hundreds chart in the school yard, have students skip count on it, starting at 2 and skipping every second number, and chanting the numbers as they land on them. When the first student gets to 10, the next student can start.

Counting by 2s up to 100.

**PROBLEM SOLVING**
Reflecting on the reasonableness of the answer.

Counting by 2s from 1 to 19. Have students count by 2s starting at 1 on the first 2 rows of a hundreds chart. Then give students any number and ask them to find the next number they would say when counting by 2.

**ACTIVITY 5**

**Catch** (see NS Part 2—Introduction). The student says the next number when counting by 2. You throw numbers from 0 to 20, odd and even.

**Count by 2 and check your answer.** Have students individually write the next number when counting by 2:

8 10 ___ 11 13 ___ 12 14 ___ 13 15 ___

Then have students find the second number and use the third to check their answer: 7 ____ 11 (9 comes after 7; since 11 comes after 9 when counting by 2, 9 is correct.) Provide many problems of this sort.

**EXAMPLES:** 15 ____ 19 12 ____ 16 8 ____ 12 3 ____ 7 4 ____ 8
Skip Counting by 5s and 10s

Goals
Students will skip count by 5s and 10s from 0 to 100.

Curriculum Expectations
Ontario: 1m1, 1m3, 1m7, 1m21
WNCP: 1N1, 1N8, [R, C]

Vocabulary
skip
skip counting

Counting by 10s from 0 to 100. Count by 10s using a hundreds chart. Remind students that to add 10, they simply move down a row. Emphasize that counting by 10s is almost the same as counting by 1s—you just write a 0 after the numbers you say when counting by 1!

1 2 3 4 5 6 7 8 9 10
10 20 30 40 50 60 70 80 90 100

It may be helpful for some students to notice the similarities in the sound of the numbers as well, e.g., three and thirty, four and forty. Repeat the hundreds chart and ball catching activities from NS1-52 (pp H-60–H-61) for counting by 10. Then have students count by 10 to find out what comes next, and then check their answer, in problems like these:

30 ____ 50 10 _____ 30 70 _____90 60 ______80

Counting by 5s from 0 to 100. Repeat the above for counting by 5s. Emphasize that counting by 5s is easy once students can count by 10s: after saying zero, five, ten, and fifteen, they just need to say the same numbers they would say when counting by 10, alone and then with “five”—twenty, twenty-five, thirty, thirty-five, and so on. Students can review and apply the patterns in skip counting by 5 or 10 by completing BLMs Patterns in Skip Counting by 5 and Patterns in Skip Counting by 10.

Extensions
1. Find the mistake in skip counting: 2 4 6 8 12 14 16; 5 10 15 30 35 40; 20 30 30 40 50 60.
2. Review using 5 to add. Write on the board:
   
   \[ 4 + 1 + 3 = 5 + \_ + \_ = \_ \]. First circle the numbers that add to 5, then write the remaining number, and then add the remaining number to 5. Have students pair up the numbers that add to 5 in order to add many numbers in problems like these:

   \[ 4 + 1 + 3 + 2 = 5 + 5 = 10 \]

   \[ 4 + 1 + 1 + 4 + 2 + 2 + 3 + 3 = 5 + 5 + 5 + 5 = 20 \]

   Students can solve more such problems on BLM Adding Many Numbers.

   Have students find groups of numbers that make 10 to help them add longer lists. EXAMPLES:

   \[ 2 + 8 + 3 + 6 + 1 = 10 + 10 = 20 \]

   \[ 2 + 4 + 4 + 5 + 3 + 2 + 1 + 1 + 8 = 10 + 10 + 10 = 30 \]

3. Give each student a number card from 1 to 20 (or more, depending on the number of students in your class). Students place themselves in order by first having the multiples of 5 spread themselves out.

4. Teach students to decide what to count by given the first and last numbers and the number of spaces in between. Show students a number line like this:

   ![Number Line Example]

   SAY: I want to skip count from 10 to 14 and say only one number in between. If I count by 1s, I know that 11 comes right after 10, but 14 doesn’t come right after 11, so that won’t work. What should I skip count by if I want the same number to come right after 10 and right before 14? Do several examples in which students choose between counting by 1s and skip counting by 2s. Eventually, leave more spaces between the numbers on the number line (EXAMPLE: 10 ___ ___ 16). Repeat with examples where students need to choose between

   - skip counting by 2 or skip counting by 5;
   - skip counting by 5 or skip counting by 10;
   - skip counting by 2, 5, or 10.
Grouping to Count

Pages 86–92

CURRICULUM EXPECTATIONS
Ontario: 1m2, 1m3, 1m4, 1m7, 1m21
WNCP: 1N1, 1N3, 1N8, [R, CN, C]

VOCABULARY
skip
skip counting

Goals
Students will group objects by 2s, 5s, or 10s in order to count them.

PRIOR KNOWLEDGE REQUIRED

can skip count by 2s, 5s, and 10s

MATERIALS
lots of connecting cubes
counters, cubes, or straws

BLM Other Alphabets (p H-160)

Counting things that come in 2s. Ask students why skip counting by 2 might be useful—is there anything they can think of that comes in 2s? (feet, hands, shoes, gloves, mittens, the dice in many games, the centimetres on a large connecting cube, etc.) Have several volunteers come to the front of the class and have students count the number of shoes at the front. Ask them why skip counting by 2 is a natural way to do this. Repeat with different numbers of volunteers. Count hands, eyes, or ears instead of feet.

Group objects in 2s to count them more easily. Count 8 dots by 1s and by 2s by drawing on the board:

Have students compare the two ways of counting. ASK: Did I get the same answer both ways? How many dots are there? Which way of counting do you find easier? Why? (Some may find counting by 1s easier because they can say the next number more quickly and others may find counting by 2s easier because they have to say fewer numbers. Both answers are good.) Which way is faster? If you had a lot of things to count, which way would you be done sooner?

Count more small groups of dots this way but let volunteers draw the pictures. Include examples with dots arranged in two rows and then randomly. Eventually, count an odd number of dots, so that students need to count by 1 for the last dot. Students might enjoy grouping counters or letters in their classmates’ names in 2s to count them.

Group objects in 5s or 10s to count them more easily. Draw 6 stick people on the board. ASK: How many fingers does each person have? Explain that since each person has 10 fingers, we can count by 10s to find
the total number of fingers. Do this as a class and write the numbers on the people as you say them to keep track. Then count by 5s instead (point to each hand/arm, one at a time) and emphasize that you get the same answer both ways. **ASK:** What was easier—counting by 5s or 10s? Why?

Give each student 30, 35, 40, 45, or 50 connecting cubes. Have students count their connecting cubes by 1s and record their counting. **ASK:** How did you keep track of the cubes you already counted? How did you keep track of your counting? Did anyone have to go back to the beginning and start over? Then tell students to link groups of 5 cubes together and then count by 5s. Discuss how counting by 5 was faster. Then tell students to link groups of 10 together and to count by 10s. Was counting by 10s easier or harder than counting by 5s? Why?

**Count by 5s and then by 1s.** While you put your hand on your head, students count by 5s, starting from 0. When you move your hand to your hip, they switch to counting by 1s instead. When you move your hand back to your head, they go back to 0 and start counting by 5 again. (**EXAMPLE:** 0, 5, 10, 15 [hand to hip], 16, 17, 18, [hand to head] 0, …) Repeat several times. Student volunteers may take on your role and change the cues, e.g., jumping jacks to count by 5s and hopping to count by 1s. Students might give each other cues working in partners.

**Bonus** Students count by 5s and 2s.

**ACTIVITY 1**

Give each student up to 20 counters, cubes, or straws. Suggest that students group their objects by 5s. Then have students pair up and count how many objects they have in total. (Students may or may not need to make another group of 5.) Have pairs form groups of 4 and repeat.

Draw dots arranged on the board, first all in a row and then more randomly; students group them by 5s and then by 1s when there are less than 5 left.

**Draw by 5s and then by 1s.** Repeat for 10s the exercises and activities in Count by 5s and then by 1s.

**Count by 10s and then by 1s.** Repeat for 10s the exercises and activities in Count by 5s and then by 1s.

**Two of everything by L. T. Hong.** A Chinese folktale. Everything is counted by 2s. **Cheerios Counting Book** by W. Mcgrath and B. Mcgrath. Count by 1s to 10 and then by 10s to 100.

**Extension**

Which letters are missing on **BLM Missing Letters** (p H-161)? Students will group by 5s to see how many letters are missing and then use an ordered list to determine which letters are missing.
Grouping to Estimate

Page 93

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m7, 1m21
WNCP: 1N1, 1N3, 1N8, [R, C]

VOCABULARY
skip
skip counting

Goals
Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

Goals

Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

Goals

Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

Goals

Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

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PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

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Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

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Students will estimate by first finding a group of 5 or 10.

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Students will estimate by first finding a group of 5 or 10.

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Students will estimate by first finding a group of 5 or 10.

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PRIOR KNOWLEDGE REQUIRED

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PRIOR KNOWLEDGE REQUIRED

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PRIOR KNOWLEDGE REQUIRED

Goals

Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

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Students will estimate by first finding a group of 5 or 10.

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Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

Goals

Students will estimate by first finding a group of 5 or 10.

PRIOR KNOWLEDGE REQUIRED

Goals

Students will estimate by first finding a group of 5 or 10.

Prior Knowledge Required

can skip count by 2s, 5s, or 10s
can group objects into 5s and 10s to count them

Materials

counters
straws
elastics
sheet with dots arranged randomly (details below)

Group counters and straws to estimate. Show students a pile of almost 50 counters. Take and record students’ guesses for how many there are. Then count out 10 counters. Ask if anyone wants to change their guess. Continue counting out 10 counters and asking students if they want to revise their guesses until you get the answer. Give each student a group of many straws, cut in thirds, and several elastics. Students can guess how many straws they have, bundle a group of 10, revise their guess and continue in this way until they’ve counted all the straws.

Group dots to estimate. Hold up a sheet with dots arranged randomly. EXAMPLE:

Ask students to estimate the total number of dots. Then ASK: How many groups of 5 do you think there are? Circle a group of 5 and ask if anyone wants to change their estimate of the total. Circle another 5 and repeat. Continue in this way, recording the counting as you go: 5, 10, 15, 20, 25, 30, 35, 40, 45, 46, 47, 48. Ask students if showing a group of 5 made it easier to estimate the total. ASK: How does grouping by 5 make it easier to count them all? Repeat with grouping by 10 (10, 20, 30, 40, 41, 42, 43, 44, 45, 46, 47, 48).

Extensions

1. Display a large hundreds chart or use the overhead projector. Ask a volunteer to think of a number from 1 to 30, then try to guess the volunteer’s number. Have the volunteer tell you whether your guesses are too high or too low each time. Start guessing at 1 and continue in order (1, 2, 3, …) until you reach the number. Repeat with other volunteers until
someone gives you a number close to 30. Discuss the strategy you used (saying the numbers in order), first asking students to explain the strategy and then discussing whether the strategy was good or not. Then use a different strategy—count by 2s instead of by 1s. If, for example, 36 is too low and 38 is too high, the answer must be 37. Discuss this strategy and how it is better than the previous strategy. Then use counting by 2s to guess a number between 1 and 100. Discuss the strategy again. **ASK:** Do you think we should try a different strategy? Why? Instead of counting by 2s, what other numbers are easy to count by? Try counting by 5s or 10s. If a volunteer says that 60 is too low and 70 is too high, **ASK:** How can I find the number? (count by 1s or 2s or 5s)

2. Each student will need pre-made paper “snakes” (strips of paper)—2 of length 10 cm, 4 of length 5 cm, and 2 of length 25 cm—cotton balls, and connecting cubes.

Give each student their 10 cm and 5 cm long snakes and explain that these are child snakes and adult snakes. Have students count their snakes to ensure that they have 2 adult snakes and 4 child snakes. **ASK:** How many child snakes are as long as—or fit into—an adult snake? How do you know?

Give students a few cotton balls and tell them that these are snake food pellets. Explain that each child snake needs 1 pellet of food a day. Explain that the longer the snake, the more food it needs. Challenge students to find out how many pellets an adult snake needs a day. Give them time to think about the problem. Explain that because 2 child snakes fit into 1 adult snake, the adult needs 2 pellets of food each day. Demonstrate this visually by placing the 2 child snakes and their pellets next to an adult snake:

Then tell students that these are magic snakes! If you give the child snake 2 pellets, it will sing. **ASK:** How many pellets do I need to give the adult snake to make it sing?

Then tell students that if you give the child snake
- 3 pellets, it will dance.
- 4 pellets, it will skip rope.
- 5 pellets, it will turn the rope while you skip.

Ask students to determine how many pellets an adult snake would need to do each of these things. Encourage students to discover the pattern: they need to skip count by 2s to determine the next answer. In other words, if they know that an adult snake needs 4 pellets to sing, it will need 6 pellets to dance, 8 to skip rope, and so on.

Give students snakes that are 25 cm long. Challenge students to determine how many pellets these grandma and grandpa snakes would need in order to do each of the activities listed above. Do they see the connection with skip counting by 5s?
NS1-56
Skip Counting Backwards
Page 94

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m7, 1m21
WNCP: 1N1, 1N8, [R, C]

VOCABULARY
skip counting

Goals
Students will skip count backwards by 2s (from 20 to 0 and 19 to 1) and by 5s (from 20 to 0).

PRIOR KNOWLEDGE REQUIRED
- can count forwards and backwards
- can skip count forwards by 2s, 5s, and 10s
- can read number lines and hundreds charts

MATERIALS
- number line and hundreds chart (for reference)
- ball
- counters
- chalk

Skip count back from 10 using your fingers. Hold up all fingers on both hands. ASK: How many fingers am I holding up? (10) Bring down your two thumbs. ASK: Now how many? (8) Bring down your two index fingers and repeat the question. Continue with other fingers. Explain to students that instead of skip counting by 2 from 0 to 10, they skip counted backwards from 10 to 0. Give students some time to practise this using their own fingers.

Skip count back from 10 using a number line. Draw two number lines from 0 to 10. Show skip counting forwards by 2s on one and backwards by 2s on the other. Discuss the similarities and differences between the two number lines (they look exactly the same except for the arrows, which point in different directions; you started from the opposite end when drawing the leaps) and the two sequences of numbers (just say the same numbers, but in the other order). Ask various students to skip count back from 10 orally using the number line.

Skip count back from 20 using a hundreds chart. Show the first row of a hundreds chart and explain that we can show skip counting back by 2s by colouring the numbers we say. Draw on the board:

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Guide students to skip count back by 2s from 10 by pointing to the numbers in that order. Then repeat with 2 rows of a hundreds chart, starting at 20. Ask volunteers to skip count backwards by 2s from 20 without your guidance, but still using the chart. Then repeat starting at 19 and skipping the shaded squares instead of the white squares. Chant skip counting back by 2s (from 20 and from 19) with a large hundreds chart.

AT HOME
Games using stairs to reinforce adding, subtracting and skip counting forwards and back.
## Activities 1–2

1. Use chalk to draw the first two rows of a hundreds chart on pavement in the schoolyard. Have students skip count backwards by hopping, starting at 20 and skipping every second number. They should say numbers as they land on them. When the first student gets to 10, the next student can start.

2. Catch (see NS Part 2—Introduction). Throw numbers from 2 to 20, both odd and even. The student says the next number when counting back by 2 (i.e., the number that is two less than). Ensure that students have a hundreds chart or number line to refer to.

### Count back by 5s from 20

Use the hundreds chart as above but shade only 5, 10, 15, and 20.

#### Checking your answer

Have students individually write the next number when counting back by 2:

- 10 8 ___ ; 13 11 ___ ; 14 12 ___ ; 15 13 ___

Then have students find the middle number in a sequence of three. They should use the third number to check their answer: 11 ___ 7 (9 comes right after 11; since 7 comes right after 9 when counting back by 2, 9 is correct)

Give students many problems of this sort. Allow students to use a chart or number line to help them.

#### Examples:

- 7 ___ 3 ; 8 ___ 4 ; 19 ___ 15 ; 16 ___ 12 ; 12 ___ 8

### Extensions

1. Give students a sequence with a missing number and challenge them to find it.

   **Example:**

   - 20 18 16 12 10 8

2. Give students a sequence with a number that doesn’t belong and challenge them to find it.

   **Examples:**

   - 20 15 10 8 5 0
   - 20 18 16 14 12 11 10 8 6 4 2 0

### Problem Solving

Reflecting on the reasonableness of the answer.

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Identifying Coins

Page 95

Goals
Students will identify Canadian coins by name and appearance.

PRIOR KNOWLEDGE REQUIRED
- can compare objects by size (bigger, smaller)

MATERIALS
- play money (coins)
- opaque bag
- BLM Money Spinners (p H-162)
- paper fasteners

Matching coins by the two sides.

ACTIVITY 1

Give your students play coins—one of each type (penny, nickel, dime, quarter, loonie, and toonie). Tell students to place the coins on their desk and ask if they can tell which side is heads and which side is tails. Why do they think one side is called heads and the other side is called tails? (The heads side has the queen’s head on it.) Tell them to turn all the coins so that the heads sides are up. Give students white sheets of paper and ask them to fold the sheet in half so that the fold line separates the top from the bottom. Then have them unfold the paper, place all the coins in a row under the top half of the page, and rub a pencil over the paper to make rubbings of the coin images. When this is done, they should turn each coin over, rearrange the coins in a different order, place the bottom half of their sheet over the coins, and rub the pencil over the paper again. Then they draw lines to match the heads side of each coin with its tails side. Students should keep this sheet for reference.

Identifying coins by names. Tell your students that a penny is the coin with maple leaves on it. Ask students to hold up the penny. Write “penny” on the board and ask students to copy the word on the sheet they created in the Activity above, beneath the tails side of the penny. Repeat with other coins. Then ask students to hold up various coins, one at a time. Students may refer to their sheets at first, but should eventually be able to identify coins by name without help.
2. Give your students 8–10 play coins and have them sort the coins by type. Ask them to label each group (penny, nickel, etc.). When the sorting is done, ask students to describe the strategy they used to sort: Did they take each coin, look at it, and place it in the right group? Did they choose all coins of a certain denomination, say all the toonies, set them aside and proceed to the next type? Continue until only coins of one type are left. Let students remix the coins and sort them using a new method. Did it produce the same result? Which way was easier? Why do they think that was?

3. Give students a penny, a nickel, a dime, and a quarter. Ask them to compare the sizes of the coins by placing one on top of the other, and then ask them to order the coins by size. Which coin is the largest? Which coin is the smallest?

4. Give each student 5 quarters, 5 dimes, and an opaque bag. ASK: How are the coins different? (size, images) Now tell students to place their coins in their bag and shake it. Ask students to feel the coins inside the bag (no peeking!). ASK: Can you tell by feeling what is drawn on each coin? (no) What can you tell by feeling? (which coins are larger and which coins are smaller) Challenge students to pick out all the quarters. Then give students 5 nickels. ASK: How are these coins different from the quarters? (size, images, smooth edges instead of ridges). Which of these differences can you feel? Now have students put their quarters and nickels in the bag, and challenge them to pick out all the quarters. Then have students put all three types of coins in the bag. Discuss strategies for telling the coins apart by size (feel each coin separately, place coins one on top of the other and see which one sticks out). ASK: Which coins will be the easiest to pick out? (quarters) Why? (they’re biggest) Suggest that students pick out the quarters first, then the nickels, and then the dimes. Now give students 5 pennies and repeat, starting with just quarters and pennies in the bag, then quarters, pennies and dimes, and then all the coins.

5. Each pair of players will need a spinner with coins on it (there are two spinners on BLM Money Spinners) and play coins. Player 1 spins the spinner 4–5 times and creates a core using the coins that come up on the spinner. Player 2 has to continue the pattern.

Extension

Students can bring in coins from different countries, sort them by country, make rubbings as in Activity 1, and create a display of pictures of international coins.
Coin Values

Goals
Students will identify Canadian coins by name and value.

PRIOR KNOWLEDGE REQUIRED
understands that number is more than just quantity

MATERIALS
play money
BLM Coins on a Chart (p H-163)
BLM Coins on a Number Line (p H-164)
BLM Fake Coins (p H-165)
BLM Fake Money Game (p H-166) with tokens, a die, and play money
BLM Coins (p H-167)

NOTE: Students should refer to play money or actual coins when completing the worksheet for this lesson, in order to write the amount in the correct location on each coin.

Match coin values to names and pictures. Ask students if they know which coin is worth the most and which is worth the least. Ask them if the amount of money is shown on the coins. Does every coin have the amount written on it? Is the value of the coin printed on both sides or just one side? Tell students that a nickel is worth 5 somethings, and challenge them to find the something. Tell them that it’s written right on the nickel. Then ASK: How much is a penny worth—1 what? Which is worth more—a penny or a nickel? How much is a dime worth? 10 what? Write the values on the board (see margin).

Students can refer to this list while they do the worksheets. They can also copy this information onto the reference sheet they created in the last lesson (see Activity 1, page H-70).

ACTIVITIES 1–2
1. Students can cut out the coins on BLM Coins on a Chart and glue them to the squares showing their value (e.g., glue nickel to square 5). A similar exercise is on BLM Coins on a Number Line. Alternatively, have students place play coins on a hundreds chart or number line according to their value.

2. Count to 30 as a group. Instead of saying 1, 5, 10, and 25 say the coin name (penny, two, three, four, nickel, six,...). Repeat by counting by 5s. (nickel, dime, 15, 20, quarter, 30)
Show students pairs of coins of different denominations and ask them to say which coin is worth more.

**ACTIVITY 3**

Player 1 thinks of a coin. Player 2 has to identify the coin. She can ask up to 3 questions, such as “Is it worth more (less) than a nickel?” As an easier variation, if Player 1 thinks of a nickel, he could answer “it is a nickel” instead of “no” to the last question.

**Introduce the cent symbol (¢).** Review the meaning of the equal sign (is the same as, is the same number as). Explain that the equal sign can also mean “is worth as much as,” and this is the meaning we use when working with money. **ASK:** Why do we use the symbol instead of writing the words? (we use these words a lot and the symbol takes up less space) **SAY:** Look at the list on the board. What word do you think we use the most when talking about money? Is there a word that is used more often than the others? (cents) Do you think there should be a symbol for that word like there is for “=” , so that we don’t have to keep writing it? Then ask if anyone already knows what symbol people invented for that word. Let a volunteer show it if someone wants to. Then write on the board:

\[
\text{penny} = 1¢ \quad \text{nickel} = 5¢ \quad \text{dime} = 10¢
\]

**ASK:** How could I write 8 cents using cents notation? (8¢) Invite volunteers to write various amounts using cents notation. **EXAMPLES:**

- 12 cents
- 7 cents
- 46 cents
- 39 cents

**Bonus**

- 100 cents
- 200 cents
- 1 000 cents

**ACTIVITIES 4–5**

4. **BLM Fake Coins.** Students cross out things that are wrong on each coin (e.g., numbers, words, geometric shapes).

5. Students can use **BLM Fake Money Game** as a game board. They will need tokens, a die, and play money. Students can play individually or co-operatively in pairs. Each cell has the picture of either a real coin or a fake coin. The goal is to fill the board with real coins.

To start, players place their tokens on any real coin and put all the play money in the centre of the game board. Players take turns rolling a die and moving, according to the number rolled, around the board in whichever direction they wish. Two players cannot be in the same cell at the same time, so if the number rolled takes a player to a cell that is already occupied, the player must go in the other direction. When a player’s token lands on a fake coin, the player puts the corresponding real coin in the cell.

6. **Electrical Matching Game.** (See NS Part 2—Introduction) match coin names to their values. **VARIATION:** Match coin names to their pictures.
**NS1-59**

**How Much Money?**

Pages 98–102

**CURRICULUM EXPECTATIONS**

Ontario: 1m1, 1m3, 1m7, 1m16

WNCP: optional, [R, C], 2N4

**VOCABULARY**

penny  
nickel  
cent

**Goals**

Students will count money (nickels and pennies) and represent amounts up to 20 cents.

**Prior Knowledge Required**

can skip count by 5s

**Materials**

play money or BLM Coins to Cut Out (p H-168)  
BLM Counting Pennies by 5s (p H-169)  
dice  
BLM Money Memory (p H-173)  
BLM Counting Coins (pp H-170–H-172)

**Counting pennies.** Review with students what a penny looks like and how much it is worth. Tell them that adding money is really easy when you have only pennies because each penny is worth 1 cent. Demonstrate counting out a pile of pennies: 1 cent, 2 cents, 3 cents, and so on. Give each student a pile of play coins, predominantly pennies and nickels. Have them separate the pennies from the other coins. Then put an amount on the board (up to 20¢) and tell students to count out that many pennies, as though they are going to buy something for that price. Repeat with different amounts.

**A quick way to draw coins.** Draw a circle and write in it: 1¢. Show students an easy way to draw a penny. Draw a nickel and a dime the same way.

**Counting pennies by 5s.** Draw two five-frames (rows with 5 squares) on the board. Draw a penny (as above) in each cell. Then draw 10 pennies scattered next to the five-frames. **ASK:** Which group of pennies will be easier to count—the pennies in the five-frames or the other pennies? Invite several volunteers to check by counting both groups. (Using a frame is easier because you can count by 5s.) Review skip counting by 5s. **ASK:** How could you arrange play money to make it easier to count? (put coins in rows or stacks of 5) Demonstrate stacking pennies by 5s, then have students show various amounts of play money by stacking (see examples in margin).

Draw 18 pennies on the board in disarray. **SAY:** I want to count the pennies quickly. I know that counting by 5s is quicker than counting by 1s, so I’ll group the pennies by 5s. Draw circles around groups of 5 pennies, and count the pennies by 5s: 5 cents, 10 cents, 15 cents. Explain that there are not 5 more pennies, so we can’t make another group of 5. How can we count from here? (count by 1s) Draw more groups of pennies for students to count.

**A nickel is worth 5 pennies.** Draw 5 pennies on one side of the board and a nickel on the other. Point to the pennies and **SAY:** This is Josh’s money.
How much money does Josh have? Let’s count together—1 cent, 2 cents, 3 cents, 4 cents, 5 cents. Point to the nickel and SAY: This is Samantha’s money. How much money does Samantha have? (5 cents) Who has more money: Josh or Samantha? Add five more pennies to one side and another nickel to the other. What is worth more: 10 pennies or 2 nickels?

**ACTIVITY 1**

**Trading coins.** Give each student 20 pennies and 8 nickels. Have pairs trade coins (5 pennies for a nickel) so that they have the same amount of money all the time. They should continue trading until one student has 20 coins and the other has 36.

**Counting nickels.** Demonstrate skip counting by 5 to count out nickels: 5 cents, 10 cents, and so on. Give each student a die and 6 nickels. The student rolls the die, lays out as many nickels as the die shows, and counts the money. They can fill in the blanks: ___ nickels is ___¢. Repeat several times. Then ask students to put 15¢ to the side of their desk, as though they are buying something for that price. Repeat with 20¢, 10¢, and 25¢.

**Counting nickels and pennies.** Draw 8 pennies on the board and ask students to say how much money that is. (8 cents) Then invite a volunteer to trade 5 pennies for a nickel. Did the amount change? Do we still have 8 cents? Verify by counting on from 5. Repeat with 14 pennies, this time trading for a nickel twice. Demonstrate counting the money by starting with the nickels. Then **ASK:** Should I continue counting by 5s? What should I count by? (1s) Continue counting. Repeat with various other amounts, first trading pennies for nickels. Involve as many volunteers as possible in counting.

Give students 18 pennies each and have them trade pennies for nickels. **ASK:** How much money do you have? Repeat Activity 1, this time giving each student 17 pennies and 3 nickels. Let them count the money, then trade coins until one player has 12 coins and the other has 28.

**ACTIVITIES 2–3**

**2. Picking Pairs and Money Memory.** Use **BLM Money Memory** and match equivalent sums of money.

**3. Create a design with play pennies and nickels.** How much money is in your design?

**Making money amounts with both nickels and pennies.** Show an item with a price tag of 9¢. **ASK:** How could you make 9 cents to pay for this item? If the solution with a nickel does not appear, ask students how many pennies you have to add to a nickel to get 9 cents. Repeat with other items and various prices (up to 20¢). Students should lay out the necessary amount of money with play coins. Encourage multiple solutions (e.g., 3 nickels and 2 pennies or 2 nickels and 7 pennies for 17¢).
Goals
Students will add and subtract amounts of money up to 10 cents.

Prior Knowledge Required
- can skip count by 5s
- can count money amounts up to 20 cents

Materials
- play money
- BLM Adding Money Game (p H-174), a die, and a token for each student
- BLM Money Memory (p H-173)
- BLM Food Sale (pp H-175–H-176)

Counting money is the same as adding coin values. Show on the board one nickel and three pennies in a random arrangement. ASK: How much money is this? How do you know? Write an addition sentence to show the total amount of money (1¢ + 5¢ + 1¢ + 1¢ = 8¢). Then show other amounts and have volunteers write the corresponding addition sentences. EXAMPLES: 1 nickel and 2 pennies; 4 pennies; 1 nickel and 1 penny.

Reordering coins does not change the total value. Ask students if they will get the same answer by counting the nickel first. Write 5 + 1 + 1 + 1 under the coins. Then rearrange the coins (penny, penny, penny, nickel) and have a volunteer write the corresponding addition statement underneath (1 + 1 + 1 + 5). ASK: Does rearranging the coins change the total amount of money?

Then write on the board 5 + 1 + 1 + 1 = 1 + 1 + 1 + 5 and ask if this is correct. Remind students that “=” means “is the same number as.” ASK: Does adding 5 + 1 + 1 + 1 give the same number as adding 1 + 1 + 1 + 5?

Counting the 5 first is more convenient. ASK: Did you find it easier to count the 5 first and then count on by 1s or is it just as easy to count in any order? Demonstrate adding 1 + 1 + 1 + 5 in that order (1, 2, 3, 8) and then by counting the 5 first (5, 6, 7, 8). ASK: Did anyone find one way easier than the other? Was it easier to add 5 after you counted the 3 ones (3 + 5 = 8) or was it easier to count on from 5? Which did you learn first – saying the numbers in order starting at 5 or adding 5 to a number?

Draw on the board 3 nickels and 2 pennies. Count the money first in random order: for 1 + 5 + 1 + 5 + 5, say 1, 6, 7, 12, 17. Then count the nickels first: 5, 10, 15, 16, 17. Discuss which way of counting is easier and why. Emphasize that counting by 5s from 0 is easier than adding 5 to any number, like 12 or 7. Have students practise counting various piles of coins.

How much more money? Draw a nickel and three pennies in a large circle on the board. Then draw four pennies in another large circle. Ask how much...
money is in each group and write down the answers. **ASK:** Where is there more money? How much more? Repeat several times with other amounts. **SAY:** I have three pennies and Jasmine has five pennies. Who has more? How many more? Which operation do you use to find out how many more pennies Jasmine has? (subtract 3 from 5) Have students write subtraction sentences showing how much more money is in one group than in the other. Repeat with how much less money is in one group than in the other.

### ACTIVITIES 1–3

1. **Adding Money Game** (Adapted from *A Companion Resource for Grade One Mathematics* by Saskatchewan Learning) Students will need the **BLM Adding Money Game** as a game board, play pennies and nickels, a die, and a token. The player rolls the die, moves forward the correct number of squares, and receives the coin shown on the board. When the player is at the end of the board (not necessarily by the exact amount shown on the die), he or she write an addition statement for the money collected and counts the money. Students might find it easier to count their money if they trade 5 pennies for a nickel or vice versa.

2. **Give each pair of students the cards from the BLM Money Memory.** Students write the numbers from 0 to 5 in order on a separate sheet of paper. They pull a pair of cards simultaneously from the deck and turn them over. How much more money is on one card than the other? Players take turns writing subtraction statements to find out how much more money is on one card than on the other, and cross out the result in their list. If there are no more cards left in the pile, collect all the cards, shuffle them, and start again. The goal is to cross out all the numbers.

3. **Give each pair a copy of BLM Food Sale.** Students should cut out the receipts and take turns being the cashier and the customer. The cashier writes out the receipts for the customer. Each customer has 10 nickels and should buy as much as they can for 50¢. The cashier has 15 pennies to give change. **VARIATION:** Students attempt to buy a balanced meal (one item from each of the four food groups).

### Extension

Students will need **BLM Adding Money Game** as a game board, play pennies and nickels, a die, and a moving token. The player begins with a nickel and 4 pennies. The player rolls the die and moves forward the corresponding number of places. When players land on a nickel, they get a nickel; when they land on a penny, they lose a penny (players may need to trade a nickel for 5 pennies). At the end, students count their money. We suggest that students play individually to avoid competition.
Doubles

Goals
Students will use the double of 5 and 10 to double other numbers.

Prior Knowledge Required
- can count
- can skip count by 2s
- can add 10 to a one-digit number

Materials
- MIRAs
- BLM What Is the Double? (p H-177)
- BLM Double Tens and Ones (pp H-178–H-179)
- counters

Introduce “double.” ASK: Does anyone know the word double? What does it mean? (add the same number to the number you have) If I have 3 pennies and I double the number of pennies, how many will I have? Demonstrate counting out 3 pennies and then 3 more. Explain that if you have double, that means you have the same number again. Tape paper counters to the board to demonstrate this. Show 2 counters and SAY: Now I’m going to double my counters, so if I start with 2, I need to add 2 more. (put 2 more counters on the board) ASK: How many do I have now? Write: 4 is the double of 2. Repeat with other examples, always emphasizing the word double and using pictures or concrete objects to illustrate the doubling.

Write addition sentences to show doubles. The double of a number is obtained by adding a number to itself, so the double of 3 is $3 + 3 = 6$. Give students counters. Have students write addition sentences to show the doubles of 4, 2, 5, 1, and 0.

Doubles from a mirror. Explain that we see doubles in a mirror. We see the real object and then we see it again in the mirror. Give students MIRAs. Tell students to place four counters in front of the MIRA. Ask a volunteer to draw what they see. Have another volunteer write an addition sentence based on the number of counters on each side of the MIRA and the number of counters they see altogether. Do students see a double?

Double a number by creating 2 rows of the same number. Put a row of 3 paper counters on the board and write 3 beside it. Then add another row underneath and ASK: How many are there now? Write “6 is the double of 3.” Repeat with doubling other numbers from 1 to 10.

Extra Practice
BLM What Is the Double? asks students to double the numbers from 0 to 9 without the model.
PROBLEM SOLVING
Changing into a known problem, Making a model
PROBLEM SOLVING
Reflecting on what made the problem easy or hard

Using 5 to double. Tell students you want to double the number 8 a different way. Draw a model for 8 with 5 coloured circles and 3 uncoloured circles. Now double 8—draw two rows of 8 circles and adjust the number sentence (see Figure 1).

Review adding 10 to a one-digit number. Discuss why 10 is particularly easy to add to other numbers. Why is doubling easier when you split the number into 5 plus another number? What is the double of 5 that makes it easier to work with? Repeat with several examples. Then double some numbers this way without the model—just use the numbers: $6 = 5 + 1$, so $6 + 6 = 10 + 2 = 12$. Have students double more numbers this way.

**Bonus** Find the double of 13 ($13 = 5 + 8$ so the double of 13 is $10 + 16 = 26$).

Using 10 to double. Have students fill in the blanks: $13 = 10 + ____$; $18 = 10 + ____$; $16 = 10 + ____$. Then use a model like the one in Figure 1 to double 13. Emphasize that this answer is the same as the bonus above. It doesn’t matter how you double 13 (by thinking of it as $5 + 8$ or $10 + 3$), you still get the same answer. Have students practise using 10 to double various numbers. EXAMPLES: $11, 14, 13$.

**Bonus** $17, 18, 16, 19$.

Double 2-digit numbers. Double tens by doubling the first digit: 20 doubled is 40, 30 doubled is 60.

**Bonus** 70 doubled is 140, 50 doubled is 100.

Then double numbers by separating the tens and ones: $34 = 30 + 4$, so $34$ doubled is $60 + 8 = 68$. Repeat with more 2-digit numbers where both digits are less than 5.

**EXAMPLES:** $24, 21, 32, 33, 42, 41, 43, 44, 34, 22, 23$. Students can complete BLM Double Tens and Ones for extra practice.

Extensions

1. On BLM Big Cubes and cm, students discover that the number of small cubes is double the number of large cubes for any given length.

2. Challenge students to double numbers in different ways, including by subtraction, and verify that they get the same answer. **EXAMPLE:** $7 = 5 + 2$ so $7$ doubled is $10 + 4 = 14$, but $7 = 10 – 3$ so $7$ doubled is also $20 – 6 = 14$.

3. Challenge students to double numbers with ones digit 5 or more. E.g. $17$ is $10 + 7$, so $17$ doubled is $20 + 14 = 34$. 
Goals
Students will use doubles to add by using the concept of one more than or one less than.

PRIOR KNOWLEDGE REQUIRED
knows the doubles of numbers to at least 10
can complete number sentences where one number is missing
can add 10 to a one-digit number
can solve addition sentences with three addends
can find one more than and one less than

MATERIALS
MIRAs
BLM Doubles and Mirrors (p H-181)
counters

Review—using pairs that make 10 to add. EXAMPLES: 8 + 3 is one more than 7 + 3 (or 8 + 2) which is 10, so 8 + 3 is 11. Since 7 + 2 is one less than 8 + 2 (or 7 + 3), which is 10, then 7 + 2 is 9.

Use given doubles to add. Teach students to use doubles to add in the same way they used pairs that make 10. For example, 3 + 4 is one more than 3 + 3 = 6, so 3 + 4 = 7. Another example: 7 + 6 is one less than 7 + 7 (or one more than 6 + 6), so 7 + 6 = 14 − 1 = 13 (or 12 + 1 = 13).

Draw a model to demonstrate why this works:

7 + 6

6 + 6 is 12, so 7 + 6 is 13.

Have students solve various problems of this sort. EXAMPLES:
4 + 4 = 8, so 5 + 4 = ___  5 + 5 = 10, so 5 + 6 = ___
8 + 8 = 16, so 8 + 9 = ___

Bonus
Challenge students to use two or three more (less) than: 5 + 7 is two more than 5 + 5 = 10, so 5 + 7 = 12. EXAMPLES:
4 + 6 = 10 so 4 + 8 = ___  7 + 3 = 10 so 5 + 3 = ___
6 + 6 = 12 so 6 + 8 = ___  8 + 2 = 10 so 8 + 5 = ___
Have students solve the same problem in various ways. **EXAMPLES:**

\[
5 + 5 = 10 \quad \quad 6 + 6 = 12 \quad \quad 4 + 6 = 10
\]

so \(5 + 6 = \) \quad so \(5 + 6 = \) \quad so \(5 + 6 = \)

**Bonus** \quad Find \(4 + 7\) four different ways: compare to \(4 + 6 = 10\),
\(3 + 7 = 10\), to \(4 + 4 = 8\) and \(7 + 7 = 14\).

Find the double before using it to add. **EXAMPLES:**

\[
7 + 7 = \_\_\_\_\_\_ so \ 8 + 7 = \_\_\_\_\_\_; \quad 4 + 4 = \_\_\_\_\_\_ so \ 4 + 5 = \_\_\_\_\_\_;
9 + 9 = \_\_\_\_\_\_ so \ 9 + 8 = \_\_\_\_\_\_; \quad 6 + 6 = \_\_\_\_\_\_ so \ 7 + 6 = \_\_\_\_\_\_;
\]

**Bonus** \quad \(12 + 12 = \_\_\_\_\_\_ so \ 12 + 13 = \_\_\_\_\_\_; \quad 14 + 14 = \_\_\_\_\_\_ so \ 14 + 13 = \_\_\_\_\_\_; \quad 33 + 33 = \_\_\_\_\_\_ so \ 34 + 33 = \_\_\_\_\_\_; \quad 123 + 123 = \_\_\_\_\_\_ so \ 123 + 124 = \_\_\_\_\_\_;

Decide which double to solve before using it to add. **EXAMPLES:**

\[
6 + 5 = \_\_\_\_\_\_ (use either \(5 + 5 = 10\) or \(6 + 6 = 12\)); \quad 7 + 6 = \_\_\_\_\_\_ (use either \(6 + 6 = 12\) or \(7 + 7 = 14\)).
\]

**Bonus** \quad \(41 + 42 = \_\_\_\_\_\_; \quad 60 + 61 = \_\_\_\_\_\_; \quad 312 + 313 = \_\_\_\_\_\_; \quad 2341 + 2342 = \_\_\_\_\_\_.

**ACTIVITY 1**

If MIRAs are available, have students model doubles plus one, such as \(4 + 4 + 1\), using counters; one counter will always be outside the range of the mirror: Students can complete BLM Doubles and Mirrors.

**PROBLEM SOLVING**

Reflecting on what made the problem easy or hard, splitting into simpler problems.

Write on the board: \(6 + 7 = \_\_\_\_\_\_ + \_\_\_\_\_\_ + 1\)

Tell students that you want to put the same number in each box. Ask them how writing \(6 + 7\) this way can make it easier to solve. Emphasize that if they know the doubles, they don’t have to count on from the 6 or the 7—they just have to say the double and add 1. Emphasize that students are changing the problem into 2 simpler problems that they already know how to do—doubling and adding 1.

Choose between using 10 or using doubles. **EXAMPLES:**

\[
\begin{align*}
7 + 6 &= \_\_\_\_\_\_ \quad \text{(This is one more than 6 + 6 and three more than 4 + 6 or 7 + 3. Students may feel that finding pairs that add to 10 is easier than finding doubles.)} \\
7 + 4 &= \_\_\_\_\_\_ \\
5 + 6 &= \_\_\_\_\_\_ \quad \text{(5 + 5 is both a double and a pair adding to 10, so it doesn’t matter which way you look at this one)} \\
32 + 33 &= \_\_\_\_\_\_ \quad \text{(using 10 wouldn’t make sense; you have to double in this case)}
\end{align*}
\]
**Goals**

Students will learn to identify and estimate halves and quarters in shapes.

**Prior Knowledge Required**
- Can identify figures that are the same size and shape
- Knows the concepts of more and less

**Materials**
- Paper circles and circles for students to fold
- A picture to colour
- BLM Half and Quarter (pp H-182–H-183)

**NOTE:** Symmetry and indirect measurement are used in this lesson. You can skip over these parts of the lesson if your class has not yet completed Measurement Part 1.

**Introduce half.** Draw a circle on the board. Tell students it is a pizza and you want to cut it in half so that you can share it with a friend. Try cutting it different ways and ask students if you’ve cut it in half:

![Images of circles cut in half]

Then explain that for a part of a whole to be one half, it needs to be one of two same-sized parts. Draw several other parts of circles (e.g., a pizza slice) and ask students to say if it is a half or not. Now give students a paper circle and challenge them to fold it in half. Then tell them to fold it so that one piece is more than half and the other is less than half. **ASK:** Can both parts be more than half? Ask for situations where we want to divide things in half, so that both parts are the same size. **EXAMPLE:** sharing food.

**Half of a square.** Give each student a square piece of paper and challenge them to fold it in half. Challenge them to find another way until they have found at least one of the first two and one of the last two below:

![Images of squares cut in half]

Have volunteers show their different solutions. Challenge students to fold their paper so that one part is more than half. Is the other part more than half or less than half?

**Half of other shapes.** Show different shapes with parts shaded and ask if the shaded part is half.
Half of a length. Draw a line on the board and explain that Patti wants to walk from one end of the line to the other:

Ask students to show where they think Patti will be when she is halfway along the line and ASK: If Patti is there, how far did she already come? How far does she have to go? Are they the same? How can you tell?

Check by folding. Give students a blank sheet of paper and have them draw a straight line anywhere across the page. Then have them guess where the halfway point is and mark it. To check their answer, students can draw dark, big dots at each end of the line and then fold the sheet so that the dots meet. Is the fold close to the mark they made? Have them repeat with other lines on the same sheet, first guessing where the half is and then checking their answer. How can they make a line of symmetry for the line by using half?

Introduce quarter. When you divide a piece of paper into four equal parts, you have divided the paper into quarters. Challenge your students to fold a square piece of paper into quarters in as many different ways as they can.

EXAMPLES:

Show them other shapes divided into four parts and ask them if they are quarters or not. Ensure all examples are either obviously same-sized or obviously not the same size. **EXAMPLE:** Do not use a rectangle cut in four along its diagonals. Emphasize that for one part to be a quarter, it has to be one of four same-sized parts.

Quarter of a length. Have students draw lines and guess where a quarter is. Students should check their answer by folding. Draw dark dots at the two ends and fold to find half as before. Then fold again so that the half-way mark (now the side of the sheet) meets the dark dot.

Extensions

1. Ask students to brainstorm things they might have heard of that are divided into quarters and halves, such as hours, sports games, measuring cups, dollars, notes in music, and sale prices or discounts.

2. Is this square divided into quarters? How do you know?
   **ANSWER:** Yes, because each equal half is divided into 2 equal parts.

3. **BLM Pencils** (p H-184) guides students to discover the fact that if Sam’s pencil is half as long as Tara’s and Tara’s pencil is half as long as Ben’s, then Sam’s pencil is a quarter as long as Ben’s.
NS1-64
Ordinal Numbers to 39th
Pages 113–114

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m7, 1m24
WNCP: optional, [R, C], 2N3

VOCABULARY
ordinal number

Goals
Students will use ordinal numbers to decode messages.

PRIOR KNOWLEDGE REQUIRED
- can say ordinal numbers from 1st to 20th
- can read a chart using the reading pattern

MATERIALS
none

Say ordinal numbers to 39th. Review how to say the ordinal numbers from 1st to 20th. Tell students that if they know how to say the ordinals from first to ninth, then they also know from twenty-first to twenty-ninth—just say “twenty” first! (twenty-first, twenty-second, twenty-third,...) Then look at ordinals from thirtieth to thirty-ninth—this time, say “thirty” before each ordinal from first to ninth.

Write various ordinal numbers to 39th on the board and have students say them aloud.

Group letters by 5s to decode messages. Write the alphabet on the board using the layout on the worksheets. Ask how you can easily tell from this organization what the 5th letter is, the 10th letter, the 15th, 20th, and 25th. Then demonstrate finding the 12th letter by counting on from the 10th letter. Ask volunteers to find other letters according to their position. EXAMPLES: the 7th letter, the 18th letter, the 24th letter.

Have students complete both worksheets. Discuss strategies for decoding the messages on the second page:

- decode each letter one at a time, i.e., find the first letter, then the next, and so on
- look for all the a’s (1st), then the b’s (2nd), and so on
- fill in the first letter in the first word, then see if it occurs anywhere else; do the second letter and see if it repeats later, etc.
1. BLM Colouring  (p H-185) asks students to colour two balloons in nine different ways using three colours: red, blue, and yellow.

2. How many dots are on a single die?

First, students need to determine which numbers occur on the die. Then students need to find a way to add the 6 numbers. Possible strategies include:

- Draw the 6 faces of a die on paper and group the dots by 5s:

  ![Die Faces]

  The number of dots is $5 + 5 + 5 + 5 + 1 = 21$. (Skip count by 5s and add 1.)

- Count on in sequence and use the answer for each problem in the next problem: $1 + 2 = __ ; 1 + 2 + 3 = __ + 3 = __ ; 1 + 2 + 3 + 4 = __ + 4 = __ ; 1 + 2 + 3 + 4 + 5 = __ + 5 = __ ; 1 + 2 + 3 + 4 + 5 + 6 = __ + 6 = __$

- Write the number sentence for all the numbers $(1 + 2 + 3 + 4 + 5 + 6 = __)$ and try to find ways of grouping them to make 5 or 10. **EXAMPLE:** $6 + 4$ is 10 and $3 + 2$ is 5, so the sum is $1 + 5 + 5 + 10 = 21$.

- Remind students that the magic number on a regular die is 7. **ASK:** How can you use this to find how many dots are on the die? How many pairs of opposite sides are there? Encourage students to determine this by putting a star on one side of the die and a heart on the opposite side. How many stars did they use? **ANSWER:** They had to use 3 stars, so there are 3 pairs of opposite sides. Since there are 7 dots on each pair, the answer is $7 + 7 + 7 = 21$. Each pair of opposite sides adds to 7 (1 and 6, 2 and 5, 3 and 4), so the total number of dots on the die is:

  $1 + 2 + 3 + 4 + 5 + 6 = 7 + 7 + 7 = 21$.

You could also copy the six faces on a die onto paper and rearrange the order: 1, 6, 2, 5, 3, 4 to show this.

### Extensions

1. If students are familiar with writing number words past 20 (See Extension 1 from NS1-27), show students the following pattern:
3 is 2 more than 1 and three has 2 more letters than one.
23 is 2 more than 21 and twenty-three has 2 more letters than twenty-one.
33 is 2 more than 31 and thirty-three has 2 more letters than thirty-one.
43 is 2 more than 41 and forty-three has 2 more letters than forty-one.

Discuss why the pattern holds and ask how they can find other pairs of numbers which differ, both in quantity and number of letters, by the same number. (EXAMPLE: Use 6 and 8 to obtain 26 and 28, 36 and 38, 46 and 48) You might discuss whether 13 and 11 work (yes) and 16 and 18 (no) and why. 13 and 11 just by chance and 16 and 18 do not because the part that's not the same as six and eight are different (teen and een).

2. Students can make up more questions like those at the bottom of the worksheet.
Match Pictures to Number Words

Match the word with the number of hearts.

- three
- five
- one
- four
- zero
- two
- six
- eight
- ten
- six
- nine
- one
- nine
Letter Sounds in Numbers (1)

☐ Colour numbers with the f sound red.
☐ Colour numbers with the r sound blue.

Which number is purple? _____
Letter Sounds in Numbers (2)

☐ Colour numbers with the s sound yellow.
☐ Colour numbers with the v sound blue.

Which number is green? _____
More Than

Write the numbers above the number words. Fill in the blanks.

Five is ___ more than two.

Seven is ____ more than five.

Nine is ____ more than six.

Eight is ____ more than four.

Nine is ____ more than three.
Stars

Join the dots in order.
Reading Numbers

☐ Use the code to find the message.

0 1 2 3 4 5
A B C D E I

6 7 8 9 10
M N R S U

I C

five two zero seven

eight four zero three

seven ten six one four eight nine

H-92
## Finish the Number Word

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<thead>
<tr>
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<th>Number Word</th>
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<tr>
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<td>two</td>
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<td>three</td>
</tr>
<tr>
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<td>five</td>
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<td>seven</td>
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<td>8</td>
<td>eight</td>
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<tr>
<td>9</td>
<td>nine</td>
</tr>
<tr>
<td>10</td>
<td>ten</td>
</tr>
</tbody>
</table>

- **3 = th_r_ee**
- **2 = ___wo**
- **5 = f___ve**
- **4 = ___our**
- **1 = o___ ____**
- **0 = z___ro**
- **7 = se___ ___n**
- **6 = si___**
- **9 = ni___e**
- **8 = eigh___**
- **10 = ___ ___ ___**

**Bonus**

___ = ___ix
Writing Number Words

☐ Trace the words.

two  three  four
five  eight

do  wo  thre  e  fo  ur

☐ Write the missing number.

one  two  three
seven  ___ ___ ___ ___  nine
four  ___ ___ ___ ___  six
three  ___ ___ ___ ___  five
two  ___ ___ ___ ___  four
Number Word Search (1)

☐ Circle all the ws.

<table>
<thead>
<tr>
<th>m</th>
<th>o</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>w</td>
<td>e</td>
<td>d</td>
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<tr>
<td>n</td>
<td>r</td>
<td>w</td>
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<th>t</th>
<th>w</th>
<th>o</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>w</td>
<td>a</td>
<td>g</td>
<td>o</td>
<td>n</td>
</tr>
</tbody>
</table>

☐ Circle all the ts.

<table>
<thead>
<tr>
<th>r</th>
<th>m</th>
<th>w</th>
<th>t</th>
<th>x</th>
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<td>w</td>
<td>t</td>
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<td>t</td>
<td>h</td>
<td>e</td>
<td>l</td>
<td>b</td>
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<th>r</th>
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</thead>
<tbody>
<tr>
<td>t</td>
<td>s</td>
</tr>
<tr>
<td>x</td>
<td>v</td>
</tr>
<tr>
<td>y</td>
<td>z</td>
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</tbody>
</table>

☐ Circle all the xs.

<table>
<thead>
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<th>x</th>
<th>a</th>
<th>m</th>
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</thead>
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<tr>
<td>c</td>
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<td>x</td>
</tr>
<tr>
<td>i</td>
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<th>t</th>
<th>k</th>
<th>x</th>
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<tr>
<td>x</td>
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<td>p</td>
<td></td>
</tr>
<tr>
<td>l</td>
<td>z</td>
<td>s</td>
<td>x</td>
</tr>
</tbody>
</table>
Number Word Search (2)

☐ Circle the x.
☐ Shade the word six.

How did finding the x help you find the word six?
Number Word Search (3)

☐ Circle the w.
☐ Shade the word two.

Bonus: Shade the word six in each grid.
Number Word Search (4)

☐ Shade the number words.

☐ Write the letters you didn’t use in order. Use the reading pattern.

___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___
Number Word Search (5)

☐ Shade the words you find.

<table>
<thead>
<tr>
<th>zero</th>
<th>one</th>
<th>two</th>
<th>three</th>
<th>four</th>
<th>five</th>
</tr>
</thead>
<tbody>
<tr>
<td>six</td>
<td>seven</td>
<td>eight</td>
<td>nine</td>
<td>ten</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<th>a</th>
<th>s</th>
<th>i</th>
<th>x</th>
<th>t</th>
<th>w</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>z</td>
<td>e</td>
<td>i</td>
<td>g</td>
<td>h</td>
<td>t</td>
<td>p</td>
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<td>e</td>
<td>v</td>
<td>o</td>
<td>l</td>
<td>f</td>
<td>e</td>
<td>i</td>
</tr>
<tr>
<td>r</td>
<td>e</td>
<td>c</td>
<td>n</td>
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<td>n</td>
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<td>f</td>
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<td>u</td>
<td>r</td>
<td>c</td>
<td>e</td>
<td>r</td>
</tr>
</tbody>
</table>

☐ Write the letters you didn’t use in order.
Who protects the neighbourhood?

___  ___  ___  ___  ___  ___  ___  ___  ___  ___
I Have —, Who Has —? Number Words (1)

I have

19

Who has

thirteen?

I have

13

Who has

eleven?

I have

11

Who has

fifteen?

I have

15

Who has

sixteen?
I Have —, Who Has —? Number Words (2)

<table>
<thead>
<tr>
<th>I have</th>
<th>I have</th>
</tr>
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<tbody>
<tr>
<td>16</td>
<td>20</td>
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</table>

<table>
<thead>
<tr>
<th>Who has</th>
<th>Who has</th>
</tr>
</thead>
<tbody>
<tr>
<td>twenty?</td>
<td>nineteen?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I have</th>
<th>I have</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>14</td>
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</table>

<table>
<thead>
<tr>
<th>Who has</th>
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<td>fourteen?</td>
<td>seventeen?</td>
</tr>
<tr>
<td>I have</td>
<td>I have</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>17</td>
<td>11</td>
</tr>
<tr>
<td>Who has</td>
<td>Who has</td>
</tr>
<tr>
<td>eleven?</td>
<td>eighteen?</td>
</tr>
<tr>
<td>I have</td>
<td>I have</td>
</tr>
<tr>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Who has</td>
<td>Who has</td>
</tr>
<tr>
<td>twenty?</td>
<td>twelve?</td>
</tr>
</tbody>
</table>
Mixing Colours

☐ Count all the letters.
☐ Check with a partner.
☐ Correct any mistakes.

Mixing \(6\) colours \(\square\) is \(\square\) fun.

Red \(21\) and \(\square\) blue \(\square\) make \(\square\)

purple. \(\square\) What \(\square\) do \(\square\) other \(\square\)

colours \(\square\) make?

☐ Colour.

- red
- blue
- purple

- red
- yellow

- blue
- yellow
The Twenties

☐ Fill in the blanks.

20 = ______ twenty ______

21 = ______ twenty ______ - ______ one ______

22 = ______ twenty ______ - ______

23 = ______ - ______ three ______

24 = ______ - ______ four ______

____ = ______ twenty ______ - ______ five ______

26 = ______ twenty ______ - ______

27 = ______ - ______ seven ______

28 = ______ - ______

____ = ______ twenty ______ - ______ nine ______
Number Words Past Twenty

<table>
<thead>
<tr>
<th>two</th>
<th>three</th>
<th>four</th>
<th>five</th>
</tr>
</thead>
</table>

- twenty = 20
- thirty = __ __
- forty = __ __
- fifty = __ __
- forty-two = 42
- thirty-six = __ __
- twenty-seven = __ __
- thirty-three = __ __
- forty-five = __ __
- twenty-six = __ __
- fifty-two = __ __
- fifty-four = __ __

Write the number for each word.
# Hundreds Chart Pieces

<p>| | | | | | |</p>
<table>
<thead>
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<td></td>
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<p>| | | | | | |</p>
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<td>92</td>
<td>93</td>
<td>94</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Tens Digits

- **Circle the tens digit.**
  - 19
  - 91
  - 85
  - 23
  - 32

- **Circle the numbers with the same tens digit.**
  - 35
  - 44
  - 38
  - 47
  - 49
  - 37
  - 56
  - 65
  - 66
  - 78
  - 87
  - 77
  - 52
  - 53
  - 32
  - 76
  - 69
  - 79
  - 39
  - 28
  - 40
  - 20
  - 51
  - 12
Which Number Is Bigger?

☐ Colour the first number.
☐ Use blocks to place the other number on the picture.
☐ Circle the bigger number.

1. Colour the first number and place the other number on the picture.
   - First number: 28
   - Number to place: 45
   - Circle the bigger number: 45

2. Colour the first number and place the other number on the picture.
   - First number: 37
   - Number to place: 34
   - Circle the bigger number: 37

3. Colour the first number and place the other number on the picture.
   - First number: 46
   - Number to place: 29
   - Circle the bigger number: 46
The Largest Number

Circle the largest number.

Left

Right

Bonus

94 95 96 97 98 99 100 101
Addition Practice (1)

☐ Write the addition sentence.

3 flies were buzzing. 3 joined them. There are 6 flies altogether.

3 3 6

Jerome has 5 apples. John has 2 apples. They have 7 apples in total.

5 2 7

I have six pencils. You have two pencils. Together we have eight pencils.

6 2 8
Addition Practice (2)

☐ Write the addition sentence.

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<thead>
<tr>
<th>Sonia has</th>
<th>Tom has</th>
<th>How many do they have altogether?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>four</strong> pencils</td>
<td><strong>one</strong> pencil</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>4</strong> + <strong>1</strong> = <strong>5</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There are</th>
<th>There are</th>
<th>How many turtles are there altogether?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>five</strong> small</td>
<td><strong>three</strong></td>
<td></td>
</tr>
<tr>
<td>turtles.</td>
<td>big turtles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>____</strong> + <strong>____</strong> = <strong>____</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sue picked</th>
<th>Nadia picked</th>
<th>How many apples did they pick in total?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>four</strong> apples</td>
<td><strong>five</strong> apples</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>____</strong> + <strong>____</strong> = <strong>____</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There are</th>
<th>There are</th>
<th>How many fish are there in total?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>three</strong> rainbow</td>
<td><strong>three</strong></td>
<td></td>
</tr>
<tr>
<td>fish.</td>
<td>goldfish.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>____</strong> + <strong>____</strong> = <strong>____</strong></td>
</tr>
</tbody>
</table>
Addition Practice (3)

Write the addition sentence.

There are six oatmeal cookies.  There are four chocolate chip cookies.  How many cookies are there altogether?

\[ 6 + 4 = 10 \]

Five children were playing soccer.  Four children joined them.  How many are playing soccer now?


There are four red balloons.  There are four green balloons.  How many balloons are there altogether?


There are three square tables.  There are six round tables.  How many tables are there in total?


# Reading Subtraction Sentences

**How many were **taken away**?**

- \[ 7 - 2 = 5 \]
- \[ 5 = 9 - 4 \]
- \[ 8 - 3 = 5 \]
- \[ 7 - 0 = 7 \]

**How many were there **at first**?**

- \[ 9 - 7 = 2 \]
- \[ 3 = 4 - 1 \]
- \[ 4 - 3 = 1 \]
- \[ 7 - 4 = 3 \]

**How many are **left**?**

- \[ 8 - 6 = 2 \]
- \[ 3 = 7 - 4 \]
- \[ 8 - 7 = 1 \]
- \[ 6 - 6 = 0 \]
Subtraction Practice (1)

☐ Write the subtraction sentence.

10 flies were buzzing.  A frog ate 3 of them.  There are 7 left.

\[
\begin{array}{c}
\text{10} \\
- \\
\text{3} \\
\hline \\
\text{7}
\end{array}
\]

I had \textbf{seven} apples.  I ate \textbf{three} apples.  Four apples are left.

\[
\begin{array}{c}
\text{_____} \\
- \\
\text{_____} \\
\hline \\
\text{_____}
\end{array}
\]

Nadia had \textbf{five} oranges.  She ate \textbf{two} oranges.  \textbf{Three} oranges are left.

\[
\begin{array}{c}
\text{_____} \\
- \\
\text{_____} \\
\hline \\
\text{_____}
\end{array}
\]
Subtraction Practice (2)

☐ Write the subtraction sentence.

Sonia had **four** pencils. Her brother took **one**. How many pencils does she have left?

\[
\begin{array}{cccc}
  4 & - & 1 & = \\
\end{array}
\]

There are **five** turtles. **Three** turtles are big. How many turtles are small?

\[
\begin{array}{cccc}
  & - & & \\
\end{array}
\]

Sue picked **nine** apples. Her dad used seven to bake a pie. How many apples are left?

\[
\begin{array}{cccc}
  & - & & \\
\end{array}
\]

There are **six** fish. **Four** fish are goldfish. How many are not goldfish?

\[
\begin{array}{cccc}
  & - & & \\
\end{array}
\]
## Subtraction Practice (3)

- **Write the subtraction sentence.**

<table>
<thead>
<tr>
<th>Kim’s mom baked ten cookies.</th>
<th>Four fell and broke.</th>
<th>How many are not broken?</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Eight children were playing.</th>
<th>Three went home.</th>
<th>How many are still playing?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There are nine balloons.</th>
<th>You blew up three.</th>
<th>How many are not blown up?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dad had three balloons.</th>
<th>Two popped.</th>
<th>How many are left?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Add or Subtract?

- Read the problems.
- Circle how to find the answer.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six friends went swimming. Three joined them. How many went swimming altogether?</td>
<td>$6 + 3$ $6 - 3$</td>
</tr>
<tr>
<td>There are three big frogs. There are two small frogs. How many more big frogs than small?</td>
<td>$3 + 2$ $3 - 2$</td>
</tr>
<tr>
<td>There are three big frogs. There are two small frogs. How many frogs are there altogether?</td>
<td>$3 + 2$ $3 - 2$</td>
</tr>
<tr>
<td>There are three frogs. Two frogs joined them. How many frogs are there now?</td>
<td>$3 + 2$ $3 - 2$</td>
</tr>
<tr>
<td>Tania scored four goals. Josh scored one goal. How many more did Tania score than Josh?</td>
<td>$4 + 1$ $4 - 1$</td>
</tr>
</tbody>
</table>
Matching

☐ Match how to get the answer with the word problem.

There are 7 big turtles.
There are 2 small turtles.
How many more big turtles than small?

7
- 1
6

There were seven children.
Three went away.
How many are there now?

7
+ 3
10

Calli is seven years old.
How old was she last year?

7
- 2
5

Calli is seven years old.
How old will she be next year?

7
- 3
4

There are 7 big turtles.
There are 2 small turtles.
How many turtles are there altogether?

7
+ 2
9

There were seven children.
Three joined them.
How many are there now?

7
+ 1
8
The Score

Blue is leading by 4 points. What is the score?

<table>
<thead>
<tr>
<th>Red</th>
<th>Blue</th>
<th>Red</th>
<th>Blue</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>29</td>
</tr>
</tbody>
</table>
## Add Larger Numbers

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
<td>27</td>
<td>28</td>
<td>29</td>
<td>30</td>
<td></td>
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<tr>
<td>31</td>
<td>32</td>
<td>33</td>
<td>34</td>
<td>35</td>
<td>36</td>
<td>37</td>
<td>38</td>
<td>39</td>
<td>40</td>
<td></td>
</tr>
</tbody>
</table>

\[
22 + 7 = __
\]

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>52</td>
<td>53</td>
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<td>62</td>
<td>63</td>
<td>64</td>
<td>65</td>
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<td>67</td>
<td>68</td>
<td>69</td>
<td>70</td>
<td></td>
</tr>
</tbody>
</table>

\[
56 + 5 = __
\]

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>41</td>
<td>42</td>
<td>43</td>
<td>44</td>
<td>45</td>
<td>46</td>
<td>47</td>
<td>48</td>
<td>49</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>51</td>
<td>52</td>
<td>53</td>
<td>54</td>
<td>55</td>
<td>56</td>
<td>57</td>
<td>58</td>
<td>59</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

\[
49 + 6 = __
\]

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>72</td>
<td>73</td>
<td>74</td>
<td>75</td>
<td>76</td>
<td>77</td>
<td>78</td>
<td>79</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>82</td>
<td>83</td>
<td>84</td>
<td>85</td>
<td>86</td>
<td>87</td>
<td>88</td>
<td>89</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

\[
75 + 10 = __
\]
Adding to the Number 10

☐ Use the chart to add.

10 + 4 = 14

10 + 7 = ___

10 + 3 = ___

10 + 6 = ___

☐ Add without the chart.

10 + 5
10 + 9
10 + 2
10 + 8
Adding and Order

☐ Shade the square showing the second number.
☐ Circle the first number of squares.
☐ Add.

\[
\begin{array}{ccccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

\[5 + 2 = \underline{7}\]

\[
\begin{array}{ccccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
\end{array}
\]

\[7 + 3 = \underline{\hspace{1cm}}\]

\[
\begin{array}{ccccccccc}
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 \\
11 & 12 & 13 & 14 & 15 & 16 & 17 & 18 & 19 & 20 \\
\end{array}
\]

\[8 + 5 = \underline{\hspace{1cm}}\]

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
6 & 7 & 8 & 9 \\
11 & 12 & 13 & 14 \\
\end{array}
\]

\[4 + 7 = \underline{\hspace{1cm}}\]

\[
\begin{array}{cccc}
1 & 2 & 3 & 4 \\
6 & 7 & 8 & 9 \\
11 & 12 & 13 & 14 \\
\end{array}
\]

\[9 + 5 = \underline{\hspace{1cm}}\]
Next

☐ Move the circle to the next square.

☐ Move the circle 2 squares.

☐ Move the circle 3 squares.

☐ Move the circle 4 squares.
Add to Find the Picture

☐ Colour each part the correct colour.

Red parts add to 5.

Orange parts add to 6.

Green parts add to 7.

Yellow parts add to 8.

What picture do you see?

H-124

Blackline Master — Number Sense — Teacher’s Guide for Workbook 1.2
Apples

There are 12 apples in the bag.

□ Add by counting on.

12 + 3 = \_

12 + 2 = 

12 + 6 = 

12 + 5 = 

12 + 4 = 

12 + 8 = 

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Word Problems

☐ Write the addition sentence.
☐ Solve the problems using number lines.

Three flies were buzzing. 
Four joined them.  

\[3 + 4\]

There are _____ flies altogether.

John has five marbles.  
Ron has two marbles.  

_____ + _____

They have _____ marbles altogether.

Teresa has four red marbles 
and five blue marbles.  

_____ + _____

She has _____ marbles in total.
Addition Sentence Memory (1)
Addition Sentence Memory (2)
Addition Sentence Memory (3)
Adding Cards (1)

0 + 0  1 + 0
2 + 0  3 + 0
4 + 0  5 + 0
6 + 0  0 + 1
1 + 1  2 + 1
## Adding Cards (2)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>+</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>+</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>+</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>+</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>+</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>+</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>+</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>+</td>
<td>2</td>
</tr>
<tr>
<td>0</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>+</td>
<td>3</td>
</tr>
</tbody>
</table>
Adding Cards (3)

2 + 3  3 + 3
0 + 4  1 + 4
2 + 4  0 + 5
1 + 5  0 + 6
Models of Counting On

Add.

\[
\begin{align*}
4 + 3 &= \underline{7} \\
3 + 2 &= \underline{5} \\
7 + 2 &= \underline{9} \\
7 + 3 &= \underline{10} \\
1 + 3 &= \underline{4} \\
4 + 2 &= \underline{6}
\end{align*}
\]
Subtraction Sentence Memory (1)
Subtraction Sentence Memory (2)
Subtraction Sentence Memory (3)
Subtracting Cards (1)

0 – 0
2 – 0
4 – 0
6 – 0

1 – 0
3 – 0
5 – 0
1 – 1

2 – 1
3 – 1
Subtracting Cards (2)

\[
\begin{array}{cc}
4 - 1 & 5 - 1 \\
6 - 1 & 2 - 2 \\
3 - 2 & 4 - 2 \\
5 - 2 & 6 - 2 \\
3 - 3 & 4 - 3 \\
\end{array}
\]
Subtracting Cards (3)

\[
\begin{array}{cc}
5 - 3 & 6 - 3 \\
4 - 4 & 5 - 4 \\
6 - 4 & 5 - 5 \\
6 - 5 & 6 - 6 \\
\end{array}
\]
Forwards or Backwards?

Do you go forwards or backwards?

☐ Trace the correct number of leaps.

3 + 2

3 - 2

4 + 1

4 - 1

6 - 3

6 + 3

7 - 2
Add or Subtract with Number Lines

☐ Write the number sentence.
☐ Fill in the blanks.

Toni has ____ red marbles and ____ blue marbles.

How many marbles does Toni have in total?

0 1 2 3 4 5 6 7 8 9 10

____ + ____ = ____

Toni has ____ marbles in total.

How many more blue marbles than red marbles does Toni have?

0 1 2 3 4 5 6 7 8 9 10

____ + ____ = ____

Toni has ____ more blue than red marbles.
In the Bag

There are 10 apples altogether. How many are in the bag?

10 apples altogether.

10 – 3 = __7__

10 – 2 = ____

10 – 1 = ___

10 – 4 = ____

10 – 6 = ___
Models of Counting Back

☐ Subtract.

\[
\begin{array}{ll}
7 - 3 &= \_
\
3 - 2 &= \_
\
9 - 2 &= \_
\
10 - 3 &= \_
\
4 - 3 &= \_
\
6 - 4 &= \_
\end{array}
\]
Pairs Adding to 5

☐ Write the missing numbers.

\[\begin{align*}
&\text{fingers up} & \text{fingers down} & \text{altogether} \\
&3 & + & 2 & = & 5 \\
\end{align*}\]

\[\begin{align*}
&\text{fingers up} & \text{fingers down} & \text{altogether} \\
& & + & & = & 5 \\
\end{align*}\]

\[\begin{align*}
&\text{fingers up} & \text{fingers down} & \text{altogether} \\
& & + & & = & 5 \\
\end{align*}\]

\[\begin{align*}
&\text{fingers up} & \text{fingers down} & \text{altogether} \\
& & + & & = & 5 \\
\end{align*}\]
Five-Dot Dominoes

☐ Draw the missing dots to make 5.
☐ Finish the addition sentence.

4 + □ = 5
5 + 3 = 5
□ + 3 = 5
□ + 5
□ + 1
1
5
3 + □
□
5
□ + 4
4
5
Pairs Adding to 10

☐ Write the missing numbers.

\[ \begin{align*}
\text{Fingers up} & \quad + \quad \text{Fingers down} \\
7 & \quad + \quad 3 & \quad = \quad 10
\end{align*} \]

\[ \begin{align*}
\text{Fingers up} & \quad + \quad \text{Fingers down} \\
& \quad + \quad & \quad = \quad 10
\end{align*} \]

\[ \begin{align*}
\text{Fingers up} & \quad + \quad \text{Fingers down} \\
& \quad + \quad & \quad = \quad 10
\end{align*} \]

\[ \begin{align*}
\text{Fingers up} & \quad + \quad \text{Fingers down} \\
& \quad + \quad & \quad = \quad 10
\end{align*} \]
Ten-Dot Dominoes

☐ Draw the missing dots to make 10.
☐ Finish the addition sentence.

\[
\begin{align*}
7 + \square &= 10 \\
10 &= 5 + \square \\
\square + 2 &= 10 \\
10 &= \square + 4 \\
9 + \square &= 10 \\
\square + 8 &= 10 \\
\square + \square &= 10
\end{align*}
\]
**Colouring Stars**

☐ Colour one star at a time.

[Diagram of stars]

<table>
<thead>
<tr>
<th>coloured</th>
<th>not coloured</th>
<th>answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>+ 10</td>
<td>= 10</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>=</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>=</td>
</tr>
</tbody>
</table>

Which number stayed the same? Why?
Thirteen in Different Ways

☐ Show 13 in different ways.

13 = ___ groups of 2 and ___ more

13 = ___ groups of 3 and ___ more

13 = ___ groups of 4 and ___ more

13 = ___ groups of 5 and ___ more
Fill in the blanks.

12 take away 7
\[\begin{array}{cccccc}
\times & \times & \times & \times & \times & \times \\
\end{array}\]
\[12 - 7 = \_5\_\]

12 is \_5\_ more than 7
7 is \_5\_ less than 12

9 take away 6
\[\begin{array}{cccccc}
\times & \times & \times & \times & \times & \times \\
\end{array}\]
\[9 - 6 = \_\_\_\_\]

9 is \_\_\_ more than 6
6 is \_\_\_ less than 9

8 take away 4
\[\begin{array}{cccccc}
\times & \times & \times & \times & \times & \times \\
\end{array}\]
\[8 - 4 = \_\_\_\_\_\]

8 is \_\_\_ more than 4
4 is \_\_\_ less than 8

7 take away 2
\[\begin{array}{cccccc}
\times & \times & \times & \times & \times & \times \\
\end{array}\]
\[7 - 2 = \_\_\_\_\_\]

7 is \_\_\_ more than 2
2 is \_\_\_ less than 7

Draw your own model.

\_\_\_\_\_\_\_\_ extras

\_\_\_\_\_\_\_\_ extras
Fill in the blanks.

\[ 9 - 3 = \_\_\_\_ \]

\[ 7 - 4 = \_\_\_\_ \]

\[ 3 + \_\_\_ = 9 \]

\[ 6 + \_\_\_ = 10 \]

\[ 10 - 6 = \_\_\_\_ \]

\[ 10 - 4 = \_\_\_\_ \]

\[ 6 + \_\_\_ = 10 \]

\[ 4 + \_\_\_ = 10 \]

\[ 8 - 2 = \_\_\_\_ \]

\[ 10 - 5 = \_\_\_\_ \]

\[ 2 + \_\_\_ = 8 \]

\[ 5 + \_\_\_ = 10 \]
Dominoes

☐ Draw the missing dots on the domino.
☐ Write the addition sentence.

6 = 4 + \_2\_

8 = \_\_ + 5

7 = \_\_ + 1

7 = 4 + \_\_

4 = 3 + \_\_

8 = 2 + \_\_

6 = \_\_ + 3

9 = \_\_ + 5
Ten Wins! (1)

Did you win the game? ☺ or ☹.

Start

1 2 3 4 5 6 7 8 9 10

Start

1 2 3 4 5 6 7 8 9 10

Start

1 2 3 4 5 6 7 8 9 10

Start

1 2 3 4 5 6 7 8 9 10

Start

1 2 3 4 5 6 7 8 9 10
Ten Wins! (2)

What number do you need to win?

1 2 3 4 5 6 7 8 9 10

7 + ____ = 10

1 2 3 4 5 6 7 8 9 10

5 + ____ = 10

1 2 3 4 5 6 7 8 9 10

8 + ____ = 10

1 2 3 4 5 6 7 8 9 10

6 + ____ = 10

1 2 3 4 5 6 7 8 9 10

4 + ____ = 10
Patterns in Skip Counting by 2 (1)

☐ Start at 2 and count by 2s.
☐ Colour the numbers you say.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

The coloured numbers have ones digit…

2, 4, __, __, __, or __.

☐ Start at 2 and count by 2s.
☐ Circle the numbers you say.
Patterns in Skip Counting by 2 (2)

☐ Start at 2 and count by 2s.
☐ Circle the numbers you say.

\[
\begin{array}{cccccc}
43 & 58 & 34 & 85 & 14 & 67 \\
10 & 76 & 41 & 55 & 100 & 21 \\
44 & 79 & 36 & 12 & & \\
\end{array}
\]
Patterns in Skip Counting by 5

☐ Start at 5 and count by 5s.
☐ Colour the numbers you say.

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<td>1</td>
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</tbody>
</table>

The coloured numbers have ones digit…

____ or ____.

☐ Start at 5 and count by 5s.
☐ Circle the numbers you say.
Patterns in Skip Counting by 10

☐ Start at 10 and count by 10s.
☐ Colour the numbers you say.

<table>
<thead>
<tr>
<th>1</th>
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<td>38</td>
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<td>40</td>
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</tbody>
</table>

The coloured numbers have ones digit…

☐ Start at 10 and count by 10s.
☐ Circle the numbers you say.

80  77  95  100  60  42
89  50  28  30
35  53  7  20  42
34

H-158  Blackline Master — Number Sense — Teacher’s Guide for Workbook 1.2
Adding Many Numbers

☐ Pair up numbers that add to 5.
☐ Re-write the addition sentence.
☐ Count by 5s to add.

\[
\begin{align*}
1 + 2 + 3 + 4 &= 5 + 5 = 10 \\
4 + 1 + 3 + 2 &= \\
1 + 3 + 4 + 2 &= \\
2 + 3 + 4 + 1 &= \\
1 + 4 + 3 + 2 + 2 + 4 + 3 + 1 &= \\
2 + 3 + 1 + 2 + 4 + 3 + 3 + 2 &= \\
\end{align*}
\]
Other Alphabets

☐ Count by 5s and then by 1s.
☐ How many letters in each alphabet?

**Hawaiian**

- A E I O U
- H K L M N
- P W `

5, 10, 11, 12, 13

**Greek**

- Α Β Γ Δ Ε
- Ζ Η Θ Ι Κ
- Λ Μ Ν Ξ Ο
- Π Ρ Σ Τ Υ
- Φ Χ Ψ Ω

**Spanish**

- a b c ch d
- e f g h i
- j k l ll m
- n ñ o p q
- r s t u v
- w x y z

**Sign Language**
Missing Letters

There are 26 letters in the alphabet.

☐ Group the letters by 5s.

How many are missing? ____

☐ Cross out the letters in both places.

Which letters are missing? ________________________________
Money Spinners
Coins on a Chart

Cut out the coins.
Glue them to the chart where they belong.

12345678910
11121314151617181920
21222324252627282930

1 2 3 4 5 6 7 8 9 10
Cut out the coins.
Glue them to the line to show what they are worth.
Fake Coins

☐ * what is wrong on each coin.

Bonus
Fake Money Game
Coins

☐ Finish the chart.

<table>
<thead>
<tr>
<th>Coin</th>
<th>Value</th>
<th>Picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>25¢</td>
<td><img src="image" alt="Nickel Coin" /></td>
</tr>
<tr>
<td>Dime</td>
<td>1 dollar = 100¢</td>
<td><img src="image" alt="Dime Coin" /></td>
</tr>
<tr>
<td>Toonie</td>
<td>1¢</td>
<td><img src="image" alt="Toonie Coin" /></td>
</tr>
</tbody>
</table>
Coins to Cut Out
Counting Pennies by 5s

☐ Circle groups of 5 pennies.
☐ Count the money by 5s and then by 1s.

5¢, 10¢, 11¢, __, __, __.

__, __, __, __, __, __.

__, __, __, __, __, __.

5¢, 10¢, 11¢, __, __, __.
Counting Coins (1)

Sarah trades groups of 5 pennies for a nickel.

☐ Draw Sarah’s money.
Counting Coins (2)

Do Isabel and Sarah have the same amount of money?

☐ Group 5 pennies to check.

<table>
<thead>
<tr>
<th>Isabel</th>
<th>Sarah</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Image of pennies]</td>
<td>![Image of pennies]</td>
</tr>
</tbody>
</table>

Isabel: 5 pennies
Sarah: 5 pennies

Isabel: 10 pennies
Sarah: 5 pennies

Isabel: 15 pennies
Sarah: 10 pennies

Isabel: 20 pennies
Sarah: 15 pennies

Isabel: 25 pennies
Sarah: 20 pennies

Isabel: 30 pennies
Sarah: 25 pennies

Isabel: 35 pennies
Sarah: 30 pennies

Isabel: 40 pennies
Sarah: 35 pennies

Isabel: 45 pennies
Sarah: 40 pennies

Isabel: 50 pennies
Sarah: 45 pennies

Isabel: 55 pennies
Sarah: 50 pennies

Isabel: 60 pennies
Sarah: 55 pennies

Isabel: 65 pennies
Sarah: 60 pennies

Isabel: 70 pennies
Sarah: 65 pennies

Isabel: 75 pennies
Sarah: 70 pennies

Isabel: 80 pennies
Sarah: 75 pennies

Isabel: 85 pennies
Sarah: 80 pennies

Isabel: 90 pennies
Sarah: 85 pennies

Isabel: 95 pennies
Sarah: 90 pennies

Isabel: 100 pennies
Sarah: 95 pennies

Yes
Counting Coins (3)

☐ Count on from 5 to add Jomar’s money.

5¢ 1¢ 1¢ 1¢  
5 6 7 8

Jomar has ___ ¢.

5¢ 1¢  
Jomar has ___ 

Jomar has ___ .

Jomar has ___ .
Money Memory
Adding Money Game

Start

1¢ 5¢ 5¢ 1¢ 1¢

1¢ 5¢ 1¢ 1¢ 1¢ 5¢

1¢

5¢ 1¢ 1¢ 1¢ 5¢ 1¢

5¢

Finish

5¢ 1¢ 1¢ 1¢ 1¢ 5¢
Food Sale (1)

14¢
- Macaroni

9¢
- Carrots

11¢
- Celery

12¢
- Bread

15¢
- Eggs

10¢
- Milk

12¢
- Fish

13¢
- Cheese
## Food Sale (2)

<table>
<thead>
<tr>
<th>Mona’s Market</th>
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<td><strong>Item:</strong></td>
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<td><strong>Price:</strong></td>
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<td><strong>Money Given:</strong></td>
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<td><strong>Change Received:</strong></td>
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<td><strong>Change Received:</strong></td>
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## What Is the Double?

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The double of 8 is ____.
The double of 5 is ____.
The double of 4 is ____.
The double of 7 is ____.
The double of 0 is ____.
The double of 9 is ____.
The double of 3 is ____.
The double of 2 is ____.
The double of 1 is ____.
The double of 6 is ____.
Double Tens and Ones (1)

☐ Double each number.

3 + 3 = 6

6 is the double of 3, so 60 is the double of 30.

2 + 2 = 4

4 is the double of 2, so 40 is the double of 20.

☐ 5 + 5 = 10

10 is the double of 5, so 100 is the double of 50.
Double Tens and Ones (2)

☐ Find the double.

23 = 20 + 3
so 40 + 6 = 46

34 = ___ + ___
so ___ + ___ = ___

31 = ___ + ___
so ___ + ___ = ___

22 = ___ + ___
so ___ + ___ = ___

24 = ___ + ___
so ___ + ___ = ___

42 = ___ + ___
so ___ + ___ = ___

double 13 is ___
double 21 is ___

double 41 is ___
double 44 is ___

double 30 is ___
double 50 is ___

double 123 is ___
double 341 is ___
Big Cubes and cm

- Measure two ways.
  Use big ⏰ and then use cm.

Example:

- A book is 14 ⏰ long. It is ____ cm long.
Doubles and Mirrors

☐ Draw the dots in the mirror.

\[
\begin{align*}
4 + 4 &= 8 \\
\text{☐} + \text{☐} &= \text{☐} \\
\text{☐} + \text{☐} &= \text{☐}
\end{align*}
\]

Now some dots cannot be seen in the mirror.

\[
\begin{align*}
3 + 3 + 1 &= 7 \\
\text{☐} + \text{☐} + 1 &= \text{☐} \\
\text{☐} + \text{☐} + 1 &= \text{☐}
\end{align*}
\]
Half and Quarter (1)

Does the dotted line show half?

- Yes  No
- Yes  No
- Yes  No
- Yes  No

☐ Draw a line to show half.
☐ Fold to check your answer.
Half and Quarter (2)

Does the dotted line show a quarter?

- [ ] Draw a line to show a quarter.
- [ ] Fold to check your answer.
Pencils

Tara’s pencil is half as long as Ben’s pencil.

☐ Draw Tara’s pencil.

Ben

Tara

Sam’s pencil is half as long as Tara’s pencil.

☐ Draw Sam’s pencil.

Ben

Tara

Sam

Sam’s pencil is a _____________ as long as Ben’s.
Colouring

☐ Show nine different ways to colour the balloons using red, blue, and yellow.
Part 2
Patterns and Algebra

In this unit, students will learn about patterns in the hundreds charts. They will also represent equalities and inequalities using balances and make their first steps in solving equations.
Review patterns. Encourage students to give examples of the patterns (repeating) they explored in Patterns Part 1. Have them describe several repeating patterns by stating the exact rule (EXAMPLE: square, circle, circle, then repeat).

Display a large hundreds chart. (You can use chart paper, the overhead, or a hundreds pocket chart.) Ask students to identify any patterns they see. Record their ideas and suggestions. Then, ask students if they remember what the reading pattern is and have a volunteer describe it. Remind students that we use the reading pattern when we read a hundreds chart: we read from left to right and then go to the next line.

Patterns created by skip counting by 2s. Ask the whole class to count by 2s, starting at 2. As the class counts, have a volunteer circle or otherwise highlight the corresponding numbers in the hundreds chart (or flip the corresponding cards in the pocket chart). Stop students when they reach 30.

Review the term digit. Write the number 2 on the board. ASK: How many digits does this number have? Write 24 on the board and repeat. Then ASK: Which digit is the ones digit? (4) Which is the tens digit? (2) Write 246 and repeat, adding a question about the hundreds digit. Ask students what the difference is between a digit and a number. Ensure that all students understand the difference between the two terms.

Patterns in ones digits when counting by 2s. Look back at the hundreds chart and ask students to identify the ones digit in the numbers that were circled when they counted by 2s. Record the digits they identify. Have them discuss with a partner what they notice about the digits, and then discuss as a group. (The digits are all 0, 2, 4, 6, and 8 and they form a pattern: “0, 2, 4, 6, 8, then repeat” or “skip count by 2s from 0 to 8, then repeat.”)
Patterns and Algebra 1-8

Have students predict the ones digits in the next five numbers when counting by 2s (in the thirties row of the hundreds chart). Check predictions. Predict again for the next row in the hundreds chart. Do students think that this pattern will continue throughout the entire hundreds chart? Discuss.

Patterns in tens digits when counting by 2s. Refer back to the hundreds chart and ask students to identify the tens digits in the numbers that were circled when they counted by 2s (up to 30). Record the digits on the board. Ask students if they can identify a pattern in the tens digits as they did in the ones digits. Discuss how to describe the pattern. (The pattern is: 0, 0, 0, 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 3. See also the worksheet on p 116. One way to describe the pattern is “start at zero, add one to every fifth number”.)

As with the ones digits, ask students to predict the tens digits in the next five numbers when counting by 2s (in the thirties row of the hundreds chart). Check predictions. **ASK:** Do you think the tens digits will increase by one in every new row? Why? Check their prediction in the next two or three rows in the hundreds chart.

Now look at the pattern in the tens digits in any one column (but not the last column). **ASK:** Can you continue the pattern? Look at the pattern in another column and **ASK:** Is it the same? Is the pattern the same in all the columns? (No, the last column has a slightly different pattern.) Can you continue the pattern in the last column? How can the patterns in the columns help to describe the patterns in the rows? (The patterns in all the columns but the last one are the same, in the last column the number of tens is always 1 more than in the other columns. The numbers in the pattern in the rows repeat as long as the columns are the same. They jump up by 1 when you come to the last columns.)

**Bonus** Write a sequence of even numbers in the hundreds (EXAMPLE: 352, 354, 356, 358, 360, 362,…) and ask students to look for patterns in the ones and the tens digits and then continue the sequence.

Patterns when counting by 5s. Follow the steps above to find and describe the patterns created in the ones and tens digits when skip counting by 5s.

**ACTIVITY**

Have students complete **BLM Connect the Dots by 2s.** Students must start at 2 and only connect the dots for the numbers which they say when counting by 2s.
Equality and Inequality with Balances

Page 118-122

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m6, 1m66, 1m67, 1m68
WNCP: 1PR3, 1PR4, [CN, V]

VOCABULARY
balance
equal
not equal
addition sentence
subtraction sentence

Goals
Students will use pan balances to illustrate equalities and inequalities and solve simple equations.

PRIOR KNOWLEDGE REQUIRED
Can count to 10
Recognizes numbers and quantities to 10
Is familiar with how a balance works
Understands that attaching connecting cubes into trains does not change their mass
Understands addition facts
Knows the concepts of more and less

MATERIALS
pan balances
connecting cubes
BLM Equal or Not Equal? (p I-13)
BLM Balances (p I-14)

Equal and not equal. What does it mean when we say two things are equal? What does it mean when we say two things are not equal? Ask students to think of things that are equal and not equal. (EXAMPLES: a dime is equal to ten pennies; a brand new pencil and a crayon are not equal (in length); a square is divided by a diagonal line into two equal parts) PROMPT: Are two brand new pencils equal? Is a dime equal to three nickels?)

Review how pan balances work. Tell students that you are going to put five connecting cubes in one pan and three in the other. Ask them to predict what will happen and why. Check. ASK: What do I have to do in order to balance the two pans? Why? Test students’ answers. Repeat several times with different numbers of cubes.

ACTIVITY 1
Students will need pan balances, connecting cubes, and a copy of BLM Equal or Not Equal? Students can work independently or in pairs to predict and check which groups of connecting cubes are equal and which are not equal. They should join the cubes (in “trains”) as shown in the pictures. Have students explain their results to the class. (This would be a good explanation for the second problem: “One cube and a train of three cubes have the same mass as two trains of two cubes because there are the same number of cubes (4) on both sides of the balance.”) Then have students complete BLM Balances. Students can also check their guesses with pan balances and connecting cubes.

NOTE: If you do not have pan balances, use a teeter-totter to review the concept of a balance then work through the same examples with pictures of cubes and balances (see the worksheets for examples).
Balance the pans by adding cubes. Place a train of two connecting cubes in one pan. ASK: How many cubes do we need to put in the other pan in order to balance the pans? Do so. Then add one more cube to the train and ASK: How many cubes must be in the other pan to balance the pans? (3) How many are there now? (2) How many cubes should we add to the other pan? (1) Balance the pans again. Add two cubes to the original train (for a total of five) then add one more; balance the pans after each addition. Always ask students how many cubes need to be on the other side and how many need to be added to the other side in order to balance the pans.

Balance the pans by adding cubes and solve equations (addition). Empty the balance pans and put a train of three cubes in one pan and one cube in the other. Tell students that you want to write an addition sentence to match what you are doing. Write $3 = 1 + \_\_$ on the board. Review the meaning of the equals sign ($=$) and the word equal. Ask students how many cubes must be added to the pan with one cube in order to make what’s in one pan equal to what’s in the other. Show this on the balance. Write that number in the blank space and ask students to explain how the addition sentence matches the balance.

Now place 4 cubes in one pan and 2 in the other. Have a volunteer write the matching addition sentence ($4 = 2 + \_\_$). ASK: How many more cubes must be added to the pan with two cubes to make both sides equal. Another volunteer may fill in the missing number (the addend).

### ACTIVITY 2

Give each group of three students a pan balance and some connecting cubes. Player 1 creates a balance problem by placing some cubes on each pan so that the balance is unbalanced. Player 2 writes the addition sentence (with a blank) that represents the unbalanced pans. Player 3 balances the pans and fills in the blank. Players then exchange roles. Repeat until all students are comfortable with the concept of balance in addition sentences. Advanced: Change the order. Player 1 writes an addition sentence with a blank, Player 2 creates the corresponding balance model, and Player 3 balances the pans and fill in the blank.

Balance the pans by removing cubes and solve equations (subtraction). Repeat the above for subtraction: instead of asking students how many cubes they need to add to balance the pans, ask them how many cubes they need to subtract (and from which side). Then write and solve the subtraction sentences corresponding to different balance models.

### Extension

Students can choose two different types of manipulatives, such as connecting cubes and paper clips, and check whether four of one have the same mass as four of the other. Have them explain what they discover.
PA1-10
Two Ways to Find the Same Total
Page 123-125

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m5, 1m6, 1m7, 1m66, 1m67, 1m68
WCNP: 1PR3, 1PR4, [C, CN, R, V]

VOCABULARY
column
row
addition sentence
subtraction sentence

Goals
Students will create equivalent addition sentences using an area model.

PRIOR KNOWLEDGE REQUIRED
Can count to 10
Recognizes numbers and quantities to 10
Is familiar with how a balance works
Understands that attaching connecting cubes into trains does not change their mass
Understands addition facts and notation; can write addition sentences different ways (e.g., \(2 + 3 = 5\) is the same as \(5 = 2 + 3\))

MATERIALS
grid paper
geoboards
connecting cubes

Row and column. Ensure that all students can identify a row and a column in a hundreds chart or calendar. Label a row and column accordingly. As an alternate memory aid, have students create the words “row” and “column” with letter cards or magnetic letters. Then ask a volunteer to rearrange the letters in the word “column” so that it reads downwards, in a column, and arrange the word “row” across. Have students read both words in these positions. Which letter appears in both words?

Count the squares in each row and add. Draw the grid below on the board. ASK: How many squares are shaded in the first row? (Point to the row in question.) Write the answer next to the row. Then ASK: How many squares are shaded in the second row? Have students determine how many squares are shaded in total by completing the addition sentence next to the grid:

\[
\begin{array}{c}
\text{1} \\
\text{+ 1} \\
\text{2}
\end{array}
\]

Create a similar grid with three rows, and have a volunteer count the shaded squares and write the corresponding addition sentence.
Repeat with more grids. Increase the difficulty by adding more rows and more columns.

Count the squares in each column and add. For the same grids used above, have students determine the number of shaded squares in each column and ask them to write the corresponding addition sentence. Start with the simplest grid:

1 + 1 = 2

Ask students to compare the two addition sentences, the one for the rows and the one for the columns. Which numbers are the same? Are any numbers different?

Repeat with more of the grids used previously. Do the totals (sums) change? What about the other numbers, the ones we add together (the addends)—do they change? Why do the sums remain the same even when the addends change? (The total number of shaded squares doesn’t change; what changes is how we group and count them.)

Combine the two ways of finding the sums, as follows:

1 + 1 = 2

Repeat with the grids used previously.
Goals

Students will decompose numbers up to 20 in different ways and create addition sentences and models to illustrate these decompositions.

PRIOR KNOWLEDGE REQUIRED

Can count to 20
Recognizes numbers and quantities to 20
Understands addition facts
Understands that addition facts and sentences can be represented by different models
Understands the notation for equivalent addition sentences: $2 + 5 = 3 + 4$

MATERIALS

counters or other school materials (for making models of addition sentences)
yarn circles

Introduce two models for addition. Invite a few students to make a model for $1 + 2$. Accept all correct answers. If no one draws this model, show it to your students:

Now, ask a volunteer to use this type of model to show $2 + 3$. Repeat with several different addition facts, increasing the value of the numbers (the addends) as you proceed. Have all students use counters or other school materials to create models.

Next, ask students what number sentence they would create for this model:

(ANSWERS: $2 + 1 = 3$ or $3 = 2 + 1$;
make sure both forms are shown.)

Modify the other models for addition facts in a similar way. Students can place yarn circles or elastics around the counters to show different groupings.

Combine the models. Ask students to write the number sentence for this model:
They should write $3 + 4 = 7$. Now draw the same arrangement of dots but circle two of them, to create groups of two and five. Ask students to create an addition sentence for the new model. They should write $2 + 5 = 7$.

Explain that we can write $3 + 4 = 7$ because $3 + 4$ is the same as $7$. **ASK:** Why did we write $2 + 5 = 7$? Can we say that $3 + 4$ is the same as $2 + 5$? How can we write that? If one or both of the answers do not arise, explain that there are two ways to show this equality: $3 + 4 = 7 = 2 + 5$ and $3 + 4 = 2 + 5$. The second, shorter addition sentence tells us that $3 + 4$ is equal to $2 + 5$. (Make sure students do not read the second sentence as $3 + 4 = 2$ and then we add $5$.) The longer addition sentence gives more information; it tells us what the two sides are equal to ($7$). Write the combined sentence, $3 + 4 = 2 + 5$, beneath the two models. Emphasize that the total number of dots is the same and does not change if we group the dots in various ways.

Next, ask students if they see any similarities in the two models, the one with dots only and the one with dots and circles. (Both represent the same sum. There are equal numbers of dots in each of the rows in the two models.) Then, prompt students to identify the differences. (The dots in the second model are in groups of two and five.)

Now, draw this model and ask for a volunteer to write the two corresponding addition sentences.

(ANSWERS: $4 + 6 = 10$ or $10 = 4 + 6$
$5 + 5 = 10$ or $10 = 5 + 5$)

Ask students to help you combine the two sentences: $4 + 6 = 5 + 5$. Practise writing such addition sentences for different models as a class. Vary the symbols you use in the models—try squares, dots of different colours, and other geometrical shapes. Enlarge the numbers gradually.

For a variation, explain that this box [10] represents a group of ten counters. What number is represented by the box and two more counters? (12) What addition sentences are represented by the following model?

**Bonus** What sentences are represented by this model?
Use Models to Solve Problems

Goals
Students will solve simple equations using models.

PRIOR KNOWLEDGE REQUIRED
- Can count to 20
- Recognizes numbers and quantities to 20
- Understands addition facts
- Understands that addition facts can be represented by different models
- Understands the notation for equivalent addition sentences:
  \[ 2 + 5 = 3 + 4 \]

MATERIALS
- Counters or other school materials (for making models of addition sentences)
- Yarn circles

Create models for addition sentences. Invite a volunteer to create a model for addition sentences such as \( 3 + 5 = 8 \). Invite a different volunteer to place yarn circles around the counters so that they represent \( 4 + 4 = 8 \) or \( 1 + 7 = 8 \). Give students several addition sentences and have them create models representing both parts of the sentences.

EXAMPLES:
- \( 2 + 5 = 3 + 4 \)
- \( 4 + 5 = 6 + 3 \)
- \( 3 + 1 = 4 + 0 \)
- \( 5 + 5 = 4 + 6 \)

Increase the sums to raise the bar. (EXAMPLE: \( 9 + 24 = 13 + 20 \))

Solve equations using models. Write on the board \( 2 + 4 = 3 + \_ \). Ask students how they know how many counters to place in each row? To start making a model for the right side of the sentence, what could you do? Prompt students to use yarn circles. ASK: How can we figure out using only one yarn circle how many counters will go into the other circle? When you placed yarn loops around the counters in other models, what did each yarn circle show? Were there any counters left outside both yarn circles? (no) Invite a volunteer to position a yarn circle to represent the three on the right side of the addition sentence. ASK: Where will you put the second circle? (around the rest of the counters) How many counters are in the second circle? (3) Complete the addition sentence. Solve more such problems as a class.
ACTIVITY

Pairs will need counters, yarn circles, and dividers to hide their models from each other. Player 1 creates a model representing two addition sentences with the same total so that Player 2 does not see the model. Player 1 writes the corresponding addition sentence, leaving one of the numbers as a blank, and gives the equation to Player 2. Player 2 has to create a model independently and solve the equation.

Bonus

Draw this arrangement of dots:

Ask students to find as many ways of grouping the dots as possible. Have them write the corresponding addition sentences.

EXAMPLES:

\[
\begin{align*}
1 + 5 &= 6 \\
2 + 4 &= 6 \\
4 + 2 &= 6
\end{align*}
\]

etc.

Raise the bar by using larger numbers.
Connect the Dots by 2s

☐ Skip count by 2s from 2 to 78 to create a picture.
**Equal or Not Equal?**

- **Predict.**
- **Use a balance to check.**
- **Draw the balance.**

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<thead>
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<th>Are They Equal?</th>
<th>Predict</th>
<th>Check and Draw</th>
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</thead>
<tbody>
<tr>
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<td>Equal</td>
<td><img src="image2" alt="Draw Balance" /></td>
</tr>
<tr>
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<td>Not Equal</td>
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</tr>
<tr>
<td><img src="image4" alt="Equal" /></td>
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</tr>
<tr>
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<tr>
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<td><img src="image8" alt="Draw Balance" /></td>
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<tr>
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<tr>
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</tr>
<tr>
<td><img src="image12" alt="Not Equal" /></td>
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<td></td>
</tr>
</tbody>
</table>

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**Blackline Master — Patterns and Algebra — Teacher’s Guide for Workbook 1.2**

I-13
Balances

☐ Circle the correct balance in each row.

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]

- [ ]
Part 2
Measurement

This unit covers measurement using rulers, measurement of time (non-standard units, hours, days, weeks, months, seasons), measurement of area and measurement of capacity.

Talking About Clocks. For some of the lessons, you will need an analogue clock with three hands—hours, minutes, and seconds. Referring to the hand that measures seconds as the “second hand” may confuse your students if you do not introduce the second as a unit of time; students might wonder why this hand isn’t called the first or third hand, for example. We suggest calling the second hand the “fast-moving hand” at first. After using the phrase a few times, you can shorten it to “fast hand.” If you do introduce seconds (see the online Extensions for lesson ME1-27), then you can start using the phrase “second hand,” but be aware of the possible confusion.

We will refer to the two slower hands as the hour hand and the long hand. The hour hand moves past one number every hour, and so the term “hour hand” makes sense. However, the minute hand does not pass one number every minute but every five minutes. (Similarly, the second hand goes past one number every five seconds.) Since the number of minutes are not marked on most of the clocks and watches students will come in contact with, we do not recommend using the term “minute hand.” Furthermore, constantly referring to the minute hand as the long hand will reinforce for students that the hour hand is the short hand.

Scheduling. Some of the lessons using clocks will need to be completed over the course of a day (or two) rather than all at one time. Start these lessons as early in the day as possible. You will find details in the relevant lesson plans.

More Connecting Cubes. Students will need a large number of both 2-cm and 1-cm connecting cubes for some lessons.

Containers. You will need a variety of containers for the students to use to measure capacity during this unit. Ask your students to help you to create a collection by bringing empty washed containers (non-breakable bottles, jugs, cans, juice boxes, etc.) You will also need a stack of identical cups to serve as measurement tools and funnels to prevent spilling.

Meeting Your Curriculum. For students following the WNCP curriculum, lessons ME1-22 and ME1-23 are optional but recommended, as they deepen students’ understanding of length. Lessons ME1-24 to ME1-28 on comparing and measuring elapsed time, ME1-29 to ME1-31 on telling time, and ME1-32 on days, months, and seasons are optional, as the material will be covered in later years.

For students following the Ontario curriculum, lesson ME1-23 is optional but recommended, as centimetre rulers are a natural extension of the non-standard rulers built in ME1-22 and will deepen students’ understanding of length.

Connection 8 O’Cluck by Jill Creighton
This book introduces time. Mr. Wolf and his neighbours are preparing for dinner.

AT HOME
Check with a parent/guardian which capacity measurement tools are used in the kitchen or at home in general.

Teacher’s Guide for Workbook 1.2
**Rulers**

**Goals**
Students will learn how to use a ruler.

**PRIOR KNOWLEDGE REQUIRED**
Can measure lengths using non-standard units

**MATериалS**
small paper clips, strips of construction paper, and paper fasteners (to
make rulers—details below) various classroom objects to measure
BLM Concrete Rulers (p J-37)
BLM Concrete Rulers Without Pictures (p J-38)

**ACTIVITY 1**

Introduce rulers. Draw a chain of paper clips on the board, and draw the
non-writing end of a pencil above it. **SAY:** The pencil is 2 paper clips long. Who wants to finish drawing the pencil? Then mark the number 2 where the
pencil ends.

Explain that we write 2 where the pencil ends because anything that starts
where the chain of paper clips starts and ends here is 2 paper clips long.
Invite a volunteer to draw a pencil that is 1 paper clip long. Have another
volunteer write 1 where the pencil ends. Repeat with pencils that are 3 and 4
paper clips long.

Prepare small-paper-clip rulers for each student by fastening a chain
of 8 small paper clips to a strip of construction paper with paper
fasteners. The strips of paper should be longer than the chain of paper
clips, and neither end of the chain should line up with the edge of the
paper. This will get students used to the way actual rulers work. Have
all the chains begin (but not end) with a coloured paper clip so that
you can tell your students clearly with which end to start measuring.
Have students measure a big paper clip. **ASK:** About how many small
paper clips long is the big paper clip? Where does it end on your ruler?
Have students mark “2” where an object that is exactly two paper clips
long would end. Repeat with many objects of various sizes, such as
an eraser, a pencil, a roll of tape, and a tens block. Students can also
measure the length and width of their index fingers. Explain that the
width of their index fingers is between no paper clips long and 1 paper
clip long and is likely closer to no paper clips long. **ASK:** What number
should we write to show this? Have students write 0 at the beginning.
of the coloured paper clip and explain that an object that was exactly 0 paper clips long would end right where it started. **EXAMPLE:** the thickness of a sheet of paper.

**Rulers do the counting for you.** Draw a longer small-paper-clip ruler on the board, one with 10 paper clips and markings from 0 to 10. Draw a pencil lined up with the 0 and 9. **ASK:** How many paper clips long is the pencil? (9) Students could answer by raising the correct number of fingers. Repeat with other drawings of pencils that are different number of paper clips long. **ASK:** Did you count the paper clips to find out? Is there another way to find the answer? How is the counting already done for you? Explain that a ruler is a tool that does the counting for you. Then show pencils of different lengths and **ASK:** How many paper clips long is this pencil? How do you know? Students should check their answers by counting.

**Using rulers correctly.** Draw a pencil above a small-paper-clip ruler so that it starts at 2 and ends at 7.

![Paper clipping ruler](image)

**SAY:** I think this pencil is 7 paper clips long because it ends at the number 7. Am I right? (No; if you count you find only 5 paper clips along the length of the pencil.) **SAY:** But the ruler is supposed to do the counting for us. Why didn’t the ruler get the same answer our counting did? Explain that the object has to be lined up with the 0. A ruler is a tool that people made so that they don’t have to count every time, but we have to use it properly for it to do what we want it to do.

**ACTIVITY 2**

Give students copies of rulers from **BLM Concrete Rulers**, but do not use the ruler of small (1-cm) connecting cubes yet. Have students measure various objects using their rulers and record their measurements. Then have them compare their measurements with a partner who measured the same object(s) with the same kind of ruler. Did both students get the same answer? If not, have them work together to determine the correct measurement. Students might also find a partner who measured the same objects with a different kind of ruler. Were their partner’s measurements more or less than their own? Can they explain why? Repeat with rulers from **BLM Concrete Rulers Without Pictures**.
**Goals**

Students will learn the centimetre and the advantage of standard units.

**PRIOR KNOWLEDGE REQUIRED**

- Can measure using non-standard units/rulers
- Can skip count by 2s, 5s, and 10s

**MATERIALS**

- small (1-cm) and large (2-cm) connecting cubes
- BLM Ruler or Counting (p J-39)
- BLM Concrete Rulers (p J-37)
- rulers
- BLM Measure with a Ruler (p J-40)
- BLM Practise Measuring with Centimetres (p J-41)

**Curriculum Expectations**

Ontario: 1m3, 1m5, 1m7, optional

WNCP: optional, [R, CN, C]

**Vocabulary**

- ruler
- centimetre (cm)
- standard units

**Problem Solving**

Reflecting on what made the problem easy or hard.

**Introduce small connecting cubes.** Remind students that we have big paper clips and small paper clips (show samples). Then show students the big and small connecting cubes. So far they have used only the big cubes. Now they will measure using the small cubes, too.

**Measure using small connecting cubes and rulers.** Give students small connecting cubes and a copy of BLM Ruler or Counting. Have each student measure the real objects pictured to complete the first column on the BLM. Then give students a small-connecting-cube ruler (from BLM Concrete Rulers) to measure the same objects again and complete the second column. Discuss whether they got the same answer both ways, and if not, why not. Did they forget to line up one end of the object with the 0? Did they count the cubes properly or were there so many that they got lost in the counting? **ASK:** Which way of measuring was easier? Which way was less work? Why? Explain that because the ruler does the counting for us, it is less work to use the ruler.

**Relate the length of small connecting cubes to the spaces on a ruler.** Give each student a regular ruler (30 cm long) and 30 small connecting cubes. Have students line up the cubes on the ruler so that they fit in the markings. What do students notice? (The spaces between the markings are the same length as the cubes; the cubes fit exactly between the markings.) Explain that the length of each small cube is called a centimetre and people use centimetres to make rulers. Students can practise measuring with a ruler by completing BLMs Measure with a Ruler and Practice Measuring with Centimetres. Students can measure the pictures directly on the page.
they are all a whole number of centimetres) or else measure the real objects whenever available.

**Use a ruler to measure longer objects.** Have students use rulers to measure objects that are between 20 and 30 centimetres long, such as the length of a sheet of paper. Then give students metre sticks and ask them to measure objects that are more than half a metre long but less than one metre long. Remind them to line up the 0 mark on the metre stick with the end of the object. Objects they might measure include the width of a doorway, the length of a bookshelf, a width of a window, the length of an arm, and the distance around a garbage can (using string and the metre stick). Emphasize how much easier it is to have the ruler count for them when there are many centimetres to count.

**Centimetre and cm.** Write the word centimetre on the board and tell students that people often just write cm for centimetre. Have a volunteer find and circle the letters c and m in the word.

**ACTIVITY 1**

Have students find objects which are about 1 cm long, wide, or high in the classroom.

**The need for standard units.** Tell students that a long time ago, people didn’t use paper clips or straws or connecting cubes or even centimetres to measure lengths. They used other things. For example, in ancient Egypt, they used cubits. Tell students that a cubit is the length from the tip of your middle finger to your elbow and show this length on yourself. Use the following Activity to illustrate the disadvantages of such a unit of measurement and the need for standard units.

**ACTIVITY 2**

Tell students that you want to make a table that is 4 cubits high. Have students each make one leg using their own cubit and then get into groups of 4 to make a table. Students can roll old newspapers to make the legs and use bristol board to make the tabletop. (Rolling newspapers diagonally works well; the ends are thinner and easier to cut off.) Then ask students to lay a pencil on their tables. Does the pencil roll off? Why? Why aren’t the legs the same height? Explain to students that the ancient Egyptians recognized the need for everyone to use the same, or a standard, cubit. Who’s arm did they use to determine the length of the standard cubit? The king’s! Discuss: How do you think people recorded and shared the king’s cubit so that everyone would know what it was? (They used a wooden stick with lines scratched in to show the length of the king’s cubit, just like we use rulers.)
Clock Faces

Goals
Students will become familiar with the details on a clock face.

PRIOR KNOWLEDGE REQUIRED
Can use number lines

MATERIALS
- an analogue clock with three hands
- masking tape, string, or a hula-hoop
- cards numbered 1 through 12
- BLM Clocks (p J-42)
- BLM Make Your Own Clock (p J-43), paper plate, paper fastener, and scissors for each student

NOTE: Students will need to copy the hands on the clock at different times throughout the day.

Compare clocks to number lines. Point out how the clock face has numbers all around, beginning with 1 and ending with 12. Draw a number line on the board and label it from 1 to 15. Discuss how the clock is like a number line that goes in a circle. Ask students what comes before and after various numbers from 1 to 12, first on the number line and then on the clock. (EXAMPLE: What comes before 3 on the number line? On the clock?) Finish with the number 12, and explain how it is special (the next number on a clock is 1; the next number on a number line is 13). Emphasize that clocks are like number lines, except the clock only goes from 1 to 12 and then starts over again at 1.

Add the numbers to a clock face. Tell students to look closely at a clock face and to try to remember where all the numbers go. Then gather the class around a large “clock” on the floor: a circle (made from masking tape, string, or a hula-hoop) with cards numbered 1 to 12 placed face down in the correct positions. Make sure students have their backs to the actual clock or hide it, if possible. Have volunteers turn over cards of their choice after predicting the number.

ASK: Which numbers were easier to remember? Why do you think they were easier to remember? (Most students will likely say 12 and 6; some will say 3 and 9.) Explain that the numbers at the top, bottom, left, and right are usually the easiest to remember. Put the cards for 3, 6, 9, and 12 in position and ask students to place the remaining numbers on the “clock.”
Take away all the cards and **ASK:** Where does the 12 go? Have a volunteer place it in the correct position. Repeat with 6, 3, and 9. **ASK:** What numbers come before and after the 3? Have volunteers place those numbers and repeat for 6 and 9. End with 12. Emphasize that the clock face shows only numbers 1 to 12.

**SAY:** We said that 2 comes right before 3 and that 1 comes after 12. That means the 1 comes right before 2. Does that make sense? Does 1 come right before 2 on a number line? Repeat with more numbers on the clock. Explain that when students can solve the same problem in two different ways and get the same answer, then they must have done the problem correctly. If we know that 5 comes right before 6 and right after 4, and both pieces of information make the number go in the same place, the answer must be right.

**Discuss differences between the hands on a clock.** Draw students’ attention to the three hands on a clock. Brainstorm how they are different and record students’ answers. Depending on the clock you have, answers might include:

- Two are thicker, one is thinner
- The thin one is moving (reflect this back as: only the thin hand looks like it’s moving)
- They are different lengths (reflect this back as: one of the thick hands is longer than the other)
- Two are black and the other one (the fast one) is red

**All the hands are moving.** Explain that all the hands on a clock move, but two move so slowly that they don’t look like they’re moving. Compare this to the motion of the sun. You don’t see the sun moving, but it is in a different place after school than it was when school started. You might have students note where the sun is at the start of the day and then again at the end. **NOTE:** Although it is technically the earth’s motion, not the sun’s, students at this level will naturally see motion only as relative to themselves.

**Copy clock hands throughout the day.** Give each student a copy of BLM Clocks. Pause throughout the day to have students look at the clock and copy the two thicker hands at various times. Discuss how the hands have moved. **EXAMPLE:** From 1:15 to 1:50, both hands moved but the short hand didn’t move very much—it is still between the 1 and the 2, but closer to the 2 instead of the 1.

**ACTIVITY 1**

**Make your own clock face.** Students will need a paper plate, a copy of BLM Make Your Own Clock, scissors, a paper fastener, and a pencil. Students use the circle on the BLM to make a hole (with the pencil) in the centre of the paper plate and write the numbers in the correct positions. Attach the hands to the plate with the paper fastener.
# What Takes Longer?

**Goals**

Students will directly compare two amounts of time.

**Prior Knowledge Required**

- Ordinals, 1st and 2nd, before and after
- Can compare lengths directly

**Materials**

- Two windup toy cars
- BLM More Time and Less Time (p J-44)
- BLM Time and Length (p J-45)
- BLM Draw Lines to Match Stories (p J-46)

**Start at the same time, end later.** Wind up two toy cars and let them both go at the same time, then **ASK:** Which car ran for more time? How can you tell? Which car stopped first? Which car stopped second? Explain that the car that stopped second ran for more time than the car that stopped first.

**Car times are like pencil length.** Show two pencils side by side. They should be similar, but not identical, in length. The pencils start at the same point, but the shorter one ends first. Similarly, the cars start moving at the same time, but the one that stops first runs for less time than the one that stops second.

**Compare times directly.** Ask students to predict which activity will take more time: walking around the room or doing 10 sit-ups. Explain that you will check the prediction by asking one person to do one activity and another person to do the other, and seeing who finishes first. Emphasize that this is not a race! The only reason you need two volunteers is because one person can’t do both things at the same time. Volunteers should do each activity at a normal pace (demonstrate correct and incorrect paces). Invite volunteers to get into position. Remind students that just as pencils have to be lined up for you to compare their lengths, the volunteers have to start moving at the same time for you to compare the time each activity takes. **ASK:** How can we make sure the two volunteers start at the same time? (**EXAMPLE:** Say “1, 2, 3, GO!”) Invite a third volunteer to tell the others when to start. When the volunteers are finished, **ASK:** What took longer, walking around the room or doing 10 sit-ups? How do you know? How is this like comparing the lengths of pencils?

**Introduce longer and shorter with reference to time.** **ASK:** What’s another way to say “more time” and “less time?” Can we say heavier time and lighter?
time? Thicker time and thinner time? Longer time and shorter time? Explain to students that we use the words longer and shorter to describe time because time is so similar to length. More time is longer time and less time is shorter time.

Have pairs compare the time it takes to do 5 jumping jacks and say the alphabet. Students should start at the same time. Who stopped first? Who stopped second? Which activity took a longer time? Which activity took a shorter time? Students can record their answers on BLM More Time and Less Time.

Start later, end at the same time. Have two volunteers clap their hands until you tell them to stop. Ensure that one of them starts before the other but they stop at the same time. ASK: Who clapped for a longer time? (the one who started first) Who clapped for a shorter time? (the one who started second) Repeat with other activities, such as doing jumping jacks or marching on the spot. Relate this to length.

Start sooner, end later. Tell two volunteers when to start clapping so that one starts sooner and finishes later. ASK: Who clapped for a longer time? Who clapped for a shorter time? Explain that when one person starts clapping sooner and finishes later, that person is clapping for a longer time. Relate this to length.

Connect measuring time to measuring length. Have students cut out the four pictures of lines on BLM Time and Length. Tell students the following stories, one at a time, and have them choose the picture they think best matches the story.

- Sarah started drawing a snowman and Tom started writing the alphabet at the same time. Tom finished first. (PROMPTS: Did Tom and Sarah start at the same time? Which picture shows lines starting at the same place? Which line represents Tom—the shorter line or the longer line? How do you know?)

- Sarah started clapping. Then Tom started clapping. Then Tom stopped clapping. Then Sarah stopped clapping.

- Sarah started clapping. Then Tom started clapping. Then Sarah stopped clapping. Then Tom stopped clapping.

- Tom was playing a song on his recorder. Sarah joined him on her guitar partway through. They both stopped playing at the same time. Tom played for longer.

Make up other “time” stories to match the pictures. Then tell stories and have students draw pictures (lines) to match. Start by drawing the lines for students and asking them to identify which line represents which character; then draw one of the lines and have students add the second. See also BLM Draw Lines to Match Stories.
Goals
Students will compare elapsed time indirectly.

PRIOR KNOWLEDGE REQUIRED
Know the alphabet
Can compare length directly and indirectly

MATERIALS
audio recording of a song that is familiar to students (a second recording at a different speed, if possible)
cards or puzzles for tasks to measure elapsed time (see Activity)

Which takes longer—saying or writing the alphabet? Ask one volunteer to say the alphabet while another volunteer writes it on the board, so that you can determine which takes a longer time. Again, this is not a race. The student saying the alphabet should whisper. NOTE: Choose volunteers who know and are comfortable writing and saying the alphabet. ASK: Which took longer—saying the alphabet aloud or writing it?

What does it take the same person longer to do? Using your students’ names as appropriate, SAY: It took Nora longer to write the alphabet than it took Tom to say the alphabet. Now I want to know if it would take Nora longer to write the alphabet than for her to say the alphabet. How can I figure this out? Students may suggest asking Nora to do both at the same time. Invite volunteers to try writing and saying the alphabet simultaneously, and then do so yourself. Point out that at least one of the tasks—the saying or the writing—will be slowed down.

Invite students to brainstorm other solutions. Prompt them to think about how they compared lengths, specifically the length of the sides of their desks. Remind them that they couldn’t line up one side of their desk with the other, but even before they knew how to measure with connecting cubes there was a way to compare sides. Does anyone remember what that was? (make something the same length as one side and compare it to the other side)

ASK: How can we find out whether it will take Nora longer to say or to write the alphabet? Which do you think will take longer? Can we find something that takes another volunteer more time than it takes Nora to say the alphabet but less time than it takes Nora to write the alphabet? Have students come up with a third task that a different volunteer can do, one that takes longer than saying the alphabet but not as long as writing
Use music to compare times. Play or sing a familiar song while Nora does each activity. Tell Nora to start saying the alphabet as soon as the song starts. Stop the song when she is finished. Where did you stop the song? Repeat with Nora writing the alphabet. Explain that since you heard more of the song when Nora wrote the alphabet than when she said it, writing the alphabet took her longer than saying the alphabet.

Emphasize that by stopping the song when Nora finished saying the alphabet, we found something that takes the same amount of time, just like we found something the same length as one side of the desk and compared it to the other side. Now we can compare how long it takes to get to the same place in the song with how long it takes Nora to write the alphabet. Did we hear more of the song or less in the time it took Nora to write the alphabet?

Demonstrate trying to compare two tasks with a slow and a fast version of the song. Choose two activities that will take your students approximately the same time to complete. Use two versions of a song, one that is clearly faster than the other, to try and determine which activity takes longer. (If you don’t have two different recordings, sing the song once slowly and once quickly.) ASK: For which activity did we hear more of the song? Does that mean this activity takes more time than the other? How can we check which activity really took longer? (use the same music both times; like using the same size paper clips to measure the length of a pencil)

### ACTIVITY 1

Have students sing to compare times. Have partners sing for each other to compare the time it takes them each to do two tasks.

(Possible Tasks: solve two different tangram puzzles, sort a deck of cards into suits or numbers, sort a deck of SET cards into different numbers (1, 2, and 3) or by shape, do 20 jumping jacks and 20 sit-ups)

Stress the importance of singing the same song at the same speed each time. ASK: Which task took longer? How do you know? Students should do different tasks than their partner so as not to compete. Students might also wish to say the words to a song they know well instead of singing the words. Allow students to choose a song they know well, but stress the importance of using the same song for both tasks and being consistent: if they choose to say the song instead of singing it, they must do so for both tasks. Ask students to articulate why this is important.
Using Clocks to Measure Time

Goals
Students will measure time by counting the numbers that the fast-moving (second) hand of a clock passes.

PRIOR KNOWLEDGE
Are familiar with clocks

MATERIALS
analogue clock with three hands
BLM How Long? (p J-47)
BLM About (p J-48)

Introduce the clock as a measuring tool. Ask students to find something in the class that moves in a circle at the same speed all the time. (the fast-moving hand on an analogue clock) Draw students’ attention to this hand and watch it move. Point out how the hand moves at a steady pace, all the way around the clock. Just as connecting cubes are all the same length, the time it takes the fast hand to move from one number to the next is always the same, so we can use these “clock intervals” to measure time.

Use the clock as a measuring tool. Have a volunteer start doing 10 jumping jacks when the fast hand is at the 12 and have the other students tell you where the hand is pointing when the volunteer is done. Repeat with a different activity, such as clapping your hands 10 times. Then ASK: Which activity took more time, or more clock intervals? How do you know? Where was the fast hand when the volunteer started jumping/clapping? Where was it when the volunteer stopped? How many intervals passed? Draw a clock on the board and count the intervals together.

Repeat with other tasks that take less than a minute to complete.
EXAMPLES: hop on one foot 10 times, count to 20, say the alphabet, walk around the room. ASK: Which task took the longest time, or the most clock intervals? Which took the shortest time? Did any two tasks take about the same amount of time? Did any task take a little longer than another? A lot longer?

BLM How Long? provides extra practice.

Remind students that the length of objects is not usually an exact number of cm. The pencil might be almost 5 cm or just more than 5 cm long, etc., but we record it as about 5 cm. We can do the same thing with time. We can say about 5 passed, even if it’s really a little bit more or a little bit less.

Count intervals when the fast hand starts at 12. Draw the clock shown and say: The fast hand was at the 12 when we started and at the 3 when we finished. How many intervals passed? Repeat with different numbers, but always start at 12.

Bonus: Do not include the numbers on the clock faces, only the markings.
The clock counts for us when the clock hand starts at 12. **SAY:** The fast hand was at 12 when we started and at 9 when we finished. Can you tell me how many clock intervals passed without counting? Point out that when the clock hand starts at 12, we don’t have to count the intervals—the clock counts for us! **ASK:** What does this remind you of? What other measuring tool does the counting for us? (a ruler) How do we have to use a ruler to make sure it does the counting for us? (start at zero)

**Make and check predictions.** **SAY:** I think hopping on one foot 30 times will take the same amount of time as walking around the room. Invite a volunteer to test your prediction while the class counts clock intervals and you count hops silently. Record the estimate and the measurement. Did the two tasks take close to the same amount of time? How can you tell? Are the numbers close? Repeat with other tasks that students think will take about the same amount of time.

**ACTIVITY 1**

Have students time each other doing first one task and then another. **EXAMPLES:** write your first and then your last name; write the first five letters of the alphabet (a to e) and then the last five (z to v); find page 3 of your JUMP Math workbook and then page 43. Students might predict which task they think will take longer (i.e., more clock intervals) before starting. Partners should choose to do different activities so as to not compete. **ASK:** Who took longer to write their first name? Who took longer to write their last name? Why do you think some people needed more time to write their first name and some needed more time to write their last name? Discuss why some activities might have taken more time than others.

**Extension**

**You don’t have to wait for the fast hand to get to 12.** Ask a volunteer to start counting to 20 when the fast hand gets to 12 and ask the rest of the class to see where the hand is pointing when the volunteer finishes. **ASK:** If—counts again, but starts when the fast hand is at the 3, where do you predict the fast hand will be when—is finished? Record and check predictions. Repeat with different starting points for the same task.

Explain that they don’t have to wait until the clock is at the 12 between tasks, as long as they are willing to count the clock interval themselves; this can be convenient. Tell students that you want to know how long you can balance a book for, on your head. Start at 12 and stop at, say, the 5. Write “5” on the board and explain that you want to try again; this time start at the closest number, say, 6 or 7. Together as a class, count the numbers as the fast hand passes them. Write how many numbers the fast hand passes. Discuss whether or not you improved.
Goals
Students will use a 30-second sand-timer (small hourglass) to measure time.

Prior Knowledge Required
Can use the fast hand on an analogue clock to measure elapsed time
Understand the need for reliable measurement tools

Materials
30-second sand-timers (one for each student if possible)
BLM More Time or Less Time (p J-49)

Introduce sand-timers. Show students a 30-second sand-timer and ask if anyone knows what it is and how you can use it. Turn it upside down and watch the sand run out. ASK: The sand took some time to finish going down. Do you think it will take the same amount of time for the sand to go down when I turn it around again? How can we check? (Count the number of clock intervals the fast hand passes—it should be 6 both times.)

We can use sand-timers and clocks to see improvement. Explain that we can use sand-timers to see if we get better or faster at doing things. Use the Activity below to illustrate.

Activity 1
Play Memory. Arrange the red numbered cards from a regular deck, 1 (ace) through 10, in 4 rows of 5. How many pairs can you find before the sand-timer runs out? Students should each play at least three games and time themselves each time. Did anyone find more pairs the second or third time?

ASK: How can you use the clock to do the same thing? (You can count how many pairs of cards you can find in the time it takes the fast hand to go all the way around the clock or past a certain number of intervals.)

What can you do in the time it takes the sand-timer to run out? Ask students to see which of a number of tasks they can complete before the sand-timer runs out. Include tasks that will take less than 30 seconds (one sand-timer unit) and some that will take more than 30 seconds but less than a minute. EXAMPLES: writing the alphabet, doing 5 jumping jacks, tracing your hand, erasing the tracing, sorting SET cards into solid and not solid. Give students a list of the tasks so that they can write “yes” or “no” next
to each one as they complete it. **NOTE:** If students finish a task before the sand-timer runs out, they will have to wait until it does before turning it over and starting the next task. Demonstrate turning the sand-timer over before it runs out, and point out how the sand is already partway down, giving students less time to do the task.

Now ask students whether they think various tasks will take more than, less than, or about the same time as a sand-timer. **EXAMPLES:** get dressed, sharpen a pencil, wrap a birthday present, unwrap a birthday present, brush your teeth, read a story, find a red pencil crayon, write your name, line up for recess. Students might show a thumbs up for “more than,” a flat hand for “about the same as,” and a thumbs down for “less than.”

**What can you do in the time it takes the hand to get around?** Ask students if they can do the same tasks in the time it takes the fast hand to move all the way around the clock and record “yes” or “no” again. (Watch students to see if they notice that they don’t have to wait for the fast hand to start at the 12.)

**Compare sand-timers to clocks.** **ASK:** Were you more able to finish more tasks within the sand-timer unit or in the time it takes the fast hand to move all the way around the clock? Why do you think that happened? (It takes longer for the fast hand to go all the way around the clock than for the sand to run down, so they had more time to work using the clock than they did using the sand-timer.)

**Why clocks are more convenient than sand-timers.** Explain that with sand-timers, you must wait for the sand to run out before you can start again. The clock is more convenient. You can demonstrate this by timing different volunteers doing the same task, one after another. While using the sand-timer, emphasize the waiting time. While using the clock, emphasize that, if the fast hand is at the 3 when one person finishes, the next person can start at the 4 or 5 and you check to see if he or she finishes before the hand gets back around to the 4 or 5.

**Practise estimating and measuring with sand-timers and clocks.** On the first worksheet, students will estimate how many claps and other actions (including one of their choice) they can do before the sand-timer runs out. If you don’t have sand-timers for each student, tell them instead to estimate how many they can do in 6 clock intervals (a sand-timer takes 6 clock intervals to run out, so this is the same thing). If you notice students slowing down or speeding up in order to match their estimates, ask them if they think they would change their estimate next time and whether it would be lower or higher.

**How long does it take?** The second worksheet and BLM More Time or Less Time asks students to demonstrate their developing understanding of how much time common and daily activities take.
The Hour Hand

Goals
Students will become familiar with the motion of the hour hand.

PRIOR KNOWLEDGE REQUIRED
Are familiar with clock faces and the movement of the fast hand

MATERIALS
an analogue wall clock
a toy clock or pre-made clock face with two hands
BLM What Are You Doing? (p J-50)
BLM Clocks (p J-42)
BLM What’s Longer? (p J-51)

NOTE: This lesson requires the class to look at and discuss the clock at various times throughout the day. Start the lesson as early in the day as possible or plan to complete it over two days.

The hour hand is short. When the hour hand is pointing directly at the 9,
ASK: Where is the short hand pointing? Tell students that the short hand is called the hour hand. Use a pre-made or toy clock to show various times and ask students what number the hour hand is closest to. Students can answer by holding up the corresponding number of fingers.

Introduce hours. Tell students that it always takes the same amount of time for the hour hand to move from one number to the next, just like the fast hand. The amount of time it takes the hour hand to move one clock interval is called an hour. That’s why this hand is called the hour hand: because it moves one clock interval in one hour.

What are students doing when the hour hand points at —? Stop and look at the clock when the hour hand points directly at different numbers throughout the morning (9, 10, 11, and/or 12). ASK: What are you doing? Where will the hour hand be pointing in one hour? Students can record the position of the hour hand and their activities on BLM What Are You Doing? or in their journals.

What are students doing when the hour hand is between two numbers? When the hour hand is halfway between the 1 and the 2, ASK: Where is the hour hand pointing now? Remind students that the hour hand is the short hand. Is it pointing at the 1? (no) At the 2? (no) Between the 1 and the 2? (yes) Explain that the hour hand is pointing halfway (right in the middle) between 1 and 2. Where will the hour hand will be pointing in one hour? (halfway between 2 and 3) Repeat when the hour hand is halfway between 2 and 3, and finally when it is pointing right at the 3. Students can record
the position of the hour hand and their activities as above, on the BLM or in their journals.

Where is the hour hand when —? Over the course of a day, ask students to check the position of the hour hand when they begin the routine activities listed on the third worksheet. Students should draw the hour hand pointing at or between the correct numbers on each clock. Verify that students record the position of the short hand, not the long hand. You can also use BLM What Are You Doing? to tailor this activity to your classroom schedule: have students record the position of the hour hand and illustrate what they are about to do as a class at various times throughout the day (EXAMPLES: go to an assembly, go to the gym, meet with reading buddies).

Identify the number of elapsed hours. Draw a clock face on the board and have a student show you where the short hour hand is pointing when school starts. Have another volunteer show where the hour hand is pointing when school finishes. Demonstrate how students can count the number of hours that school lasts by counting the number of intervals the hour hand passes through:

We say “o’clock” when the hour hand points directly at a number. If the hour hand is pointing directly at the 9, then we say it is 9 o’clock. Show students a pre-made or toy clock with only an hour hand and move the hour hand so that sometimes it points directly at a number and sometimes it is between two numbers. Ask students if the clock says “o’clock” or not. Students might show a thumbs up for “yes” and a thumbs down for “no.” Then show the hour hand pointing directly at various numbers and have students tell you what o’clock it is.

Practice finding the number of hours between two “o’clocks.” Draw a clock on the board with a dotted hour hand pointing at the 1 and a solid hour hand pointing at the 3. Tell students that on the weekend you went to see a movie. It started at 1 o’clock and finished at 3 o’clock. ASK: How long did the movie last? Repeat with other events. EXAMPLES: Grandpa visited from 11 o’clock to 2 o’clock, the baby slept from 7 o’clock to 5 o’clock, the party started at 12 o’clock and ended at 5 o’clock. Then, instead of drawing the times for them, have students draw the times and count the hours that passed using BLM Clocks.

Bonus Students can use BLM What’s Longer? to determine which part of the school day (before lunch or after lunch) is longer. Students can use the third worksheet to complete the BLM.
Investigate where the long hand is when the hour hand is at ___ o’clock.

At various times throughout the day, when the hour hand is pointing directly at a number, ask students to describe where the long hand is pointing. Record the answers on the board. **EXAMPLE:** At 9 o’clock, the long hand is pointing at the 12. After 2 o’clock, **ASK:** Where do you think the long hand will be pointing when the hour hand is pointing at the 3?

**Teach students to write = o’clock a different way.** Ask students if they have seen clocks or watches that show the time in a different way. Tell students that some watches don’t have hands but show the time using only numbers; they show 9 o’clock as 9:00. Show students a digital clock to illustrate. Then summarize the three different ways of showing or writing the same time: 9 o’clock, 9:00, and using a clock with the two hands (hour hand at 9, long hand at 12). Show different times to the hour (in sequence) on a toy or pre-made clock and have students tell what time it is. For each hour read, ask volunteers to come to the board or chart and write the name in the two forms introduced above (___ o’clock and __: 00). Repeat, but in a random order instead of sequentially.

**ACTIVITY 1**

Play **Picking Pairs** and **Memory** (see NS Part 1—Introduction) with the cards on **BLM Matching Analogue to Digital 1**.

**Draw time to the hour.** On pre-made clock faces, ask each student to show 12 o’clock, then 1 o’clock, and continue sequentially until you reach
12 o’clock again. Then repeat in random order. Ensure that students show the hour hand pointing directly at the number of the hour and the minute hand pointing directly at the 12. Then give various times orally and have students draw them on BLM Clocks. Students can compare their answers with a partner.

Find the time “in one hour.” Show various times to the hour and ask students to draw (on BLM Clocks) or show (on a pre-made clock face) what time it will be in one hour. Explain that “in one hour” or “one hour from now” tells them to move the hour hand to the next number.

Find the time “one hour ago.” Show various times to the hour and ask students to draw or show what time it was one hour ago. Emphasize the different directions they need to move the clock hand when finding the time “in one hour” and “one hour ago.” “In one hour” tells them to move the hour hand to the next number; “one hour ago” tells them to move the hour hand to the number before. Students can complete BLM In One Hour and One Hour Ago for practice.

Solve word problems. Write simple word problems on the board and read and solve them together as a class. EXAMPLES:
• Gym class starts at 10:00 and lasts for one hour. What time does it end?
• Ron started swimming lessons at 9:00. The lesson lasts for one hour. What time does it end?

Write similar word problems on the board for students to solve independently. Underline important phrases such as “for one hour” or “takes one hour” and also start times. Give problems where the activity lasts for more than one hour. EXAMPLE: A movie starts at 3:00 and lasts for two hours. What time does the movie end?

Extension

Which clock is right? Draw two clocks on the board or have several pre-drawn clocks ready to stick to the board. Start with one clock showing the short hand pointing at the 6 and the long hand at the 12, and the other clock showing the short hand pointing at the 12 and the long hand at the 6. Tell students that only one clock is possible—can they figure out which one? Have students work in pairs to solve the puzzle. Then discuss the solution: When the hour hand is pointing directly at the 12, it is 12 o’clock. ASK: Where should the long hand be pointing? (at the 12, too) Repeat with other similar pairs of clocks (EXAMPLE: 7:00 and a clock showing its “reverse”). Then show one clock with both hands pointing at the 12 and another with both hands pointing at the 6 and repeat the exercise. Explain that when the hour hand is pointing directly at the 6, the long hand cannot be pointing at the 6—it must be pointing at the 12.
Where is the long hand pointing when the hour hand is halfway between two numbers? Ask students to describe where the long hand is pointing at various “half past” times throughout the day (EXAMPLES: 9:30, 11:30). Encourage students to notice that the long hand is always pointing at the 6 when the hour hand is pointing exactly halfway between two numbers.

The long hand moves halfway around the clock when the hour hand moves halfway from one number to the next. On a pre-made clock, move the hour hand between the 2 and the 3. Explain that while the hour hand is moving between the 2 and the 3, the long hand is moving all the way around the clock, from the 12 back to the 12. Move the long hand all the way around the clock. Then point the hour hand back at the 2 and tell students you want to move it halfway to the 3. Start moving the hour hand and have the class stop you when you get there or have a volunteer move the hour hand instead. Then tell students that you will move the long hand and you want them to stop you when it gets halfway around the clock. ASK: Where is the long hand pointing now? (at the 6) Draw a clock face with a shaded half, and show the movement of the long hand from the 12 to the 6.

Explain that when the hour hand is pointing halfway between two numbers, the long hand is always pointing at the 6. It takes half an hour for the hour hand to move halfway from the 2 to the 3. It also takes half an hour for the long hand to move halfway around the clock.

Write “half past” the hour in two ways (half past ____ and ___:30).

Explain that when the hour hand is halfway from one number to the next, we
say it is “half past” the hour. Remind students that some watches show time only with numbers. Have students guess how half past 3 would be shown on a digital clock. If students guess 3:6 or 3:06, explain to them that if the long hand counted intervals in the same way the hour hand does, then 3:6 or 3:06 would be correct. But instead of counting intervals from one number to the next, the long hand counts the very small intervals between the numbers. Draw your students’ attention to the very small intervals on the clock and have students count with you the number of small intervals the long hand passes between 12 and 6. You might stress every fifth number as you count since there are five small intervals in every “big” interval. (This might lead students to notice that they can just count by 5s.) Then explain that half past 3 is written as 3:30 (and said as “three thirty”) because the long hand passes 30 small intervals.

ACTIVITY 1

Play Picking Pairs and Memory (see NS Part 1—Introduction) with BLMs Matching Analogue to Digital (1) and (2).

Show time to the half hour on an analogue clock. On a clock face or BLM Clocks, ask students to show half past 12, then half past 1, and continue sequentially until you reach half past 12 again. Repeat with times in random order. Ensure that students show the hour hand pointing halfway between two numbers and the long minute hand pointing straight at the 6. Repeat with a mix of times (“half past” and “o’clock”).

Find the time “in one hour.” Show various times on the half hour and have students show or draw the time “in one hour” or “one hour ago.”

Bonus Find the time in two hours.

Solve word problems (as in ME1-30). Include problems where students have to decide if the activity will be done by a given time. EXAMPLE: Ron started playing piano at 1:30 and played for 1 hour. Did he finish by 3:00?

ACTIVITY 2

Small groups can create a collage of pictures of clocks, watches, timers, and other timepieces and write the times shown beneath each one.

Extensions

1. Repeat the extension from ME1-30 with clocks that have one hand pointing halfway between two numbers and the other pointing at the 6.

2. What time will it be in half an hour? Use pre-made clocks and/or BLM In Half an Hour (pp J-57–J-59). Students can then complete BLM Time Word Problems (pp J-60–J-62).
Days, Months, and Seasons

ME1-32

Pages 159–163

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m5, 1m6, 1m7, 1m37, 1m38
WNCP: optional, [R, CN, V, C], 2SS1

VOCABULARY
week
day
weekend
month
year
season
calendar
tomorrow
yesterday
the days, months,
and seasons

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m5, 1m6, 1m7, 1m37, 1m38
WNCP: optional, [R, CN, V, C], 2SS1

VOCABULARY
week
day
weekend
month
year
season
calendar
tomorrow
yesterday
the days, months,
and seasons

Goals
Students will order the days, months and seasons, associate different seasons with different activities, and read the date on a calendar.

PRIOR KNOWLEDGE REQUIRED
Can sequence and order

MATERIALS
the days of the week, months, and seasons written on cards
letters of the alphabet (lowercase and capital) written on cards
class calendar

Order the days of the week. Display the cards with the days of the week in order. Ask students what the words on the cards are. Have students recite all seven days in order. Then take away one of the cards and repeat. Continue taking away cards, one at a time, and having students recite the days. Repeat several times, removing cards in a different sequence each time. Mix the cards up and ask if anyone can put all seven in order. (If this is too difficult, start with three cards, then move to four, five, and so on.)

Have seven volunteers each take a card and stand in a row facing the class, and ask another volunteer to come and place the “days” (students holding cards) in order. Have another volunteer sort the row of students/days into two categories, weekend and weekday.

Look for patterns in the words for the days of the week. ASK: What do all these words have in common? Suggest that students look at the end of the words. (They all end with the word day.) ASK: Why do you think that happened? (because they are all days)

Unscramble the days of the week. Have cards with letters on them. Put the 6 cards for the letters in “Friday” on the board in the following order: Fdiayr (F is capital, other letters are lowercase). Tell students that someone mixed up the letters for a day of the week. Can they guess which day? Tell them you want to rearrange the letters to check the guess. ASK: What letters are in every day of the week, no matter which day it is? (d, a, y) Where should those letters go? (at the end) Explain that it is easier to start with those letters because we know where they go. Demonstrate moving those cards to the end and then have a volunteer rearrange the remaining cards at the beginning. Repeat for various days of the week, this time having volunteers move the letters d, a, y to the end and completing the problem themselves. EXAMPLES: Sdayatru, oMdany, Sayndu.

ONLINE GUIDE
Songs for the days of the week and the months.

PROBLEM SOLVING
Looking for a pattern

PROBLEM SOLVING
Splitting into simpler problems, Organizing data

ONLINE GUIDE
Literature connections

Goals
Students will order the days, months and seasons, associate different seasons with different activities, and read the date on a calendar.

PRIOR KNOWLEDGE REQUIRED
Can sequence and order

MATERIALS
the days of the week, months, and seasons written on cards
letters of the alphabet (lowercase and capital) written on cards
class calendar

Order the days of the week. Display the cards with the days of the week in order. Ask students what the words on the cards are. Have students recite all seven days in order. Then take away one of the cards and repeat. Continue taking away cards, one at a time, and having students recite the days. Repeat several times, removing cards in a different sequence each time. Mix the cards up and ask if anyone can put all seven in order. (If this is too difficult, start with three cards, then move to four, five, and so on.)

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Songs for the days of the week and the months.

PROBLEM SOLVING
Looking for a pattern

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Goals
Students will order the days, months and seasons, associate different seasons with different activities, and read the date on a calendar.

PRIOR KNOWLEDGE REQUIRED
Can sequence and order

MATERIALS
the days of the week, months, and seasons written on cards
letters of the alphabet (lowercase and capital) written on cards
class calendar

Order the days of the week. Display the cards with the days of the week in order. Ask students what the words on the cards are. Have students recite all seven days in order. Then take away one of the cards and repeat. Continue taking away cards, one at a time, and having students recite the days. Repeat several times, removing cards in a different sequence each time. Mix the cards up and ask if anyone can put all seven in order. (If this is too difficult, start with three cards, then move to four, five, and so on.)

Have seven volunteers each take a card and stand in a row facing the class, and ask another volunteer to come and place the “days” (students holding cards) in order. Have another volunteer sort the row of students/days into two categories, weekend and weekday.

Look for patterns in the words for the days of the week. ASK: What do all these words have in common? Suggest that students look at the end of the words. (They all end with the word day.) ASK: Why do you think that happened? (because they are all days)

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ONLINE GUIDE
Songs for the days of the week and the months.

PROBLEM SOLVING
Looking for a pattern

PROBLEM SOLVING
Splitting into simpler problems, Organizing data

ONLINE GUIDE
Literature connections
Months of the year. Display the months of the year in order. Repeat the exercises for ordering days with the months. Then have a volunteer sort the months (or students holding cards) into school months and summer vacation months.

Seasons of the year. Display the seasons in order. Ask students what the words on the cards are. **ASK:** What season is it when the new year starts? Have a volunteer put the seasons in order. Ask students to consider why it would be difficult to go skiing in the fall and swimming outdoors in the winter. Brainstorm some ideas of what occurs during each season and the activities that can be done outdoors.

How to read a calendar. Look at the current month on the class calendar. (If you do not have one, draw the current month on chart paper and post it.) **ASK:** What is a day? Have a volunteer come to the calendar and show a day. Ask what a week is, and review the days of the week, as well as how many days are in a week. Have a volunteer identify where a week starts and ends on the calendar. Emphasize that a row represents a week. Discuss how many days there are in a month and why the month does not always start on the first Sunday and end on the last Saturday. (The start date depends on what day the previous month ended.) Ask students how many days there are in the month that is displayed. Explain the words today and tomorrow. Ask questions such as: What day will it be tomorrow? What day was it yesterday?

The day vs. the date. Explain that the day is the day of the week, and the date is the month and the ordinal number that shows how far into the month we are. The numbers are written on the calendar in order so we don’t have to count every time. If today is Wednesday, March 7th, the day is Wednesday and the date is March 7th. **ASK:** What day will it be tomorrow? What will be the date? What day was it yesterday? What was the date yesterday? Repeat for random dates on the calendar. **ASK:** If today is Wednesday, December 1st, what day will it be tomorrow? What was the date on the day before Sunday, December 19th?

**ACTIVITY 1**

Create an illustrated class calendar. Assign pairs or small groups one month of the year. Students identify important dates in their month (holidays, birthdays, field trips, and so on) and illustrate one event or activity. Have existing calendars on hand as models.

**Extension**

Have students write/illustrate what they do on each day of the week and then sequence the events.
Comparing Areas

Page 164

Goals
Students will compare areas by covering surfaces.

PRIOR KNOWLEDGE REQUIRED
- Know the concepts of longer and shorter

MATERIALS
- paper rectangles and triangles of various sizes and colours (details below)
- scissors for each student
- BLM Cut and Compare (p J-63)

Are they the same size? Cut coloured sheets of paper (8 1/2 by 11) into quarters to make rectangles of the same size. Give each student two rectangles and ASK: Are your rectangles the same size? How can you tell? Have students compare their rectangles with those of one partner and then a different partner. Are the rectangles the same size? SAY: (using your students’ names): Joy and Leyla both compared their rectangles with Achmad’s and said their rectangles are the same size as Achmad’s. Do you think Leyla’s rectangles will be the same size as Joy’s? Why? (Have Joy and Leyla verify with each other.) Then SAY: Leyla compared one of her rectangles with Le’s and said they are the same size. Can Joy and Le’s rectangles be different? How do you know? Explain that you made sure everyone’s rectangles were the same size.

Introduce area. Tell students to fold one of their rectangles in half and then cut along the fold; now they have two smaller rectangles. Ask students to rearrange the pieces to make a different rectangle than the one they started with. They should paste the new rectangle onto white paper. Tape one of the rectangles onto the board. ASK: Does anyone have a new rectangle that looks like this one? Does anyone’s rectangle look different? Have a volunteer tape a different one on the board. Then put up a copy of the original rectangle so that students can see all three shapes. ASK: Which shape is bigger? How is it bigger? Did one shape use more paper than the other? Did they use the same amount of paper? Explain that the amount of paper you need to make the shape is the shape’s area. ASK: When you cut the rectangle in two and rearranged the pieces, did you change the amount of paper you were using? Does your shape have the same shape as the rectangle I gave you? (no) Does it have the same area? (yes) How do you know? (because I used the same amount of paper to make it)

Compare areas directly. For each student, cut out these paper shapes: 2 blue rectangles (12 cm by 24 cm), 2 red squares (18 cm by 18 cm), 1 yellow square (10 cm by 10 cm). Give students one of each colour. ASK:
Which piece of paper is smaller, the blue or the yellow? How do you know? Demonstrate how the yellow paper fits onto the blue paper completely. The yellow paper has a “smaller area” and the blue paper has a “bigger area.” Compare the red and yellow pieces in the same way.

**Compare areas by cutting out the extra parts and then comparing them.** Now compare the blue and red pieces. Explain that the blue piece doesn’t fit on the red piece and the red piece doesn’t fit on the blue piece. **ASK:** Why does that happen? (The blue piece is longer one way and the red piece is longer the other way.) Ask students to remember how we compare pencil lengths when the pencil crayons are lined up so that there is extra blue at one end and extra red at the other. **ASK:** How can we compare the lengths of the pencils without lining them up end to end? (Check to see if there’s more extra red at one end or extra blue at the other.) Challenge students to think about how we can use this idea to compare the areas of these two pieces.

Give each student a pair of scissors and have them cut out the parts of each paper that are the same, i.e., the parts that overlap. Explain that because we know these parts are the same, we can just compare the leftover parts to see which is bigger. **ASK:** Does the extra red part fit onto the extra blue part or does the extra blue part fit onto the extra red part? (The extra blue part fits onto the extra red part. Because there was more extra red than extra blue, the red piece must have been bigger.)

**Compare areas by colouring the extra parts and then comparing them.** Tell students that you would have liked to compare the pieces without cutting them up. We know which piece was bigger, but it’s not bigger any more because we cut it! Give students the second blue and red shapes and have students colour the extra parts instead of cutting them out. Then have students compare the coloured parts by placing them one on top of the other. Which piece has more “extra”—the red or the blue? (the red) Have students use this method to compare various pairs of shapes. **EXAMPLES:**

**Trace, cut, and compare.** Before students do Workbook p. 164, demonstrate how to place a sheet of paper inside the workbook so that it will not move while students trace the shapes on the worksheet (you can use tape or paper clips, too). Tracing is a good exercise to improve motor skills, and all students should attempt it.
**Goals**

Students will estimate, measure, and describe area through investigation using non-standard units.

**PRIOR KNOWLEDGE REQUIRED**

- Know the concepts longer and shorter
- Can count
- Can measure using non-standard units

**MATERIALS**

- paper triangles and rectangles (details below)
- playing cards
- BLM Cake (p J-64)
- BLM How to Measure (p J-65)
- BLM Estimate and Measure (p J-66)

**Introduce units of measurement for area.** Have several pre-made right triangles with base 10 cm and height 10 cm. Give each student 4 triangles. Have students make as many shapes as they can, using 2, 3, or 4 triangles. The triangles must be joined only along lines of the same length. Students should trace their shapes onto paper and label them with the number of triangles used to make them. When students have made several such shapes, stop them and **ASK:** Show me two shapes you made that have the same area but a different shape. Show me two shapes you made where one of them is bigger—how do you know it is bigger? Did it use more paper? How do you know? Show me a shape you made with 3 triangles. Now show me a smaller shape. How do you know it is smaller? Show me a bigger shape. How do you know it is bigger? Explain that by counting the number of triangles they used to make the shape, they can know which shape used more paper and so has a bigger area.

**Using quantity to measure area.** Now tell students that you made a chocolate cake over the weekend for a birthday party. The cake had candies covering the whole top. Draw a cake with two corner pieces shaded as shown in Figure 1. Challenge students to figure out which corner piece is bigger without cutting out any pieces. Guide students to count the number of candies in each piece (as they counted the number of triangles, above) to see which has more candies and is, therefore, bigger.

**To measure area, the units should cover the whole area.** Draw the same cake but with smaller candies, as shown in Figure 2. **SAY:** What if this is how the cake was made—can we still say that the piece with more candies is the bigger piece? (no, now the smaller piece has more candies) How are the candies in the first cake different from the candies in this cake? (they are organized in rows and completely fill the top of the cake) Why can’t we tell...
by the number of candies which piece is bigger in the second cake? (the candies are not spread out evenly and they don’t cover the whole top of the cake. Explain that, in the first cake, the candies cover the whole cake, so we can find out which piece is bigger just by looking at the number of candies the piece has.

Draw two pieces of cake on the board (see Figure 3). Ask students to predict which piece is bigger and then check their prediction by counting as a class. Repeat for various examples. Students can complete BLM Cake for more practice.

To measure area, the units should not overlap. Draw various shapes on the board that are a whole number of units in area, where a unit is, say, a regular sheet of paper. Have students predict which shape is larger and then have volunteers come to the board and tape the units onto the shape such that they cover the shape completely, with no overlapping and no extra space. Which shape needed more units to cover it? Demonstrate an incorrect method that includes overlapping on a smaller shape, so that you need more units for the smaller shape than for a larger shape. Ask students to explain what you did wrong.

Which units work better? Give pairs of students a square, 15 cm by 15 cm. Ask them to determine which pattern blocks work better as units by covering the square with one type of pattern block at a time. Discuss why it was easier to use some blocks than others. (squares are easier to use as units because they can cover the shape completely)

Watch to see how students are counting the pattern blocks. Discuss strategies. (EXAMPLES: making tallies, grouping into 5s or 10s, grouping by the number in each row and doing repeated addition.)

Approximate areas. Explain that sometimes the units will not fit perfectly on the object whose area you are trying to measure. Have students estimate and then check how many playing cards they can fit onto a sheet of paper. ASK: Do more cards fit onto the paper when they are placed across or up and down? What is the better estimate for the area of the paper—8 playing cards or 9 playing cards? (9)

Bonus Place 10 playing cards on the sheet so that there is no overlap. (See margin.) Do you think you could fit another playing card on if you were allowed to cut it up? (Students might check by tracing a playing card, cutting their tracing out, and then cutting it into pieces as necessary.)

Practise estimating and measuring. Give students a square (10 cm by 10 cm) and a rectangle (10 cm by 7 cm). Have students estimate and then measure the number of 2-cm connecting cubes required to measure the area of each shape. Students should revise their estimates as they place more cubes onto the shapes. Discuss whether the measurements are exact or not, and why.
ME1-35
What Holds More?
Page 169

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m2, 1m5, 1m7, 1m34
WNCP: 1SS1; [R, CN, C]

VOCABULARY
capacity
container
less than
more than

GOALS
Students will compare capacities directly.

PRIOR KNOWLEDGE REQUIRED
Understands the comparatives larger, largest, smaller, smallest

MATERIALS
a cup, bottle of water, pitcher, funnel and large bowls or tubs
empty containers of various sizes, including 500 mL water bottles and 1 L milk cartons
dry beans, dry peas, rice, and/or sand

CONNECTION
Literature

JOURNAL
Ask students to draw three bowls of different sizes as in the story, from largest to smallest.

PROBLEM SOLVING
Using logical reasoning

Introduce capacity. Read a version of Goldilocks and the Three Bears with students. Focus on the sizes of the bowls. ASK: Who had the largest bowl? Who had the smallest bowl? What does it mean that one bowl was the largest? Was it the tallest? the widest? Explain to students that capacity generally means the amount of something (porridge, water, cubes, beans, juice, etc.) a container can hold.

Compare capacities directly—more/less. Hold up an empty small cup and a full bottle of water. ASK: Which holds more: the bottle or the cup? How could we check? Invite a volunteer to pour water from the bottle into the cup. (Work over a large bowl or plastic tub in case of spillage.) Does all the water in the bottle fit into the cup? (no) Which holds more: the cup or the bottle? (bottle) Which holds less? Refill the bottle and repeat with a container that has a larger capacity than the bottle, such as a large pitcher. Which holds more water? How do we know that the pitcher holds more? (There is room for more water in the pitcher.)

Empty the bottle and fill the pitcher with water. SAY: When I pour the water from the bottle into the pitcher, there is room left in the pitcher. What will happen if I pour the water from the pitcher into the bottle? (The bottle will fill and water will overflow into the bowl or remain in the pitcher.) Check the predictions by pouring the water into the bottle using a funnel (discuss why a funnel is necessary).

Which holds the most/least? Order by capacity. Ask students to say which of the three containers (the cup, the bottle, or the pitcher) holds the most water and which holds the least water. Rephrase the answers using the terms largest capacity and smallest capacity. Then invite a volunteer to order the containers from largest (holds the most) to smallest (holds the least).
ACTIVITY

Create stations at which students can compare capacities directly. Each station will need a large bowl or tub, three or four empty containers of different shapes and sizes, and enough dry goods (beans, peas, or rice) to fill the largest container. At each station, students should:

• Choose two containers, predict which one has the larger capacity, and check.
• Choose a third container and order the three containers from smallest to largest.
• Determine the capacity of the fourth container (if there is one) relative to the other three.

Before letting the students work at the stations, discuss with them how they will perform each task. For example, students can fill the container they think is larger with beans, then pour the beans into the other container. PROMPTS: If the first container has a larger capacity, will the beans fit into the second container or will there be beans left over?

Bonus Add a fifth container.

Can two containers of different shapes have the same capacity? Show students two containers that have the same capacity but a different shape, such as a 500 mL water bottle and an empty milk carton cut so that it can contain exactly 500 mL. (To determine where to cut the milk carton, pour water into the bottle, empty the water into the milk container, and mark the height the water reaches; cut the milk carton at that height.) ASK: How are these two containers different? (Have students describe the shape of the containers.) Which one can hold more? Can these two containers have the same capacity? Have students compare the capacities directly using water, beans, sand, or rice. (Different groups of students can use different materials.) Students can then compare and discuss their findings. Did everybody get the same result? Why or why not?

Sort by capacity. Sorting

Show students a 1 L milk carton and various containers of different shapes and sizes (EXAMPLES: juice box, pan, glass, cup, jug, pitcher, pot). To sort the containers into two groups (“holds more than a milk carton” and “holds less than a milk carton”), hold them up one at a time and ASK: Will this hold more than the milk carton or less? Students can show thumbs up for more, thumbs down for less, and closed fists if they think the container holds the same amount as the benchmark milk carton (leave this last group of containers outside both sorting circles).

Check the sorting by direct measurement. Give small groups of students one of the containers from the collection you sorted, a 1 L milk carton, and beans, and ask them to compare the capacity of their container with the capacity of the milk carton. Was the container placed in the correct sorting group?
Goals
Students will compare capacities indirectly.

Prior Knowledge Required
- Understands the comparatives larger, largest, smaller, smallest
- Knows the concepts of length, width, and height
- Can compare linear measurements

Materials
- Containers of various sizes
- Two different containers full of juice
- Dry beans, rice, and water
- Large bowls or tubs
- Markers or masking tape

Compare capacities indirectly. Show students two containers of different shapes full of juice. ASK: Which container holds more? How can we check? (Students should suggest comparing the capacities directly, as in the last lesson.)

Tell students that you do not want to throw out any of the juice in order to pour juice from one container into the other. As a prompt, place two identical see-through jars where students can easily see them. SAY: In mathematics, we often use a problem that we have already solved to help us solve new problems. I think comparing capacity is a bit like comparing lengths. Discuss how you compared the lengths of pencils in the very beginning of the unit (by lining them up) and the capacities of containers in the last lesson (by pouring from one into the other). ASK: Both these containers are full. Can we pour from one to the other? (no) When we compared lengths, was there a time when we could not line up the lengths? How did we solve that problem? (For example, to compare the lengths of the sides of a book, we used a third object; we compared both sides of the book to the third object.) Can we use the same idea here? Can we compare to a third object? Invite volunteers to pour the juice from each container into one of the identical jars and compare the juice level. Where is there more juice? Which container of juice holds more?

Tell your students to pretend that you need to take your desk out of the room, but you are not sure if it will fit through the door. How could you check? Show your students a piece of string and use it to measure the short side of the desk and the width of the door, marking each length on the string with a piece of tape. Point out that the string is longer than both objects you measured. Now show your students a cup, a can, and a larger plastic bottle. SAY: I would like to check which has greater capacity, the cap or the can. Can I use only the bottle to compare capacity the same way as I used the string? Give students time to think through a solution with a partner. Discuss how to do it (and model the steps for students after the
discussion: fill one container, pour the contents into the bottle, and mark the level; empty the bottle; fill the second container, pour the contents into the bottle, and compare this level with the mark). Discuss how this way of comparing capacities is different from the way you compared capacities in the beginning of the lesson. (We have only one container instead of two identical ones to use as a benchmark.)

ACTIVITY

Every student should have an opportunity to compare capacities directly. Each student or pair will need three containers, the largest of them see-through; beans, rice, or water; a large bowl or tub to work over; and markers or masking tape. Each student should have the same two smaller containers as at least one other student, so that they can compare their findings. Students with the same smaller containers can have different large containers and should use different materials (beans, rice, or water). If you choose to do this activity at stations, create three stations with the same smaller containers, different large see-through containers, and different materials, and have individuals work at the stations simultaneously and then they can compare their findings.

Students have to compare the capacities of the two smaller containers using the third, see-through container as a benchmark (the way you used the string above). Ask students to predict which of the smaller containers has larger capacity. (Scaffold for students who need it: Have the students fill one of the containers, then empty it into the benchmark container and mark the level the beans reach with the marker or a piece of tape. Then empty the benchmark container and repeat with the other container. This time, leave the beans/rice/water in the benchmark container and compare the level they reach with the mark made for the first container. What does it mean if the mark is higher than the level? What if it’s lower? Which container holds more?)

Extension

After students do the activity above, have students with the same containers pair up and discuss their findings. Did they identify the same container as being larger? (If the answer is no, discuss what students might have done wrong and repeat the experiment. Possible reasons for different answers: filling the container(s) incompletely; holding the container at an angle while marking the level; spilling water, rice, or beans while pouring from the container(s) into the benchmark container. Discuss how else students could check the results. Lead students to the idea of returning to direct comparison.) Did people with the same smaller containers but different benchmark containers get the marks at the same level? (most likely not)
CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m4, 1m5, 1m7, 1m34
WNCP: 1SS1, [R, CN, C]

VOCABULARY
capacity
container
measure

Goals
Students will measure capacity in non-standard units.

PRIOR KNOWLEDGE REQUIRED
Understands the comparatives larger/largest and smaller/smallest
Understands the concept of measurement
Can compare and order measurements

MATERIALS
containers of various sizes, including identical containers with wide mouths
marbles and masking tape
identical plastic cups, water, and large bowls or tubs

Compare capacities by counting how many marbles fill the containers.
Provide three containers, the largest of them see-through, and invite volunteers to fill the two smaller containers with marbles. Then pour the marbles from one of the containers into the largest container, mark the level of the marbles, and empty the container. Repeat with the second container. Ask your students if it was easy to mark the level of the marbles. Why not? (Marbles do not form a level surface as water does.) Now tell the students they are not allowed to use the largest container. Ask: How else can you tell which container holds more marbles? As a prompt, hold a handful of marbles in each hand and ASK: What is an easy way to say which hand has more marbles? (count them) ASK: Can you do this with water? Can you count water like you count marbles? (no) Why not?

Measuring capacity in marbles. Review what it means to measure something. Ask students to think about what they have measured in the course of the year. (length, width, height, area, mass) ASK: Which units did you use? SAY: People measure length in order to tell which of two or more objects is longer. ASK: If we say that one pencil is 5 cm long and the other is 8 cm long, does that tell us which pencil is longer? If we say that one container can hold 7 marbles and the other can hold 50 marbles, does this help us tell which container has larger capacity? (yes)

ACTIVITY
Give each student a container with a wide mouth (EXAMPLES: milk cartons and juice boxes with tops cut off) such that many students have identical containers. Students should measure the capacity of their containers in marbles. Have students record their measurements in their journals (I measured a [small milk carton]. Its capacity is [38 marbles].). Did people with the same containers get the same results? Discuss why not. The answer might depend on the way the marbles are packed. ASK: Are marbles a convenient unit to measure capacity? (not really)
Comparing different mediums used to measure capacity. Discuss marbles as units for measuring capacity: they are all the same size, we have plenty of them, and we can count them, but there is free space around them and it is hard to mark a level with them. Compare marbles with beans. How are beans more convenient than marbles and how are they less convenient? (It is harder to count beans because there are more of them. However, marbles are too big to be used with some containers. As a prompt, hold up a bottle with a neck that is too narrow for a marble to pass through and ASK: Can you use marbles to measure the capacity of this bottle? Why not? Can you use beans?) Hold up a small cup and ASK: The capacity of this cup is 10 marbles. Will I need more than 10 beans to measure it or less than 10 beans? (more) Why? (beans are smaller, so you need more of them)

Compare beans and marbles to water. Point out that water does not leave free space and it is easy to mark levels when you use it. If we found a way to “count” water, it would be a good measuring medium.

Cups as measuring tools. Discuss with students when and why people use capacity to measure water and other liquids, or dry goods like rice.

The need to fill cups completely. Take three cups and fill them completely with water. Take another four cups and fill them only halfway. SAY: I have three cups of water here and four cups of water there. I think that I have more water there, because 4 is more than 3. What do you think? How could we check? Emphasize the need to fill all the cups the same way. Every cup of water must be the same. Remind students that connecting cubes and paper clips are good measuring tools for mass and length because they are all the same length and mass. Have students practise filling cups the right way (to the top, or, if the cups have a line inside, to that line).

Estimate and measure capacity by filling a row of cups from the container. Show your students a large see-through container, such as a 2 L jar, and have them guess how many cups of water this container can hold. Write their estimates on the board. Fill the jar with water and fill two cups from the jar. Show students how much water is left in the jar. Let students adjust their estimates. Continue filling the cups, stopping occasionally to let students adjust their estimates, until you have measured the capacity of the container. Show several more containers and ask students to predict which containers hold more water than the jar and which hold less water. Then ask students to estimate the capacity of each container. SAY: The jar can hold 10 cups. You said that this container can hold less than the jar. Should your estimate be more than 10 cups or less than 10 cups? How much more (or less)—a lot or a little? Then let students measure the capacity of the containers using the same method as above. Ask them to identify the largest container.
Capacity and “almost.” Take a container that has a capacity of almost two cups (such as a 0.5 L milk carton cut appropriately). Fill it with water and then pour the water into cups. Show your students how one of the cups is not full, but nearly full. Explain that the container can hold almost two cups. Repeat with a container that holds a little more than two cups (such as a 0.5 L plastic bottle). Point out that in both cases we can say that the capacity of the container is about 2 cups.

Estimate and measure capacity by filling a container cup by cup and counting the cups as you go. Show students an empty container. **ASK:** How could you measure the capacity of a container if you had only one cup? (by filling the cup, pouring the water into the container, and repeating, keeping track of the number of cups used)

Introduce scoops as measuring tool. Show your students a scoop. Explain that we can use scoops to measure rice or beans the same way we use cups. Show two scoops full of beans that are not level (one overfull and one not quite full) and **ASK:** These are both one scoop. Does that mean that they have the same amount? Is filling the scoop this way a good way to measure? How could we make sure we fill the scoop the same way each time? Demonstrate making the beans level (e.g., with a popsicle stick or plastic knife). **ASK:** Why is it better to use the levelled scoop? (because every scoop must be the same) Measure the capacity of a container with scoops of beans or rice.

**ACTIVITY 1**

Have students predict the capacities of various containers, then measure the capacities by filling the containers with water or beans.
A “ruler” for capacity. Tell your students that they already solved a similar problem when measuring length (only one unit to measure an object that was several units long). Remind them how they used hands and index cards to measure length: They moved the index card marking to the end of each previous placement. What other tools did they use to measure length? (Remind students about rulers if they do not come up.) Explain that students are going to make a “ruler” to measure capacity.

Measure capacity using a measuring bottle. Explain to students that they have created a “ruler” for capacity, and this “ruler” is called a measuring cup (or, in this case, a measuring bottle). Show them a smaller container (about 1 L) full of water and ask how they could use their measuring cup to tell what the capacity of this container is. Should they place the measuring cup beside the new container as they did with a ruler and find which marking the top of the container reaches? Demonstrate doing this. (no) Pour the contents of the container into the measuring cup and repeat until the bottle is full. Have students do the same. Ask them to mark the number of cups poured beside each mark, as on a ruler.

Measure capacity using a measuring bottle. Explain to students that they have created a “ruler” for capacity, and this “ruler” is called a measuring cup (or, in this case, a measuring bottle). Show them a smaller container (about 1 L) full of water and ask how they could use their measuring cup to tell what the capacity of this container is. Should they place the measuring cup beside the new container as they did with a ruler and find which marking the top of the container reaches? Demonstrate doing this. (no) Pour the contents of the container into the measuring cup and have students determine the capacity of the container. If the water level is between two marks, ask your students how they measured length when an object ended between the marks on a ruler. (Which mark is closest?)

ACTIVITY 3

Give students more containers and have them estimate and measure capacity using their measuring bottles. They can record the results in their journals or on BLM Estimate and Measure Capacity.

Extension

If 2 scoops of beans fill a pail, how many scoops are needed to fill 2 pails, 3 pails, 5 pails, 8 pails, and 15 pails? Use skip counting to find out.
The worksheet and the following extensions will help students to review and consolidate their learning in this unit. The questions on the worksheet treat the clock as a number line.

To guide students to do the bonus problem on Workbook p. 173, see the Extension from ME1-30.

Extensions

1. Continue the pattern:
   September, October, November, ___________, ___________,
   ___________, ___________, ___________, ___________, ___________,
   ___________, ___________, ___________.

   Bonus: What is the core? How long is the core?

2. On BLM Picture or Frame? (p J-67) students predict whether a picture or its surrounding frame has a bigger area, and then check using big (2 cm) connecting cubes.

3. Students can use BLM Compare Two Units (p J-68) to predict and check which of two units they will need more of to measure the area of their desk.

4. Students can use pennies to determine which cookie on BLM Cookies (p J-69) is bigger.

5. Look for patterns on a calendar. Show the calendar for a month that starts on a Wednesday. ASK: What day of the week is the 1st? What day of the week is the 8th? Repeat with calendars for different months until the pattern emerges: the 1st and 8th days of any month are always the same day of the week. What other dates fall on the same day as the 1st and 8th? (the 15th, 22nd, and 29th) What dates are the same day as the 10th? Repeat for the 9th and the 11th. Then show students how, if the 1st day of the month is a Wednesday, you can quickly figure out that the 23rd is a Thursday. (If the 1st is a Wednesday, so too are the 8th, 15th, and 22nd; the 23rd is the day after the 22nd.) Repeat with different dates.

   EXAMPLE: If May 1st is a Tuesday, what day is May 16th? If December 1st is a Sunday, what day is December 31st?

Then ASK: If May 5th is a Sunday, what day is May 12th? How do you know? Relate calendars to a hundreds chart: To move down a row in a hundreds chart, you add 10 to the number because there are 10 numbers in each row. To move down a row in a calendar, you add 7 to the number because there are 7 numbers in each row.
Concrete Rulers
Concrete Rulers Without Pictures

- Small paper clips: 0, 1, 2, 3, 4, 5, 6, 7
- Big paper clips: 0, 1, 2, 3
- Small connecting cubes: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
- Big connecting cubes: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
### Ruler or Counting

How long is it?

<table>
<thead>
<tr>
<th></th>
<th><strong>Count</strong></th>
<th><strong>Use a Ruler</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Ruler" /></td>
<td>[ ] long</td>
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<tr>
<td><img src="image2" alt="Ruler" /></td>
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<td><img src="image3" alt="Ruler" /></td>
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</tr>
<tr>
<td><img src="image4" alt="Ruler" /></td>
<td>[ ] long</td>
<td>[ ] long</td>
</tr>
<tr>
<td><img src="image5" alt="Ruler" /></td>
<td>[ ] long</td>
<td>[ ] long</td>
</tr>
</tbody>
</table>

Using a ruler is easier than counting because the ruler does the ___________ for me.
Measure with a Ruler

Use a ruler to measure these objects.

- Stapler: _____ cm
- Scissors: _____ cm
- Pencil: _____ cm
- Eraser: _____ cm
- Notebook: _____ cm
- Calculator: _____ cm
- Coin: _____ cm
Practise Measuring with Centimetres

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Clocks
Make Your Own Clock
More Time and Less Time

Who will do 5 jumping jacks? ________________________

Who will say the alphabet? _________________________

Who stopped first?

Who stopped second?

It took more / less time to do 5 jumping jacks.
It took more / less time to say the alphabet.
Time and Length
Draw Lines to Match Stories

☐ Draw the line for James.

Nora and James started playing outside. It rained.
Nora and James stopped playing outside.

Nora started swinging.
Then James started swinging.
Then Nora stopped swinging.
Then James stopped swinging.

Nora started swimming.
Then James started swimming.
Then James stopped swimming.
Then Nora stopped swimming.

Bonus: Tell a story to match the lines.
How Long?

☐ Start when the fast hand is at the 12.
Where is the fast hand when you finish?

Count the cards in a regular deck.

Separate the red and black cards.

Separate the ♠ and ♦.

Put the ♥ in order.
A, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K

took the shortest time.

took the longest time.

About

The fast hand started at 12.

About how many \( \text{\textbullet} \) passed?

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)

Bonus

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)

About \( \text{\textbullet} \)
More Time or Less Time

☐ Write more time or less time.

It takes me ________________ ________________ to
write my name than to tie my shoes.

It takes me ________________ ________________ to
give a thumbs up than to draw a picture.

☐ Write and draw.

It takes me ________________ ________________ to
______________ than to ________________.
What Are You Doing?
What Is Longer?

☐ Draw the hour hand at each time.

About how many hours long?

The school day before lunch is _____ hours long.

The school day after lunch is _____ hours long.

The school day before lunch is longer / shorter than the school day after lunch.
Matching Analogue to Digital (1)
### In One Hour and One Hour Ago (1)

<table>
<thead>
<tr>
<th>One Hour Ago</th>
<th></th>
<th>In One Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Clock 2 o’clock" /></td>
<td><strong>2 o’clock</strong></td>
<td><img src="image2" alt="Clock 4 o’clock" /></td>
</tr>
<tr>
<td><img src="image3" alt="Clock 3 o’clock" /></td>
<td><strong>3 o’clock</strong></td>
<td><img src="image4" alt="Clock 11 o’clock" /></td>
</tr>
<tr>
<td><img src="image5" alt="Clock 4 o’clock" /></td>
<td><strong>4 o’clock</strong></td>
<td><img src="image6" alt="Clock 11 o’clock" /></td>
</tr>
<tr>
<td><img src="image7" alt="Clock 7 o’clock" /></td>
<td><strong>7 o’clock</strong></td>
<td><img src="image8" alt="Clock 11 o’clock" /></td>
</tr>
</tbody>
</table>
Matching Analogue to Digital (2)

<table>
<thead>
<tr>
<th>12:30</th>
<th>1:30</th>
<th>6:30</th>
<th>7:30</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:30</td>
<td>3:30</td>
<td>8:30</td>
<td>9:30</td>
</tr>
<tr>
<td>4:30</td>
<td>5:30</td>
<td>10:30</td>
<td>11:30</td>
</tr>
</tbody>
</table>
# In One Hour and One Hour Ago (2)

<table>
<thead>
<tr>
<th>One Hour Ago</th>
<th>In One Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="2:30" /></td>
<td><img src="image" alt="4:30" /></td>
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<tr>
<td><img src="image" alt="3:30" /></td>
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<tr>
<td><img src="image" alt="6:30" /></td>
<td><img src="image" alt="4:30" /></td>
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<tr>
<td><img src="image" alt="12:30" /></td>
<td><img src="image" alt="4:30" /></td>
</tr>
<tr>
<td><img src="image" alt="2:30" /></td>
<td><img src="image" alt="4:30" /></td>
</tr>
</tbody>
</table>
Extra Practice: Time

☐ Write the time.

2:30
In Half an Hour (1)

Where will the long hand be in half an hour?

Clocks showing the current time and what time it will be in half an hour.
In Half an Hour (2)

Where will the hour hand be in half an hour?

<table>
<thead>
<tr>
<th>Now</th>
<th>In half an hour</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Clock" /></td>
<td><img src="image2" alt="Clock" /></td>
</tr>
<tr>
<td><img src="image3" alt="Clock" /></td>
<td><img src="image4" alt="Clock" /></td>
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<tr>
<td><img src="image5" alt="Clock" /></td>
<td><img src="image6" alt="Clock" /></td>
</tr>
<tr>
<td><img src="image7" alt="Clock" /></td>
<td><img src="image8" alt="Clock" /></td>
</tr>
</tbody>
</table>
In Half an Hour (3)

You read for **half an hour**. What time will you finish?

<table>
<thead>
<tr>
<th>Start at</th>
<th>Finish at</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00</td>
<td>8:30</td>
</tr>
<tr>
<td>10:30</td>
<td></td>
</tr>
<tr>
<td>5:00</td>
<td></td>
</tr>
<tr>
<td>9:00</td>
<td></td>
</tr>
<tr>
<td>11:30</td>
<td></td>
</tr>
<tr>
<td>6:00</td>
<td></td>
</tr>
</tbody>
</table>
Time Word Problems (1)

☐ Write the finish time.
☐ Draw the finish time on the clock.

Lisa plays piano at 4:00.
She plays for 1 hour.

She finishes playing at ________.

Lunch starts at 12:00.
Lunch lasts for half an hour.

Lunch ends at ________.

You walk for 1 hour.
You start at 8 o’clock.

You finish walking at ________.
Time Word Problems (2)

I took a bath at 7:30. It lasted **half an hour**.

The bath ended at ____________.

Lin started the race at **10:30**. Lin finished the race **after one hour**.

She finished at ____________.

We played checkers at **6:00**. We played for **half an hour**.

We stopped at ____________.
Time Word Problems (3)

☐ Write an hour or half an hour.

The math lesson starts at 1:00.
It finishes at 1:30.

The math lesson is ________________ long.

You start reading at 7:30.
You finish at 8:30.

You read for ________________.

The music class starts at half past ten.
The music class ends at 11:00.

The music class is ________________ long.
Cut and Compare

☐ Cut the shapes out and compare the areas.
☐ Write **biggest, smallest, or middle** on each one.

Write **biggest**, **smallest**, or **middle** on each one.
Find the area of each piece of cake.

Colour the largest piece blue.
Colour the smallest piece red.
How to Measure

Mona, Petra, and Bilal measure the area of a book with playing cards.

☐ √ what they did right.
☐ × what they did wrong.

Mona says the area is 4
☒ the book is covered
✓ the cards do not overlap

Petra says the area is 6
☐ the book is covered
☐ the cards do not overlap

Bilal says the area is 8
☐ the book is covered
☐ the cards do not overlap

Whose measurement is correct? ________________

What did the other two do wrong? ________________
Estimate and Measure

Which part is bigger, shaded or white?

I estimate: **white** is bigger.

I measure: shaded __5__

white __4__

Shaded is bigger.

I estimate: __________ is bigger.

I measure: shaded ___

white ___

___________ is bigger.
Picture or Frame?

Which is bigger, the **picture** or the **frame**?

I estimate the _________________ will be bigger than the _________________.

☐ Measure with big 🎨.

The frame has an area of ____________ 🎨.

The picture has an area of ____________ 🎨.

The _________________ is bigger than the ________________ because ______________________________.
Compare Two Units

A pattern block square □ is smaller than an index card □□□.

☐ Estimate.

Do you need more □ or □□□ to cover your desk?

Why?

☐ Measure.

How many □ to cover your desk? ________

How many □□□ to cover your desk? ________

I need more ______________________ to cover my desk because ______________________

______________________________
Cookies

☐ Cover the cookies with pennies.
☐ Fill in the blanks.
☐ Circle the biggest cookie.

_____ pennies

_____ pennies

_____ pennies
Estimate and Measure Capacity

☐ Draw your containers.
☐ Estimate how many each can hold.
☐ Measure capacity. Use .

I estimated about .
I measured about .

I estimated about .
I measured about .

I estimated about .
I measured about .

I estimated about .
I measured about .
Part 2
Geometry

In this unit, students will identify, describe, compare, and manipulate cubes, rectangular prisms, cones, cylinders, and spheres. They will also learn to describe location (e.g., below, above, between).

Manipulatives: 3-D Shapes
For many lessons, you will need at least one set of the five basic 3-D shapes (we recommend having a set for each student) as well as additional 3-D shapes. We have provided nets of four basic solids on online BLM Nets of Basic Solids to help you create manipulatives if you do not have a commercial set or need more pieces.

Vocabulary
As students learn the names of different shapes and locations words, add them to your word wall. Include pictures or samples.

ACTIVITIES 1–5

These activities can be used and repeated throughout the unit, for practice and reinforcement.

1. Sorting. Distribute copies of BLM Sorting Circle and collections of 3-D shapes and have students sort the shapes. When you do this activity for the first time, as an introduction to the unit, you might ask students to sort the shapes using a rule of their choice. As students learn about different shapes, ask them to apply new knowledge to the task (e.g., put all the cylinders in the circle). Students can use BLM Sorting into Two Groups to sort by two different criteria simultaneously (e.g., put all the cubes in one circle and the spheres in the other; put shapes with less than three faces in one circle and shapes with three or more faces in the other).

2. Collages and posters. Invite students to make collages or posters for the different shapes they learn about. They can look for examples of each shape in old catalogues, magazines, and newspapers. They can also look for particular shapes in everyday objects and add drawings to their collages or posters.

3. Mystery shape. Place some shapes inside an opaque bag. Have students reach into the bag, grab a shape, and identify it by feel. As students learn attributes of 3-D shapes, such as the difference between curved faces and flat faces, they could describe the attributes of the shape they selected to a partner and ask the partner to identify it.

4. 20 Questions. Choose an object in the room and have students guess what it is. Students can ask only about its geometric attributes. (EXAMPLES: Does it have flat faces? Does it have a point?) Students can also play in pairs, with partners switching roles.

Cubes
Pages 174-175

Goals
Students will identify cubes and rectangular prisms.

PRIOR KNOWLEDGE REQUIRED
Recognize and can name squares and rectangles
Can measure sides with a ruler (centimetre or non-standard units)

MATERIALS
a large cardboard rectangle and square
a large cube
a cube and a rectangular prism for every student (different sizes, if possible)
rulers

Introduce cubes. Hold up a large cardboard rectangle and square. Ask students to identify the shapes. ASK: How are these shapes different? (A rectangle has two longer sides and two shorter sides and a square has four equal sides.) How can you check that? Invite a volunteer to measure the length of the sides of the rectangle and the square, to confirm that they are indeed different. Now show your students a large cube. Explain that the shape is called a cube.

ACTIVITY 1
Give students cubes (of different sizes, if possible) and rulers and have them measure the cubes from side to side, front to back, and top to bottom (demonstrate what you mean on your large cube). Record the results of several measurements on the board. ASK: What do you notice? (the measurements are all the same) Is a cube more like a square or a rectangle? (square) How is a cube different from a square? (the square is flat)

Introduce rectangular prisms. Have students repeat the previous Activity with rectangular boxes of different sizes and proportions. ASK: Is this shape more like a square or more like a rectangle? (rectangle) Explain that this shape is called a rectangular prism. Write the term on the board together with the word rectangle and have a volunteer circle the part that is the same in both words.

Explain that squares, rectangles, circles, triangles, and other flat shapes are called two-dimensional, or 2-D, shapes. Shapes like cubes and rectangular prisms, that are not flat, are called three-dimensional, or 3-D, shapes.
A cube is like a square because ________.
A rectangular prism is like a rectangle because ________.

ACTIVITIES 3–5

3. Sorting (see p K-1). Students can sort shapes into two groups: cubes and rectangular prisms.

4. Collages and posters (see p K-1).

5. I Spy. (see p K-1). EXAMPLE: I spy with my little eye a rectangular prism that is black. (a computer)

Cubes and rectangular prisms in the environment. Ask students to think where they have seen cubes or shapes that are almost cubes. How are the “almost cubes” different from a cube? (EXAMPLES: Dice [some have rounded corners], blocks, some Kleenex boxes. Connecting cubes have little holes in their sides and the linking part “sticks out.” Some beads are cubic but have a hole in the centre. Ones blocks are nearly cubes—they have one side missing and a linking part protruding on the opposite side.) Repeat with rectangular prisms. Students can draw and label cubes and almost cubes on the worksheet and in their journals.

Extensions

1. What shape do you get if you stack three pattern block squares one on top of the other? What if you use four squares? How many pattern block squares do you need to make a cube?

2. Choose several identical rectangular prisms with height 2 cm. Let students measure the height. Place one prism on top of the other. ASK: How high is this structure? Let students measure again. ASK: What if there was one more prism on top of these two—how high would the structure be? Check. Encourage students to make the connection between this exercise and skip counting by 2s. Eventually, stop using the model and ASK: What would happen if I stacked 6 prisms? How high would the structure be? Repeat with prisms of height 5 cm and skip counting by 5s.
G1-15
Spheres, Cylinders, and Cones
Pages 176-178

Goals
Students will identify spheres, cylinders, and cones

Prior Knowledge Required
Recognize and can name circles, squares and rectangles
Can measure sides with a ruler (centimetre or non-standard units)

Materials
a quarter and a paper “quarter” (see template on BLM Attribute Blocks, pp M-1–M-5)
several play-money quarters real-life objects that are shaped like a cylinder, sphere, or cone
paper rectangles of different proportions
1 wedge per student (see BLM Cones, pp K-27–K-29)
paper for tracing bases
scissors

Introduce spheres. Draw a circle on the board. Have students identify the shape. Ask students if they can think of a 3-D shape that reminds them of a circle in the same way a cube reminds them of a square—a shape that looks like a circle but is not flat. (Students might identify or point to a cylinder or a sphere.) Show students a sphere and tell them what it’s called. Ask them to think of objects that are spheres or almost spheres. Have some spherical objects on display and ask students to say how they are different from a sphere. EXAMPLES: Balls, globes, and marbles are perfect spheres. Oranges, grapefruits, and grapes are spheres or almost spheres. Some Christmas ornaments are almost spheres: they have a protruding part for the loop used to hang them. Drops of water are almost spheres: they have a “point” on top (show a picture). Beads have a hole in the middle.

Introduce cylinders. Show your students a paper circle with a picture of a quarter on it. Ask students to identify the shape. Then show them a real quarter and ask them to identify the shape again. ASK: How are they different? (The coin is thicker; have students look at both from the side.) Explain that the coin has thickness; it is a 3-D shape. To make thickness more visible, place several quarters in a stack. Introduce the term cylinder for the resulting shape. Explain that both spheres and cylinders are in some way like circles, but they are not flat like circles. How are they different from circles and how are they the same? (a sphere gets thicker in the middle, a cylinder has the same thickness everywhere; a sphere looks a like a circle when you look at it from any side, a cylinder looks like a circle when you look right at the ends)
Ask students to think of cylindrical objects and to describe how some objects are like cylinders. Have on display objects such as cans of non-perishable food, new round pencils, hockey pucks, cans of pop (almost cylinders—there is a depression in the bottom), paper towel rolls (almost cylinders—open on both sides), straws (again, open at the sides), and so on.

Introduce cones. Show your students a cube. Place it on the overhead or use a flashlight to create its shadow and ask students to identify the shape of the shadow (square). Repeat with a rectangular prism and a sphere. ASK: What flat shape have we not seen yet? (a triangle) Will a cylinder produce a triangle? Check, turning the cylinder so that it produces first a rectangle then a circle. Show your students a cone and introduce the term. What shape does the cone’s shadow have? Let students guess, then check with the overhead, first holding it so that the shadow it produces is a circle. ASK: How can I produce a triangle? If the right idea is suggested, let a volunteer do it. Otherwise, show the solution yourself.

**ACTIVITY 2**

a) Show students how to roll wedges into cones. Ask students to place their cones on sheets of paper, bases down, and trace the bases. Students should cut out the bases and tape them to the cones.

b) Students can compare cones to cylinders and spheres (add a column to the chart created in Activity 1b above). Add a new question to the chart: Does this shape have a sharp point?
Cones in the environment. ASK: What shapes in the world are called cones? (a pine cone, an ice cream cone) How are they the same as a cone and how are they different? Ask students to think of shapes that are cones or almost cones. Have some objects on display again, such as wooden blocks, paper cups, party hats, and ice cream cones (these are all almost cones because they are open at the end, so lack the base or circular face). Students can draw and label cones, cylinders, and spheres (or objects that are “almost” these shapes) on the worksheets and in their journals.

Snowmen are made from spheres stacked one on top of the other. How is that possible? (The snow ball changes its shape when stacked; it gets flattened at the top and at the bottom. You might demonstrate with modelling clay if snow is not available.)

**Activities 3–6**

3. Students can create cylinders, spheres, and cones from modelling clay.

4. **Collages and posters.** (see p K-1)

5. **Mystery Shape.** (see p K-1)

6. **Sorting.** (see p K-1) Students can sort shapes using three groups: cones, cylinders, and spheres.

**Extensions**

1. Which 3-D figures stack better: cones, cylinders, or rectangular prisms?

2. Show your students an ovoid—a shape that looks like an oval or a circle from all sides. If a sphere looks like a circle, then what does an ovoid look like? (an oval) What real-world objects are ovoids or almost ovoids? (eggs, some rugby balls, some balloons, mangoes, and avocados)
G1-16
Finding 3-D Shapes
Pages 179-181

CURRICULUM EXPECTATIONS
Ontario: 1m5, 1m7, 1m48, 1m48, 1m49, 1m53
WNCP: 1SS3, [C, CN, V]

VOCABULARY
cube
rectangular prism
cone
cylinder
sphere

Goals
Students will identify 3-D shapes in drawings, models, and real-life objects.

PRIOR KNOWLEDGE REQUIRED
Recognize and can name 3-D shapes
Can measure height indirectly

MATERIALS
blocks of different shapes
real-life objects made up of different shapes
a set of 3-D shapes
BLM 3-D Shapes (p K-30)
sorting circles made of yarn

Review 3-D shapes learned to date and their names.

Identify shapes in structures built from separate shapes.

ACTIVITY 1
Give each of your students 5 or 6 blocks of different shapes and ask them to create free-standing towers. Ask them to predict how tall their towers will be compared to other objects in the classroom. Let them build their towers and check their predictions using indirect measurement. Then let them work in pairs to identify the 3-D shapes in the towers of their partners.

Identify shapes in real-life objects. Provide several real-life objects that appear to consist of different 3-D solids. (EXAMPLES: bottles, candles, connecting cubes, round pencils, toys) Students can draw lines on the objects (using a washable marker) where the geometric shapes change.

ACTIVITIES 2–4
Students will need the cards from BLM 3-D Shapes. Remove the cards showing shapes with hidden lines.

2. Students will need five sorting circles made from yarn and one of each 3-D shape learned to date (to label the circles). First have students sort the cards with cubes and rectangular prisms into two circles. Then have them sort the cones, cylinders, and spheres into three circles. Finally have students sort all 14 cards into five circles. Students can
Identify shapes when some are partly obscured.

**ACTIVITIES 5–7**

**5.** Students can use blocks of various shapes to recreate the structures on the third worksheet and then create their own structures. They should draw their structures in their journals and label the 3-D shapes used. They can write about why they chose to use particular shapes. Encourage students to give their creations a title.

**6.** Place several familiar objects (e.g., ball, pencil) on a table. Have students view the objects for a limited time, then cover them up. Can students recall the shapes or objects? **VARIATION:** Remove one object while students are not looking. Can students identify the missing object? This game can also be played in pairs.

**7.** Students can use a chart (with the 3-D shapes as column headings) to tally all the objects in the classroom which resemble 3-D shapes.

**Extension**

Have students build a city with a small number of blocks. Then they should chart and count how many of each shape they used. Give each shape a monetary value (**EXAMPLE:** cones are worth $0.05). How much will the city cost to build?
G1-17
Corners
Page 182

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m3, 1m7, 1m47, 1m48
WNCP: 1SS2, [C, R, V]

VOCABULARY
cube
rectangular prism
cone
cylinder
sphere
edges
corners

NOTE: Over the course of the next three lessons, you and your students will create this chart:

<table>
<thead>
<tr>
<th></th>
<th>sphere</th>
<th>cylinder</th>
<th>cone</th>
<th>cube</th>
<th>rectangular prism</th>
</tr>
</thead>
<tbody>
<tr>
<td>corners?</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>faces?</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>edges?</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Goals
Students will identify corners of 3-D shapes in actual shapes and drawings.

PRIOR KNOWLEDGE REQUIRED
Recognize and can name 3-D shapes
Recognize and can name 2-D shapes
Can identify corners and edges in 2-D shapes

MATERIALS
a paper square
a set of 3-D shapes for each student
BLM Too Many Corners (p K-31)

Feel the corners of 3-D shapes. Each student will need a set of five shapes: a sphere, a cylinder, a cone, a cube, and a rectangular prism. Show your students a paper square. Invite a volunteer to identify the corners. ASK: How do you know these are corners? Do they feel different? (they are sharp turns, so they feel the sharpest) Ask students to hold up a cube. Ask them to feel their cubes and to show which places on the cubes feel the sharpest. Explain that these are called corners in mathematics. Ask a volunteer to show the corners of a cube. Then have students show the corners of the other 3-D shapes.

Have students sort their shapes into two groups: shapes with corners and shapes without corners.

Count the corners of 3-D shapes. ASK: How many corners does a cone have? (one, the point) Does a sphere have any corners? (no) How many corners does a cylinder have? (0) Point out that a cylinder has a part that is sharper than the other (run your finger along one of the edges), but it is more like the edge of a cube than a corner (run your finger along the edge of a cube to illustrate the location of the edge; students can feel the edges on their own shapes). Tell students you will talk about those parts (edges) later. Add the number of corners for the sphere, cylinder, and cone to the attribute chart.
Count the corners of a cube. Now ask students to count the corners of the cube. Students can problem-solve in pairs how to track the number of corners. Let students share their strategies with the class. (EXAMPLE: Tape a piece of masking tape to each corner. When all corners are marked, remove the pieces and count them.) Guide students through the following strategy, if no one suggests it: Set the cube on a sheet of paper on a table. Point at two corners, one on the bottom face and the other on the top face, and ASK: How are these two corners different? (one is on the top and the other is on the bottom, or one touches the table and the other does not) Can we first count the corners on the bottom, then the corners on the top? How many corners are on the top? How many corners are on the bottom? Explain that by counting the bottom corners separately from the top corners, we solved two simpler problems and used them to solve the harder problem. ASK: Why was it so easy to find the number of corners on the bottom? Invite a volunteer to trace the cube. ASK: What shape is the tracing? (square) Where do the corners of the cube touch the paper? (in the corners of the square) How many corners does a square have? How many corners touched the paper? (4) Repeat with the top face of the cube.

Ask students to count the corners of a rectangular prism (they can use whatever strategy they want) and complete the first row of the attribute chart.

Corners on pictures of 3-D shapes. Draw a picture of a cube without the hidden edges. Ask students to identify the shape. Invite a volunteer to place a dot on each corner they can see in the picture. Count the corners together (you can write the numbers beside the dots as you do so). ASK: How many corners are in the picture? (7) How many corners does the cube have? (8) Why did we get 7 instead of 8? (there is a corner on the back that we do not see) Explain that in mathematics people often draw the parts of shapes that we cannot see (because they are hidden behind other parts) with dashed lines. The dashed lines are behind the solid lines and do not meet them. (Show the relative positions of the lines in space with your hands or with two pencils.) We call them hidden lines, because we do not see them on an actual object unless we look at it from the other side. Add the dashed lines to the cube and invite a volunteer to mark the hidden corner.

Draw a picture of a cone and mark 3 corners, as shown. ASK: How many corners did I mark on this cone? How many corners does an actual cone have? What did I do wrong? Which dots should not be in the picture? Repeat with a cylinder on which you have marked 4 corners (all false). You could also draw a rectangular prism and mark false corners where the dashed lines intersect the solid lines (sample shown). Students can practice identifying actual and false corners on BLM Too Many Corners.

Extension

How many corners do two cubes have? Three cubes? Four? Write an addition sentence.
Goals

Students will identify faces of 3-D shapes in actual shapes and drawings.

Prior Knowledge Required

- Recognize and can name 3-D shapes
- Recognize and can name 2-D shapes
- Can identify corners and edges of 2-D shapes

Materials

- a set of 3-D shapes for each student
- small stickers
- paper (to trace shapes)
- yarn circles
- BLM Flat Faces (p K-32)

Introduce faces of 3-D shapes. Explain to students that the sides of 3-D shapes are called faces. You might say that a face is any part of the shape where you can draw a face. To draw a face you need room to draw eyes, a nose, and a mouth, so any part of the shape that provides even a small amount of room for you to do so is a face. Show the faces on the cube, then hold up a cone. ASK: Where can we draw a face on a cone? (Have a volunteer demonstrate.) How many faces does a cone have? Repeat for a cylinder and a sphere. For a cube and a rectangular prism suggest that students keep track of the faces using small stickers. Complete the second row of the attribute chart.

Tracing flat faces. Invite a volunteer to trace a face of a cube on the board and have other students do the same with their cubes. What is the shape of the tracing? Ask students to compare other faces of the cube with the tracing. Are all faces of the cube the same? Check.

Repeat with a rectangular prism. Ask students to mark the faces that are exactly the same shape with identical stickers, and count how many faces are the same on each prism. If your students use prisms of different proportions, ask them to compare results. Have them sort the prisms by the number of faces that are the same: place all prisms that have four faces that are exactly the same into a yarn circle. Leave other prisms outside.

Ask students to look at the tracings of the faces. What do they notice? How are all the prisms in the circle the same? (They all have two square faces, whereas the other group has only rectangular faces.)

To trace a face, the whole face must touch the paper. Ask students to cut out their tracing of a cube’s face. Does the tracing cover the face completely? (yes) Does it match the face exactly? (yes) Now ask students to place a cylinder on its rounded side and trace the shape without rolling it. (At this stage, it is not important whether the width of the trace is exactly the same as the width of the cylinder, so accept all tracings even if they are visibly narrower than the cylinder itself because the shape rolled slightly.)
ASK: What shape did you get? Ask students to cut out the resulting rectangle and place it on the round face of the cylinder. Does the rectangle cover the face completely? (No) Why? Explain that when students traced the faces of rectangular prisms and cubes every part of the faces touched the paper, so the tracings covered the faces. Hold a cylinder vertically against the board and ASK: Does all of the face touch the board? (No) Can the whole rounded face touch the board at the same time? (No) This means that you cannot trace this face.

Have students trace the flat faces of a cylinder and a cone. ASK: Can you trace the face of a sphere? Why not? Can you make the whole sphere touch the paper without rolling? (No)

**ACTIVITY**

**Sorting.** (see p K-1) Have students sort the five basic 3-D shapes into two groups: “Square and rectangular faces” and “Circular faces.” Where does the sphere go? (outside both circles) Explain that the sphere has only one face and it is different from a circle.

**Identifying faces in pictures.** Draw a picture of a cube on the board. Ask students to identify the shape and the shape of its faces. Shade the front face. ASK: Is this a square? (Yes) Now shade the top face. ASK: Is this a face of a cube? Ask students to find this face on their cubes. ASK: What is the shape of the face on your cube? (Square) Does it look like a square in the picture? (No; it has four sides, but it does not look like a square. Cover the rest of the picture to emphasize that.) Ask students to hold the square faces that they cut out in front of them, so that they look like squares. Then ask them to tilt the squares so that they lie horizontally at eye level. Do the sides that were vertical look shorter now? (Yes) Draw more pictures of 3-D shapes and shade various sides. Students can use their concrete 3-D shapes to identify the shape of each shaded face. Students can hold up their tracings of squares, rectangles, or circles to show the answer.

**Bonus** Show a picture of a triangular prism or a pyramid with one of the triangular faces shaded.

**Hidden faces in pictures.** Draw a cylinder on the board, as shown. ASK: How many faces do you see in this picture? (2) How many faces does a cylinder have? Where is the third face? (It is hidden) Add the dotted line that represents the hidden edge and invite a volunteer to shade the hidden face. ASK: What is the shape of the hidden face? (Circle) Point out that one of the faces (not the circular one, the one that goes all around the shape—point to it) is partially hidden. The hidden part, at the back, is part of the same face. Ask students to check this by feel—they can run their hands over their cylinders from the front to the back without turning a “corner.” Find and mark the hidden faces in drawings of the other shapes.
G1-19
Edges
Page 185

CURRICULUM EXPECTATIONS
Ontario: 1m1, 1m2, 1m3, 1m5, 1m6, 1m7, 1m47, 1m48
WNCP: 1SS2, [C, CN, R, V]

VOCABULARY
cube
rectangular prism
cone
cylinder
sphere
edge
corner
face
skeleton

PREREQUISITE KNOWLEDGE REQUIRED
Recognize and can name 3-D shapes
Recognize and can name 2-D shapes
Can identify corners and edges of 2-D shapes
Can identify corners and faces of 3-D shapes

MATERIALS
a set of 3-D shapes for each student
small stickers
BLM Too Many Edges (p K-34)
BLM Too Few Edges (p K-33)

Feel the edges of 3-D shapes. Review straight and curved lines. Hold up a cube. Run your finger along one of the edges and explain that the place where two faces meet is called an edge. Some edges are straight, like on a cube, and some edges are curved, like on a cone. Straight edges go from one corner to another. Ask students to show the edge on their cones. How many edges does a cone have? Find the edges on cylinders (2) and spheres (0), and add this information to the attribute chart. Have students sort a group of 3-D shapes into shapes with straight edges and shapes with curved edges.

Count the edges of a cube. Ask students to count the edges of a cube. Ask students to recall how they counted corners and faces. After they count the edges, let them explain their solutions. E.g., students can mark the edges with small stickers (as they did the faces). ASK: Does anyone remember how we counted the corners of the cube by splitting the corners into two groups? What two groups did we use? (corners on the top and corners on the bottom) Challenge students to find three groups of edges that they can count separately. SOLUTION: Look at the cube sitting on the desk. There are edges that lie on the desk, edges that touch the desk only at one end, and edges that do not touch the desk at all because they are on the top face. Count the number of edges in each group separately and add the numbers.

Referring to the attribute chart, ASK: How many faces does a cube have? How many faces does a rectangular prism have? How many corners does a cube have? A rectangular prism? What do you notice? (Both have the same number of faces and corners.) How many edges do you think a rectangular prism has? Ask students to check by counting the edges of a rectangular prism using the method of their choice. Add the number to the chart.

Place a cube in front of students. ASK: How many edges do you see from where you sit? (9) Why? (Some edges are on the back.) What hides these

Goals
Students will identify edges of 3-D shapes in actual shapes and drawings.

PROBLEM SOLVING
Looking for a similar problem for ideas, Making a diagram, Splitting into simpler problems

PROBLEM SOLVING
Revisiting connections that were true in one context

PROBLEM SOLVING
Revisiting connections that were true in one context

PROBLEM SOLVING
Revisiting connections that were true in one context

PROBLEM SOLVING
Revisiting connections that were true in one context

PROBLEM SOLVING
Revisiting connections that were true in one context
edges? (faces) If the cube was made of glass, would you see them? If you have a transparent model of a cube or an aquarium that is a rectangular prism, look at it together. Explain to students that sometimes people make models of geometric shapes that do not have faces, only edges and corners. This allows them to see all the edges clearly. These models are called skeletons and the edges are the "bones."

**ACTIVITY**

Use old newspapers to create skeletons of cubes and rectangular prisms. Roll newspaper tightly into thick sticks, starting from a corner, and secure with tape. Use the sticks as edges and bind them together near the ends to create corners. (The sticks are thinner at the ends, which makes binding them together easier.)

**Edges in pictures of 3-D shapes.** Draw a picture of a rectangular prism with hidden edges shown and ask a volunteer to identify the hidden edges. Point out that they are drawn with dashed lines. Compare the picture with a skeleton, and ask the volunteer to show these edges on the skeleton.

**Lines in pictures that are not edges.** Draw a circle and a sphere (a circle with a small curvy "rectangle" in it—see samples in the workbook). **ASK:** Which picture shows a sphere? How do you know? Explain that the little "rectangle" tells us the shape is not flat. Point to the circular line in the picture of a sphere. **ASK:** Is this an edge? (no) How many edges does a sphere have? (0; refer to the chart and have students check again by feeling their spheres)

Draw a cone and point at the lines that meet at the point. **ASK:** Do these lines represent edges? Ask students to check whether their cones have edges there. Then trace over the actual edge of the cone in the picture and mark the solid part of the edge with a 1 and the dashed part with a 2. Write: 2 edges. **ASK:** Have I counted the edges correctly? Why not? Invite a volunteer to correct the mistake. Repeat with a cylinder. Finally, draw a cube, mark too many edges, and ask students to identify the mistake. **EXAMPLE:** Count one of the edges where a hidden line intersects a solid line as two separate edges (the part to one side of the intersection and the part to the other side).

Students can practise identifying edges in pictures on BLMs Too Many Edges and Too Few Edges. Remind them to compare their answers against the attribute chart. Remind them also that if they are not sure whether a line is an edge or not, they should look at the actual shape.

**Bonus** Count the edges of a pentagonal or a hexagonal prism, if available.

**Extension**

How many edges meet at the corners of a cube? (3) Of a rectangular prism? (3) Of a cone? (0)
**Goals**

Students will identify side views of 3-D shapes using actual shapes.

**PRIOR KNOWLEDGE REQUIRED**

- Recognize and can name 3-D shapes
- Recognize and can name 2-D shapes
- Can identify faces of 3-D shapes

**MATERIALS**

- a set of 3-D shapes for each student
- partially completed tracings (see Activity for details)

**ACTIVITY 1**

**Preparing to trace shapes that can roll.** Divide the class into 4 or 5 groups. Have at least 10 different objects for each group. **(EXAMPLES:** scissors, pencil, tens block, water bottles of different shapes, tennis ball container, highlighter, stapler, playing card, crayon) Also, have ready partial tracings of 3–4 of the objects (1 or 2 of which can roll) for each student, such that the students in each group get a different combination of tracings. Invite students to find the matching objects and finish the tracings. They can trade pages with a partner to check their work.

**ASK:** Can you see the tracing all around every object? Why or why not? (Objects that can roll might have rolled while students were tracing them. Show students how to hold objects firmly while tracing.)

**Bonus**

Leave one object per group out of all the tracings for that group, and ask students to find the object that no one in their group used. Students will need to work with group members to find the answer. Solving this problem also gives students a way to check their work.

**ACTIVITY 2**

**Tracing 3-D shapes.** Demonstrate the right way to trace a cone by holding it vertically against the board and tracing around it without rolling it. **ASK:** What shape have I drawn? (a triangle) Explain that the tracing you’ve drawn is called a side view. Invite students to draw the side views of different shapes.

**TIP:** To prevent a sphere from rolling, place a plastic bottle lid beneath it.
ASK: Why do you think these tracings are called side views? (The 3-D shapes look like these tracings from the side; students checked whether the tracings fit the 3-D shape by viewing them from one side.) Point out that a side view is not always the same as a face. For example, the cone’s side view is a triangle but there are no triangular faces on a cone. Discuss with students which other shapes have side views that are different from their faces. (cylinder and sphere) Create a chart to compare the two and invite volunteers to help you fill it in.

<table>
<thead>
<tr>
<th>Shapes of side views</th>
<th>sphere</th>
<th>cylinder</th>
<th>cone</th>
<th>cube</th>
<th>rectangular prisms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>□</td>
<td>○</td>
<td>○</td>
<td>□</td>
</tr>
<tr>
<td>Shapes of flat faces</td>
<td>none</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>□</td>
</tr>
</tbody>
</table>

**Identifying shapes from side views.** Hold up several real-life objects, one at a time, and ask students to identify the two-dimensional shapes of different side views. **EXAMPLE:** A bottle looks like a circle from the bottom, and like a rectangle with a triangle on top of it from the side.

Students can use actual 3-D shapes to identify the side views on the worksheets.

**Extensions**

1. Give pairs of students two identical rectangles and ask them to check if the rectangles are the same by superimposing them. Then ask students to make a cylinder from one of their rectangles (as in G1-13, Activities, but make sure students don’t overlap the sides when they roll the rectangle—the sides should just touch). What is the side view of the cylinder? (a rectangle) Is it the same rectangle as the remaining rectangle? (no) How is the curved face the same as the remaining rectangle? (It is the same rectangle, but rolled.) Is the side view the same as the curved face? (no)

2. Students can pair cones with their side views on BLM Side Views of Cones (p K-35).

3. **Identify 3-D shapes from side views.** Place a ping-pong ball on the overhead and hide it from view so that students see only its shadow. **ASK:** What shape do you see? Can you guess what 3-D shape is making this shadow? Tell students that you are going to turn the shape so that they see what it looks like from the other side. Turn the ball several times and have students identify the 2-D shape they see and guess the 3-D that is producing it. Repeat with other shapes.
G1-21
Curved and Flat Faces
Page 188-189

CURRICULUM EXPECTATIONS
Ontario: 1m2, 1m5, 1m7, 1m47, 1m48, 1m53
WNCP: 1SS2, 1SS3, 1SS4 [C, CN, R, V]

VOCABULARY
cube
rectangular prism
cone
cylinder
sphere
face
slide
roll
stack

ONLINE GUIDE
See a completed attribute chart.

PROBLEM SOLVING
Making and investigating conjectures

GOALS
Students will identify curved and flat faces of 3-D shapes on actual shapes and in pictures. Students will sort

PRIOR KNOWLEDGE REQUIRED
Recognize and can name 3-D shapes
Recognize and can name 2-D shapes
Can identify faces of 3-D shapes

MATERIALS
a set of 3-D shapes and a plank or piece of cardboard for each student
large collections of 3-D shapes
BLM Dice Nets (pp K-36–K-37)
BLM I Am... (p K-38)
BLM I Am Not... (p K-39)
BLM Describing Shapes (p K-40)

Have ready a new chart with the basic shapes across the top and these attributes in the first column: How many curved faces?, Can roll, How many flat faces?, Can slide, Stacks well. You will complete the chart over the course of the lesson.

Roll and slide. Write “rolls” and “slides” on the board. Ask students to explain (or to show with their bodies or shapes) what each word means. Then hold up each of the five basic shapes, one at a time, and ASK: Will this shape roll? Will it slide? Call a vote for each shape and record the results on the board. Let some students explain their predictions. Has anyone changed their mind? (You might call another vote.) Give each student or small group of students a plank or a piece of cardboard to use as a ramp, and let them check the predictions using their 3-D shapes. Discuss and record the results in the correct rows on the chart and compare them to the predictions.

Curved and flat faces. Review the terms “curved line” and “straight line” with students. Explain that faces can be curved or straight, just like lines. Show various shapes and check the faces one by one—which faces are flat and which faces are curved? Record the number of flat and curved faces in the chart. ASK: Which faces roll—the curved faces or the flat faces? Which faces slide?

ACTIVITIES 1–2
Give students a spinner divided into 3 parts, labelled “only curved faces,” “only flat faces,” and “both curved and flat faces.”

1. Students spin the spinner and create shapes from modelling clay that have the faces indicated.

2. Give each pair of students a large number of 3-D shapes (more than one of each kind). Player 1 spins four times and chooses shapes with faces as indicated by the spinner, creating the core of a pattern. Player 2 has to extend the pattern.
Stack well. Have students explain what the word stack means. Why would anybody want or need to stack shapes? (packing, building) Ask students to predict and then check which 3-D shapes stack well. Complete the last row of the chart.

**ACTIVITIES 3–4**

3. Give small groups a die with pictures of 3-D shapes on its faces (see BLM Dice Nets) and a large collection of 3-D shapes. Have students take turns rolling the die and stacking the 3-D shapes rolled, one on top of the other, to create towers. When the tower cannot be continued, a new tower starts. What shapes are at the tops of the towers? Which shapes can go anywhere in the towers? Which shapes can be placed any way and which shapes must be placed in a specific way (e.g., you cannot place a cylinder "on its side" unless it is on top of the tower, and even then it might roll off)?

4. Player 1 builds a structure from 3-D shapes. From his or her own set of 3-D shapes, Player 2 selects the shapes used to build the structure. Then Player 2 checks the solution by deconstructing the structure and pairing up the chosen shapes with the shapes from the structure. Then the two players switch roles. **VARIATION:** Players check their solutions by building a replica instead of deconstructing the original structure.

5. Player 1 sorts 6-8 shapes according to a rule and then Player 2 tries to guess the rule. Player 1 can give up to three hints, by adding another shape or a real-life object to the group or by drawing attention to a geometric attribute (e.g., look at the number of corners). **VARIATION:** Player 1 sorts only 4 shapes according to the rule. Hints are not allowed.

6. Each student creates a page for a class book entitled “What Shape Am I?” The student should include three hints about the shape, progressing from quite vague to more specific. Under a flap on the page, the answer could be written out, sketched, or taken from a magazine.

**Guessing shapes from clues.** Display the basic 3-D shapes and the attribute chart from lessons G1-15 to G1-17. Ask students to guess which shape you are thinking of. Give clues one at a time and remove shapes from the collection accordingly. For example, if you are thinking of a cylinder, **SAY:** My shape can slide. Which shape cannot slide? (a sphere) Why can we remove the sphere from the collection? (A sphere does not slide and your shape does; your shape cannot be a sphere.) Continue until students find the shape and repeat with other shapes.

**Bonus** BLM I am... and BLM I am not...

After completing BLM Describing Shapes, students can write and illustrate similar descriptions of a sphere and a rectangular prism in their journals.
G1-22
Location Words
Pages 190-193

CURRICULUM EXPECTATIONS
Ontario: km27, 1m7, 1m53, 1m55
WNCP: optional, [C]

VOCABULARY
above below under on top of beside between

Goals
Students will learn words to describe location and will create structures according to descriptions that feature these words.

PRIOR KNOWLEDGE REQUIRED
Recognize and can name 3-D shapes
Recognize and can name 2-D shapes

MATERIALS
paper 2-D shapes, pattern blocks, or attribute blocks (see BLM Attribute Blocks (pp M-1–M-5))
a set of 3-D shapes

Write the new vocabulary on cards and use these word cards throughout the lesson, as needed.

Above and Below. Place the words “above” and “below” where students can see them, and read them together. On the board, draw a $3 \times 3$ grid. Shade the middle horizontal row and ask volunteers to identify the row above the shaded row and the row below the shaded row. Add a row at the top of the grid (making it $4 \times 3$) and ask students if the row directly above the shaded row has changed (no). Do the same at the bottom of the grid (now $5 \times 3$) and ask if the row directly below the shaded row is still the same (yes). How many rows are now above the shaded row? (2) Below the shaded row? (2)

Give pairs of students a circle, triangle, and square (or three other shapes which can be easily differentiated). Tell them to put both shapes on their desks so that the triangle is above the square. Then tell them to put the circle below the square. Finally, ask them to rearrange their shapes so that the square is below the circle and the triangle is above both shapes. Observe students as they work. Are they placing the shapes correctly? Prompt or assist individuals as necessary. Continue asking the class to position shapes in different ways until all students demonstrate understanding. Then ask students to identify the location of various objects in the classroom.

EXAMPLE: Are the desks below or above the ceiling?

Draw three pictures as shown and ASK: Which picture am I describing if I say, The square is below the circle and the triangle is above the square. (All of them!) Can you draw another picture that fits that description?

Ask pairs to draw as many pictures as they can for more such descriptions. (EXAMPLE: A circle is above a triangle, and a square is below a heart.) Have students share their answers.

Bonus Include size and colour. EXAMPLE: Draw a small blue circle above a large red triangle.
Under. Explain to your students that the word under is often used instead of the word below. Explain the difference—under often means that an object is covered by another object, e.g., the paper is under the book. Show several examples using large objects, such as a box and a chair. Then have students place various objects under and below their chairs, books, or pencil cases.

**NOTE:** An object under the table is not usually below the whole table, but is only below the surface of the table; the legs of the table, for example, might be right next to the object. Similarly, someone who is under water is not below the whole body of the water, only the surface.

On top of. Introduce the term and illustrate the difference between “on top of” and “above” by holding a block above the table then placing it on top of the table. Point out that the block on top of the table touches the table. Have students describe the three pictures from earlier in the lesson using the terms “above,” “on top of,” “below” and “under.” Then have students place paper shapes or blocks on their desks according to this description: A circle is on top of a square, the square is above a rectangle, a triangle is below the rectangle, and another square is under the rectangle. **ASK:** Is the triangle below or under the circle? Is the square below or under the circle? Is the circle above the rectangle or on top of the rectangle? Repeat with other shapes.

Beside and Between. Invite three volunteers to stand in a line. **ASK** the person in the middle: Who is beside you? Who are you between? Invite more volunteers to stand in front of the class and tell you who they are standing beside and between. Then ask other students to describe the positions of some of the volunteers. Finally, draw the following picture and ask students to describe the position of each shape. Point out, if necessary, that the light square is between the dark square and the dark circle, but the position of the triangle could also be described using the word between—it is between the light square and the striped circle.

**Bonus** Circle the 4-letter word inside the word “beside.”

**Use all six terms.** Students create simple designs with pattern blocks, attribute blocks, or other classroom materials according to your descriptions. Observe students as they work and assess understanding. Once students are comfortable creating designs on their desks, let them try building 3-D structures with 3-D shapes. **EXAMPLE:** The cone is on top of the rectangle and the cylinder is next to the cone.

**ACTIVITY**

Students work in pairs: Player 1 creates a castle using 6–8 shapes and describes it to Player 2, who has to create the castle from the description without seeing it. Students then compare their castles, verify that both satisfy the description, and switch roles.
G1-23
More Location Words

Pages 194-197

CURRICULUM
EXPECTATIONS
Ontario: km27, 1m5, 1m7,
1m53, 1m55
WNCP: optional, [C]

VOCABULARY
along
over
in front of
behind
inside
outside
above
down
under
on top of
beside
between

Goals

Students will learn more words to describe position and will create structures according to descriptions that include these words.

PRIOR KNOWLEDGE REQUIRED

Recognize and can name 3-D shapes
Recognize and can name 2-D shapes

MATERIALS

paper 2-D shapes, pattern blocks, or attribute blocks
(see BLM Attribute Blocks (p M-1–M-5))
a set of 3-D shapes

Have the new vocabulary written on cards, as in the last lesson.

Between and Along. Ask volunteers to line up along a wall to illustrate the meaning of “along.” Then create a path on the floor using masking tape and ask another volunteer to walk along the path.

Draw:

ASK: Is the oval between the square and the triangle? (not quite, it is in the middle above them) Join the shapes with a line so that they look like beads on a string, with the oval between the other shapes. ASK: Is the oval now between the square and the triangle? (yes) Why? Explain that the when we say that an object is between two others, all the objects must be on a path or joined together by a path. Which object is in the middle of the path (in this case, the string). Which objects are at the ends of the path? Ask a group of volunteers to line up on the path you marked with masking tape earlier. Choose a pair of volunteers standing beside each other in line and ASK: How are Joanna and Richard standing? (beside each other) Joanna is standing between Richard and somebody else—who? If students have difficulty identifying people in different positions, remind them about the path. How are people arranged on the path? (The path goes from Richard to Joanna to… and so on.) Who is beside —? Who is between — and —? Repeat several times, as necessary, varying the direction of the path.

Bonus — Circle the 4-letter word inside the word “along.”

Over. Ask students to show, with their hands, how the cow in the nursery rhyme jumped over the moon. What other animals jump or go “over” things? Have students show the difference between these phrases: “the circle is above the triangle,” “the circle is on top of the triangle,” and “the circle rolled over the triangle.” Repeat with other shapes to make sure all students understand the difference.
**Behind and In front of.** Invite 4 or 5 volunteers to line up behind each other (as though they are lining up to go out for recess). **ASK:** Who is in front of Ann? Who is behind Ann? How many people are in front of Jackie? How many people are behind Jackie? Repeat for several people in the line, including the people at the ends (so that the answer to some questions is “no one”). Then try harder questions and problems, such as “I am thinking of a person. Two people are standing in front of this person. Who is it?” or “What is right: two people are in front of Sam or two people are behind Sam?”

**Bonus** Use a longer line.

**Behind and In front of, from a different perspective.** Ask two volunteers to stand one behind the other facing the class. **ASK:** Who is in the front? Who is in the back? Who is behind whom? How do you know? Do you see all of Avijeh? Do you see all of Karen? Why not? (Whoever is in front hides whoever is behind.)

Attach a large paper square to the board. Attach a circle of a different colour to the board such that it obscures part of the square. **ASK:** Which shape is in the front? Which shape is in the back? How do you know? Do you see the whole square? (no) Do you see the whole circle? (yes) Repeat with 3 shapes that overlap (sample at left).

**Inside and Outside.** Draw a circle on the board and ask a student to draw a flower inside the circle and another to draw a tree outside the circle. Label the positions of the objects with the appropriate word cards and then draw another circle. Put a triangle inside the circle and a square outside the circle. **ASK:** Which shape is inside the circle? Which shape is outside the circle? Brainstorm with the class a list of things which are outside the classroom and inside the classroom.

Have students describe a picture (see BLM Location Words (p K-41)) or a place (EXAMPLE: their bedroom, the schoolyard) using location words.

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**ACTIVITIES 1–2**

1. Give pairs a variety of objects of different sizes, an open box or bowl, and a die with location words on the faces (see BLM Dice Nets). Player 1 rolls and gives Player 2 a task that contains the rolled word. For example, a player who rolls “in front of” can say: Place a tens block in front of the bowl. Player 2 then rolls the die and gives a task that uses the word rolled, the last object placed, and a new object. If students manage to use all the objects, they “win” as a pair. If they cannot use any of the remaining objects with the last object placed and the word rolled, they “lose.”

2. Play a variation of “Simon says...” using location words. **EXAMPLE:** Simon says stand between two desks.
Goals
Students will create maps of the classroom and use vocabulary words to describe the position of various objects on these maps.

PRIOR KNOWLEDGE REQUIRED
Can use location words to describe position

MATERIALS
grid paper
shapes representing furniture and other objects in the classroom

Discuss with your students when and why people use maps.

Create maps by tracing. Give students sheets of grid paper and ask them to place on the paper two small objects from their desks, such as an eraser and a stapler, so that there is some space between and around them. Ask students to trace the objects without changing their location. Have them place a third object between the eraser and the stapler and trace it as well. Repeat with an object above the stapler and another beside the eraser.

Ask students to remove the objects and to write on each tracing what the object was. Explain that they have created a map. ASK: Can you tell which object was between the eraser and the stapler by looking only at your map? What was beside the eraser?

Ask students to exchange maps with a partner, and have partners ask each other questions about the position of the objects on their maps. Students could put their maps away for a day (so that they forget where each object was) and answer questions about the positions of the objects later.

Create a classroom map. Explain to your students that they will each create a map of their classroom. They should pretend they are looking at their classroom from above, as if they were spiders on the ceiling. In small groups or in pairs, students should list all the objects that they think should appear on the map. Compare the lists and discuss how the objects should be represented on the maps. ASK: If we look at our desks from above, what geometric shape will we see? What kind of rectangle—a long thin rectangle or a short and squat rectangle? If we look at the teacher’s desk, what will we see? Is this rectangle larger or smaller than the rectangles representing the students’ desks? Repeat with other items, such as a sink or shelves. (Empty a shelf for students to examine, since they will not be able to look at the whole bookshelf from above. Compare it to a box—it is long and rather thin if we look at it from the side, but it looks different from above.) ASK: How would you represent the blackboard? (It could be a very thin rectangle, or even a line.)
Prepare ahead of time a BLM with the outlines of shapes that could represent the furniture and other objects in your classroom. Have students cut out the shapes and label them. Give students sheets of 2-cm grid paper. Explain that the sheets represent the classroom, and the sides of the sheets represent the walls. Have students identify which sides of the paper represent walls with windows and then mark the windows. Ask a volunteer to tell how the furniture is positioned along one of the walls, using the appropriate vocabulary. **EXAMPLE:** The sink is in the corner, the bookshelf is beside the sink, and so on.) Have students place the paper shapes that represent these objects along that wall on their sheets. Allow another volunteer to describe the wall using different terms so that students can check their work (**EXAMPLE:** The bookshelf is between the sink and the carpet.) Repeat for the remaining walls. Then have another volunteer describe the position of objects in other parts of the room and have students add those pieces to their maps. Students can glue all the paper shapes to the grid paper at the end.

**ACTIVITY**

Students think about an object shown on their maps and describe its position to a partner, who has to guess what the object is. Partners swap roles and repeat.
G1-25
Problems and Puzzles
Page 199

Tangram. Give students a copy of BLM Tangram (p K-42). The shapes that make up this square are called tans. Have students cut out the shapes and solve the following sequence of puzzles:

1. Create a square using only one of the shapes, then two. **CHALLENGE:** Create a square using three shapes (two small and one middle triangles). Can you trace lines of symmetry in the designs?

** ANSWERS: **

2. Create a square using four triangles. (HINT: One of the large triangles is not required.)

** ANSWER: **

3. Find two ways to create this shape using only two shapes:

** ANSWER: **

4. Now distribute copies of BLM Tangram Puzzles (pp K-43–K-46). The pictures on the BLM are made up of tangram shapes. Can students match their shapes to the outlines on the BLM to create the pictures?

5. Make the task a little more difficult: instead of matching shapes to the outlines on the BLM, give students small versions of the pictures (see BLM Tangram Puzzles—Answers (p K-47)) and have them create the shapes from the pictures. Ask students to start by identifying the largest triangle in each picture and placing the largest triangle from their set of tans in the same position. Then have them add the other shapes one by one, identifying the exact position of each new shape in relation to the shapes already in place.

Students are now ready to solve the tangram puzzles on the review worksheet.
Cones (2)
Cones (3)
3-D Shapes
Too Many Corners

☐ ✓ the corners.
☐ ✗ the dots that are not corners.
Flat Faces

How many flat faces of each shape? How many flat faces altogether?

<table>
<thead>
<tr>
<th>Shape</th>
<th>Flat Faces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder</td>
<td>$2 + 0 + 0 = 2$ flat faces</td>
</tr>
<tr>
<td>Cube</td>
<td>$0 + 0 + 1 = 1$ flat faces</td>
</tr>
<tr>
<td>Rectangular prism</td>
<td>$0 + 0 + 1 = 1$ flat faces</td>
</tr>
<tr>
<td>Cone</td>
<td>$1 + 0 + 0 = 1$ flat faces</td>
</tr>
<tr>
<td>Bonus</td>
<td>$0 + 0 + 1 = 1$ flat faces</td>
</tr>
</tbody>
</table>
Too Few Edges

☐ Circle the missed edges.

How many edges altogether?

12 edges

___ edges

___ edges

___ edges

___ edges

___ edges

___ edges

___ edges

___ edges

Blackline Master — Geometry — Teacher’s Guide for Workbook 1.2

K-33
Too Many Edges

☐ ✗ the wrong numbers.

How many edges?

- Edge: 0
- Edges: 7
- Edges: 13
- Edges: 4
- Edges: 6
- Edges: 14
- Edges: 11
Side Views of Cones

Match the cones to their side views.
Dice Nets (1)

You Choose
Dice Nets (2)
I Am...

☐ Circle the right shape.
☐ Write the name of the shape.

I have 6 faces.
I am a ________________

I have 12 edges.
I am a ________________

I have 2 circular faces.
I am a ________________

I roll.
I am a ________________
I Am Not...

- ❌ the wrong shapes.

I have a curved face.
I have no corners.

I have 12 edges.
I have 6 matching faces.

I have 1 curved face.
I have no edges.

Bonus
I can look like a circle.
I have no edges.
I have no corners.
# Describing Shapes

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>Cone</th>
<th>Cube</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Cylinder" /></td>
<td><img src="image" alt="Cone" /></td>
<td><img src="image" alt="Cube" /></td>
</tr>
<tr>
<td>A cylinder has flat faces and curved edges.</td>
<td>A cone has flat face and curved edge.</td>
<td>A cube has flat faces and curved edges.</td>
</tr>
<tr>
<td>The flat faces are corner and curved edge.</td>
<td>A cone can corner and curved edge.</td>
<td>A cube cannot corners and edges.</td>
</tr>
<tr>
<td>A cylinder can flat faces and curved face.</td>
<td>The flat face is a flat face and curved face.</td>
<td>A cube has flat faces and curved faces.</td>
</tr>
</tbody>
</table>
Location Words

□ Describe the picture. Use words from the list.

<table>
<thead>
<tr>
<th>beside</th>
<th>outside</th>
<th>inside</th>
</tr>
</thead>
<tbody>
<tr>
<td>The tree grows <strong>beside</strong> the house.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The parents are <strong>outside</strong> the house.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The children are playing <strong>inside</strong> the house.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>behind</th>
<th>below</th>
<th>along</th>
<th>between</th>
</tr>
</thead>
<tbody>
<tr>
<td>The flowers grow <strong>between</strong> the tree and the house.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The boy hides <strong>outside</strong> the house.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The cat climbed <strong>along</strong> the branch.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The dog is <strong>behind</strong> the cat.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Tangram
Tangram Bunny
Tangram Man
Tangram Boat
Tangram Mystery
Tangram Puzzles — Answers

[Diagram of tangram puzzles]
In this unit, students will collect and organize data using graphs, charts, and tallies. They will also learn to describe and compare the likelihood of various events.

**Weather Graphs**

During the month that you teach this unit, record the weather every day on the class calendar. As an alternative, give students copies of BLM Weather Calendar (p L-20) and ask them to mark the weather using the easy-to-draw symbols provided. The data collected can be used to make weather graphs in the course of the unit.

Discuss with students how to handle multiple pieces of data for the same day. Should days that were both rainy and sunny be marked twice in the graph? If students decide to do so, ask them to add the total number of marks on the graph. Did they get more marks than days? Why?

**Impossible vs. Unlikely**

Although the only events that are strictly impossible are events that are contradictory—like rolling a number greater than 6 on a regular die—we are going to use the word in a more common way. For example, to make things more consistent with the students’ knowledge, we will describe the likelihood of meeting a dinosaur as impossible even though scientists might find a way to clone dinosaurs in the future. The difference between highly unlikely events, like meeting dinosaurs, and strictly contradictory events will be discussed in later grades.

**Probability Pistachio by Stuart Murphy.** An introduction to the language of probability (usually, sometimes, and so on). Discuss the meaning of each term and have students think of three examples.

**Meeting your Curriculum**

This section is optional for students following the WNCP curriculum. They will learn this material in grades 2 and 4.
Sort by colour. Give each student or small group of students about 20 large connecting cubes of three different colours. Ask them to sort the cubes by colour.

Create a concrete graph. SAY: I want to see which colour you have the most of. How can you show me that quickly? Ask students to link the cubes into trains of the same colour so that you can easily compare their lengths. Ask students to place the trains side by side, so that the difference is easy to see. Explain that they have created a concrete graph. A graph is a way of ordering data that makes it easy to see and compare the data.

The need for a common starting line. Show three trains side by side without a common starting line; as shown at left. Compare each colour to another colour. ASK: Is it easy to see that there are more light grey cubes than white cubes? (yes) What about dark grey cubes and white cubes—can you compare them easily? (No, they are not lined up properly.) How should the trains be arranged so that we see clearly the differences between all three colours? (The ends of the trains should line up on one side, usually the left side.) Invite a volunteer to rearrange your cube trains accordingly. Then have them rearrange their own cube trains if necessary.

When all students have created their concrete graphs, prompt them to “read” their graphs. ASK: Which colour do you have the most of? How many more red cubes do you have than green cubes? How do you know?

The need for one-to-one correspondence. Have students break apart their cube trains and replace some of their large connecting cubes with small connecting cubes. Have students sort their cubes by size and create
two new trains. Hold up two cube trains side by side, one made of 4 large cubes and the other made of 6 small cubes, and **SAY:** I think I have more large cubes than small cubes because this train is longer. Am I right? Have students identify your mistake. **ASK:** How could we draw these two trains on grid paper so that we can see where there are more cubes? **PROMPT:** Think of reading buddies. The older students are larger. How do we know if there are the same number of older students and younger students? Buddies work in pairs. Can cubes go in pairs, too? How can you order the cubes on grid paper so that we see the pairs? Ask students to place their cubes on 2-cm grid paper so that there is one large cube in a row for every small cube in the other row. Is it easy now to see which size we have more of?

Invite a volunteer to draw the graph for his or her trains on the board. **ASK:** How did you sort the cubes? (into large and small) What do the words “large” and “small” describe? What did you sort the cubes by? (**PROMPT:** Sorting into red and blue is sorting by colour. Sorting into big and small is sorting by…?) Show students how to label the rows (small, large) and title their graphs (Sizes of cubes).

**Horizontal or vertical.** Graphs can be created by arranging data in rows or columns. Have students rearrange their concrete graphs on grid paper so that there is one large cube in a column for every small cube in the other column. The columns need to line up (at the bottom) just as the rows did.

**ACTIVITY**

Have students sort six attribute blocks according to a rule of their choice, create a concrete graph and trade it into their journals.

**Graphs can be used to display survey results.** Explain what a survey is and discuss what people use surveys for. Ask a survey question, such as **What is your favourite season?** Prepare ahead of time cards with the possible answers (spring, summer, fall, winter) and the title (Favourite Season). Attach the cards to the board and invite students to stand in a line under their favourite season. **ASK:** Which season is liked by the largest number of people? Which season is liked by the smallest number of people? How do you know? How does our concrete graph make this easy to see? How many people like summer? How many people prefer spring? How many more people chose summer than spring?
**PDM1-8**

**Pictographs**

Page 201-203

**CURRICULUM EXPECTATIONS**

Ontario: km33, 1m1, 1m3, 1m7, 1m73, 1m74, 1m75

WNCP: optional, [C, CN, R]

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**VOCABULARY**

- graph
- picture graph
- symbol
- pictograph

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**Goals**

Students will create and analyze picture graphs and pictographs.

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**PRIOR KNOWLEDGE REQUIRED**

- Can sort according to one attribute
- Can compare and order numbers
- Can tell how many more or how many less
- Can create concrete graphs

**MATERIALS**

- Plastic fruits, play money, or other small items to sort
- BLM 3-Column Chart (p L-21)
- BLM Graph Templates (pp L-22–L-23)

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**Picture graphs are more convenient than concrete graphs.** ASK: How did we make concrete graphs before? Give students 8–10 items to sort, then ask them to create a concrete graph. SAY: Suppose you want to take this graph home. Will it be convenient? What could you do to show your work to your parents without taking the things you sorted home? (Draw pictures of the items.) Have students draw pictures in place of each item in the graph. Explain that they have created a picture graph.

**Introduce pictographs.** Now tell students that there is an even simpler graph they can make to take home. Write the word *pictograph* on the board and have a volunteer circle the part of the word that tells you it is a graph. Then write picture on the board and have another volunteer circle the part that is the same in both picture and pictographs. Explain that a pictograph uses very simple pictures of objects instead of the objects themselves. These simple pictures are called *symbols*, and they are very easy to draw. Discuss which symbols could represent the items in their graphs and have students translate their picture graphs into pictographs. Ask students to think about what symbols they could use to represent people, flowers, desserts, books, and other items in a pictograph. Explain that sometimes people use the same symbol in all rows of the graph and sometimes they use different symbols.

**Review the need for one-to-one correspondence and a common starting point in graphs.** Draw the graph (at left) on the board and explain that it shows how many times during the week students have various after-school classes. SAY: I think there are more art classes during the week than music classes or soccer classes. Is that correct? Why not? Then SAY: I think there are more soccer classes than music classes. Have students explain your mistake. Discuss with students why you might be making mistakes. (The paint brushes are longer than the other symbols. The soccer balls aren’t...
lined up with the other symbols.) How could we redraw the pictograph to make it easier to read? (Make the symbols the same size. Use different symbols that are all the same size. Use the same symbol in every row, e.g., stick people.) Invite a volunteer to redraw the pictograph as suggested.

What activity has the largest number of classes in a week?

**Translate a concrete graph into a pictograph and analyze it.** Have students sort themselves according to the colour of their shirts. Provide a title for the graph and labels for the columns and have students order themselves in rows. Pick two adjacent colours, say red and white, and **ASK:** Can we see easily on this graph if we have more red shirts or more white shirts today? How can we see that? (The red column is longer.) Ask the students in the red column to pair up with the students in the white column by holding hands. How many people are not holding anyone’s hand? Which column are they in? What does this mean? (More people are wearing — than —.) How many more people are wearing — than —? Draw a grid template for a pictograph on the board and have students draw smiley faces for themselves in the appropriate rows. Ask students to check whether the graph was drawn correctly. Let students count both the people and the symbols for each colour. **ASK:** Do we have the same number of people and symbols? Can we see easily on this graph if we have more blue shirts or more white shirts today? How can we see that? Repeat with other colours. Emphasize the significance of lining up the symbols correctly.

**How many more?** Choose two adjacent rows in your pictograph, say red and blue, and **ASK:** How many people are wearing a red shirt today? A blue shirt? How many more people are wearing a blue shirt than a red shirt? How could you find out? (Use subtraction) How do you see on the graph that there are more people in blue shirts than people in red shirts? (The blue row is longer.) How did you check that on your concrete graph? (by holding hands) How could you check it with smiley faces? (It is the number of symbols that “stick out” in the longer row. These people are left out.)

**Creating pictographs given numerical data.** Give students pictograph templates on grid paper or make copies of **BLM Graph Templates** (add labels to the rows for students), and invite them to create pictographs for numerical data collected from the class. Start with two pieces of data, such as the number of people who like to play soccer and the number who don’t. Survey the class, record the numbers on the board, then brainstorm possible symbols for the pictograph. Next, create pictographs for three or more pieces of data. Sample categories: eye colour, favourite books, favourite colours, favourite snacks, and so on. Ask questions that require students to “read” their pictographs. (**EXAMPLES:** How many more/fewer people like apple juice than grape juice? What two books are preferred by the same number of people?) Students can also use stamps, stickers, or clip art to create pictographs. Discuss possible symbols for “Other” categories (? , box, whatever). (**SAMPLE DATA:** Favourite fruits in Mrs. Raven’s class: Apple 5; Banana 4; Orange 7; Watermelon 5; Other 3.)
Goals
Students will create and analyze charts.

PRIOR KNOWLEDGE REQUIRED
Can sort according to one attribute
Can skip count by 2s, 5s, and 10s
Can tell how many more or how many less

MATERIALS
empty cans or other small containers
popsicle sticks or marbles
BLM Graph Templates (pp L-22–L-23)

Checkmarks are easier and faster to draw than other symbols. ASK:
What do you think takes more time to draw—a stick person or a smiley face? A stick person or a checkmark? A smiley face or a checkmark? How could we find out? Have students brainstorm possible solutions. (One way to check could be to use a sand timer. Students could work in groups of four: one student times the other three, each of whom draws a different symbol. Another, possibly quicker, solution: three students each draw 10 marks—one draws smiley faces, one stick people, and one checkmarks—and the fourth records who finishes first, second, and third.) Discuss the results. If John drew 15 stick people and Jade drew 20 smiley faces during the same time, what takes less time—to draw a stick person or a smiley face?

Introduce charts. Explain that you want to create a graph showing how students get to school, but you do not want to spend too much time drawing stick people or smiley faces. Could you use checkmarks instead? Ask students to suggest various ways of getting to school, write their suggestions on the board, and place cups beneath each label. Be sure to include a label that will not be used, such as “by helicopter.” Give each student a popsicle stick and ask them to put the sticks in the appropriate cups. Invite volunteers to create the corresponding graph (provide the template on the board) using checkmarks as symbols. (Each volunteer counts the popsicle sticks from a single cup, then draws the appropriate number of checkmarks in the appropriate column or row. Volunteers work simultaneously to save time.) Explain that this type of graph is called a chart. Ask students to tell what they can see from this chart. As a prompt, write the following words and phrases on the board and suggest that students use some of these in their answers: how many, more, fewer, how many more, how many fewer.

There should be no “breaks” in the data. Draw the following chart on the board and explain that it shows the number of students in a class that were born in Canada and outside Canada.
Use clothespins to conduct a more detailed survey of students' birthplaces.

<table>
<thead>
<tr>
<th>Students Birthplaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born in Canada</td>
</tr>
<tr>
<td>Born outside of Canada</td>
</tr>
</tbody>
</table>

SAY: I think more students were born in Canada than outside Canada because the Xs start at the same place, but the ones in the top row extend further than the ones in the bottom row. Is that correct? Have students explain your mistake and redraw the chart correctly. Remind students that the rows must line up at one end.

Creating charts from numerical data and clues. Conduct a quick survey about students’ favourite sports using popsicle sticks or marbles in cans. Give students templates for creating graphs (you can use BLM Graph Templates) and have them label the rows. Then present the numerical data in the form of clues and short statements written on the board. EXAMPLE: Soccer was chosen by 7 students. Six students prefer hockey. Three students picked swimming. Nobody chose golf. Two more students chose baseball than swimming.

Create the corresponding chart together. ASK: Does the last clue mean that two students chose baseball? Are there more students that prefer baseball or swimming? How many prefer swimming? The clue says “more than,” so do we have to draw more Xs or fewer Xs? How many more? How many students picked baseball as their favourite sport? How can you see that from your chart? Add a clue such as “Three fewer students prefer figure skating than soccer.” Then ask students to determine from their charts whether there are more students that prefer baseball or hockey.

Most popular and least popular. Ask students to identify the most and least popular sports in the class. Explain the meaning of “most popular” (liked by the most people). SAY: Imagine I have to decide which after-school programs we need at school. I can choose only one sport. Which one should I pick? Does it make sense to start a — (insert one of the least popular sports in your class)? Why does it make more sense to start a —? Which do you think will attract more people? Why?

Most common and least common. Conduct another quick survey for something that is not based on choice, such as students’ eye colour or place of birth. Display the results in a chart (you could use volunteers to create it, as before). Explain that we cannot look for “the most popular eye colour” in this chart. The word popular only applies to something you choose. Can we say that “4 students picked green?” (no) What could we say instead? (Four students have green eyes.) What word should we use instead of “popular” to describe the eye colour that most people have? Introduce the term common (happens a lot or to many people). What is the most common eye colour? What is the least common eye colour?
Goals

Students will recognize the need for an efficient way of counting large numbers of objects and will use tallies to count.

PRIOR KNOWLEDGE REQUIRED

- Can count to 50
- Can skip count by 5s and 10s

MATERIALS

- large numbers of various classroom materials or common objects to count (see below)
- rubber bands
- cups or other containers
- pipe cleaners
- marbles

Review skip counting by 2s, 5s, and 10s. What pattern is in the ones digit of the numbers you say when counting by 5s? (5, 0, then repeat)

The need for keeping track when counting. Give each student about 50 of one type of object to count. You could use Lego blocks, paper clips, connecting cubes, pencils, Popsicle sticks, blocks, coins, or pipe cleaners. Ask students to record the number of objects they’ve got and then to swap their objects with a partner, to check if they get the same answer.

Encourage students to think of ways to keep track of their counting and to use skip counting. Provide students with rubber bands and empty cups. Discuss as a class the strategies students used to keep track of the counting. (Blocks and coins can be stacked into piles of 5 or 10, or counted out into containers; popsicle sticks and pencils can be joined into small groups of 5 or 10 and kept together with rubber bands; connecting cubes, Lego, and paper clips can be linked together.) Lay 12 pipe cleaners on a desk in a row (like sticks). Show students how you can bundle four pipe cleaners from each group with the fifth one. Give each student a large number of pipe cleaners and have them count their pipe cleaners by binding every fifth one around the previous four as they go. **ASK:** Is there a way to do the same thing with marks on the board? We can draw the fifth mark differently so that it will “bundle” the first four. Explain that people often try to keep track of their counting by drawing tallies. In tallies, people just draw one vertical line for each of the first four items, and then a line across them to represent the fifth item.

Drawing tallies for small numbers. Write the numbers 1 to 5 in a row, then draw the tally for 1 below the number 1. Invite volunteers to draw the tallies for 2, 3, and 4. Show students how to draw the tally for 5 (**III**). Write

Using tallies to count is similar to grouping paper clips: join four paper clips together with the fifth one.
the numbers from 6 to 10 in another row and show the tally for 6. Invite volunteers to draw the tallies for numbers 7 to 10. Repeat for 11 through 15.

**Drawing tallies for multiples of 5.** Ask a volunteer to count by 5s to 15. Ask another volunteer to circle the numbers the first volunteer says and the corresponding tallies. How are they all the same? (All the tallies are “grouped,” there are no “loose” tally marks; all the tallies are at the end of a line.) **ASK:** For which numbers do you draw the line across for the vertical lines? (The numbers you say when counting by 5s.) Ask students to draw tallies for 20, 25, and 30 and have volunteers draw them on the board together with the corresponding numbers, for future reference.

**Drawing tallies for numbers that are not multiples of 5.** Explain that to start drawing a tally for any number that you do not say when counting by 5s, you have to skip count by 5s and write a tally for five (also called a five-mark) for each number that you say. Stop just before the number you need. Let students practise skip counting and stopping just before different numbers. **(EXAMPLE:** for 42, skip count to 40) When they are comfortable doing this, ask them to both skip count by 5s and draw the five-marks. Explain that to finish drawing a tally for a number that is not said when you skip count by 5s, you add vertical lines until you reach the number itself. **(EXAMPLE:** for 42, add 2 vertical lines next to all the five-marks) Let students practise drawing tallies for various one- and two-digit numbers. Include both multiples of 5 and other numbers.

**Converting tallies to numbers.** Draw the tally for 12 on the board. Ask students to skip count by 5s (count the five-marks) then count the rest of the tally marks (i.e., 5, 10, 11, 12). Invite volunteers to draw more tallies and have other students convert these to numbers.

**ACTIVITY**

Player 1 writes a simple addition or subtraction problem using tallies and Player 2 writes the answer using tallies. **(EXAMPLE:** Player 1 writes III + IIII = ___ and Player 2 writes IIII II) Players then exchange roles.

**Using tallies in surveys.** Discuss with students techniques they can use to keep track of the answers in surveys. (Put popsicle sticks or marbles into different containers; attach clothes pins to different strings.) Conduct a short survey and show students how they can now mark the responses with tallies. Explain that this creates a tally chart. Use the tally chart to create a graph of your choice.

**Extensions**

1. What does the tally mark for 0 look like? (nothing)

2. Which of these tallies is correct? What’s wrong with the other two?
Goals
Students will ask questions about data that is presented in various ways.

Prior Knowledge Required
Understands the difference between a question and a statement
Can read and create concrete graphs, picture graphs, pictographs, charts, and tally charts
Can tell how many more or how many fewer

Materials
none

Review the difference between a question and a statement. Write the following sentences on the board: I like bananas. Do you like bananas?

Ask: Which sentence is a question (a sentence asking us something)? Which sentence is a statement (a sentence telling us something)? How can you tell? (The question ends with a question mark.) Have volunteers give examples of questions and statements.

Analysing graphs and asking questions. Show your students the picture graph at left. Tell students that they are going to practise asking questions about graphs. Ask: What can I tell from this graph? Students might say, for example, that three people ate muffins. Ask: What question can I ask to get this answer? (How many people ate muffins for breakfast?) Write the key phrase in this sentence—how many—on the board. Invite more questions and different kinds of questions. If students are asking only “how many” questions, challenge them to think of a question that does not use these words. Prompt them to make comparisons (how many more, how many less, the same number of — and —) and evaluations (the most common). Record the key phrases for different questions on the board.

Afterwards, ask students to work in pairs, asking and answering questions about the graph using the words and phrases listed on the board. Repeat with the graphs below:

<table>
<thead>
<tr>
<th>Favourite Season</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer</th>
<th>Fall</th>
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The most common vs. the most popular. Look back at the first graph, Our Breakfast Today. **ASK:** What was the most common breakfast today for the people who were surveyed? (cereal) Review the meaning of the phrase “the most common” (the one that happens most often). Using the same labels, survey your own students about what they had for breakfast today and create a new graph. **ASK:** What was the most common breakfast today in our class? What was the least common breakfast? Then, again using the same labels, survey your students about their favourite breakfast. Title this graph Our Favourite Breakfast and compare it to Our Breakfast Today. **ASK:** How are the graphs the same? How are they different? What is the most popular breakfast in our class? Is the most popular breakfast the same as the most common breakfast? Remind students that we describe events as most or least common when there is no choice involved. In this case, students probably don’t eat their favourite breakfast every day. **ASK:** What other things do we have no choice about? (EXAMPLES: hair colour, eye colour, height, types flowers that grow were we live, weather where we live) To check and reinforce students’ understanding of these concepts, ask them to complete the following sentences with either “most popular” or “most common”:

- The [insert popular local sports team] is the ________ sports team in our town/city.
- The ________ leaves in our garden are maple leaves.
- I have to buy ice cream for a class party. I buy the ________ flavour.
- Most kids in the class have black hair. Black is the ________ hair colour in the class.
Goals
Students will conduct a survey then display and analyze the results.

Prior Knowledge Required
- Can create a pictograph, a chart, and a tally chart given data
- Can transfer data from a tally chart to a pictograph
- Can analyze data presented in a chart
- Can distinguish between a question and a sentence

Materials
- Materials to conduct a survey (cans and popsicle sticks or marbles; clothespins and string)
- BLM My Survey (p L-26)

Good survey questions. Tell students that you want to conduct a survey about how many siblings (brothers or sisters) they have. Explain that to be successful at conducting surveys and collecting data, they must learn how to ask a good question. The question and the answers should be clear and simple and should take into account all possible situations. Read and discuss the following potential survey questions and answers with the class. What’s wrong with them?

- Do you have a brother? Yes, No (ASK: What if somebody has a sister? The question is limiting.)
- Do you have a brother or a sister? Brother, Sister (ASK: What if I have none? What if I have both?)
- Do you have brothers and sisters? Yes, No (The answers don’t tell us how many brothers or sisters people have. A person with one brother and a person with four brothers and a sister would choose the same answer: Yes.)
- How many brothers and sisters do you have? 1, 2, 3, 4,…,12 (ASK: What if I have none? How many possible answers do we want? Will it be hard to create a chart with 12 columns? Do we want to limit the number of answers?)

Finally, write the following question and answers: How many siblings do you have? 0, 1, 2, 3, 4, 5, more than 5. ASK: Is the question clear? (yes) Do we have all possible situations in the answers? (yes) Do we have too many answers? (no)

Conducting a survey. Use the question above to model the steps in conducting a survey.
- Choose and write a clear question.
• Conduct the survey. Prepare cards with the answers (one answer per card). Discuss the various ways students can track answers. (Place marbles or popsicle sticks in cans or attach clothespins to strings under the proper labels.) Remind students that they can give only one answer (i.e., place one marble in a can, add one clothespin to the string).
• Make a tally chart to count all the answers. Invite volunteers to do this at the board.
• Transfer the tallies to a pictograph and then to a chart. Invite volunteers to do this at the board. Make sure they add titles and labels to both graphs.
• Discuss and ask questions about the results.

ACTIVITY

Students will conduct a survey and graph the results. You will provide the survey questions and answers. You will also group students so that they do not have to survey the whole class individually. Students can use BLM My Survey to record data.

Prepare ahead of time a set of cards, one for each student. On each card, write a survey question, all possible answers to the question, and a number (1, 2, or 3). Each question should appear at least 3 times. Adjust the number of questions, and the numbers on the cards, according to the number of students in your class. EXAMPLE: If you have 22 students, you will need seven questions, one of which will appear on four cards (you can number the fourth card 1, 2, or 3). Give each student a card and ask them to find the other students with the same question. In their groups, students will discuss how to conduct their survey and prepare the necessary manipulatives (e.g., add labels to cans). When students are ready, ask them to re-group themselves according to the numbers on their cards. Students will now be arranged in three large groups and should survey the other members of their group. When they are finished, students return to their home groups and pool their survey data. They should count and tally all of their combined data and create a graph or chart to present it. Note that students do not need to tally or count their individual data. Have students discuss what they found out and then present their results to the class. Possible survey questions and answers: What is your favourite ice cream flavour? Vanilla, chocolate, strawberry, other, none. Does your jacket have a hood? Yes, no, I do not have a jacket. What is your favourite meal? Breakfast, lunch, dinner. How many people are there in your family? 2, 3, 4, 5, 6, more than 6. What is your favourite season? Winter, spring, summer, fall. What type of home do you live in? Apartment building, townhouse, duplex, house, other. How many teeth have you lost? 0, 1, 2, 3, 4, 5, 6, more than 6, I do not know. What is your favourite summer activity? Swimming, soccer, reading, berry picking, other, none.
Review “always” and “never.” Put the words “always” and “never” on the board. Ask students what they think each of these words means. Ask students to give examples of things that always happen and things that never happen or cannot happen. As a prompt, you might suggest that students think of people and animals. SAY: In my house, I always take out the garbage but I never mow the lawn. What is something that you always do? What is something that you never do? What can a dog never do? (fly, talk, purr like a cat) What do cats always do? (purr, groom themselves, walk on four legs)

Introduce “certain” and “impossible.” Explain that taking out the garbage is something a person can do, even if they never do. ASK: Can a person breathe underwater (without an oxygen tank or other equipment)? Explain that this never happens because it cannot happen. Things that never happen because they cannot happen are called impossible. Similarly, things that always happen because they have to happen, such as things falling down to the ground when we let go of them, are called certain. Add the word cards for “certain” and “impossible” to the board.

Introduce the term “event.” Actions and activities that we can wonder about are called events. For example, “purple” or “this pencil” aren’t events but “I will sharpen my pencil” is. An earthquake hitting Toronto is an event, because we can wonder whether it will happen. Which of the following are events and which are not? (Ask students to show thumbs up if they think it is an event and thumbs down if they think it isn’t.)

- Five
- I will wear a hat tomorrow
- Five red teddy bears
- An alien will visit our school
Sort events into two groups. Put each of the following (or similar) statements on sentence strips:
- Scientists will discover that the moon is made of cheese.
- The sun will rise tomorrow.
- This eraser will stay in the air if I let it go.
- If I mix red and yellow paint, I’ll get orange.

Read the statements aloud to students and ask them to think about whether the events are certain or impossible. Students can show thumbs up if the event is certain and thumbs down if it is impossible. Then ask students to sort the sentences into two sorting circles labelled “certain” and “impossible.” Read the following statements (modify them as required for your class, the time of year, and so on) and repeat.
- There will be boys and girls in the class tomorrow.
- I will see an alien in the lunch room.
- We will work on math today.
- I will go outside barefoot in the snow.

Then give each student a sentence strip from BLM Events (some students might require help reading their strips) and have them sort themselves into large sorting circles on the floor, again labelled “certain” and “impossible.” Have students justify their choices.

Now encourage students to come up with their own certain and impossible events. Record the events and have the class determine what category the event fits into best. There will likely be some discussion about events that are neither impossible nor certain, that is, events that are possible. Such events can be placed outside both circles.

Extension
Show students three blue connecting cubes and one red connecting cube. Place the cubes in an opaque bag or container. Ask students if the following events are possible or impossible:
- I will pull out a yellow cube.
- I will pull out a red cube.
- I will pull out a blue cube.

CONNECTION

Literature—Dear Mr. Blueberry by Simon James.
A girl thinks she sees a whale in her pond but her teacher insists this isn’t possible… Is it?
Likely or Unlikely?

Goals

Students will distinguish between likely and unlikely events connected to everyday life.

Prior Knowledge Required

Understands the concepts often, always, never, certain, impossible

Review “certain” and “impossible.” Draw two sorting circles, label them “certain” and “impossible” and have students sort several events into the circles. **Examples:**
- There will be sunset on Sunday
- We will have straw for lunch.

Add an event that cannot be placed in one of the circles. (**Example:** I will come to school next Tuesday.) **Ask:** Does this event always happen? Is it an impossible event? Is it an event that happens sometimes? What could happen to make you not come to school on Tuesday? (you could get sick; you could have an appointment) Where should we place this event? (outside both circles)

Introduce “likely” and “unlikely.” Ask your students where the event “I will go outside on Sunday” should be placed. **Ask:** Does this event happen sometimes? Does it happen always? This event might or might not happen—it is possible but not certain—so it should be placed outside both circles. **Ask:** Do you often go outside on Sunday? (yes) Explain that in mathematics, events that happen often but not always are called **likely.** Ask students to identify more likely events.

Repeat with an event such as “I will have a party on Tuesday.” **Ask:** Do you often have parties on a Tuesday? (no) Can you have a party on a Tuesday? (yes) Explain that events that can happen but not very often are called **unlikely.** Ask students to think of more unlikely events.

Remove the events and labels from the sorting circles, re-label them “likely” and “unlikely,” and have students sort the following events (students might show thumbs up for likely and thumbs down for unlikely):
- It will snow tomorrow.
- I will have a healthy breakfast tomorrow.
- I will have ice cream for lunch.
- A pencil will be longer than a paper clip.
- A teacher will be taller than a student.
- I will find a mouse in the classroom.

Ask students to add more likely and unlikely events to the sorting circles.
More ways to illustrate the concepts of likely and unlikely. Show students a spinner that is three quarters red and one quarter white. Spin the spinner and record the results as many times as necessary to get at least two white but far more red. **ASK:** Do I always get red? Do I always get white? Do I ever get yellow? Which colour do I get often? Which colour do I get not so often? Which colour am I likely to spin? Which colour am I unlikely to spin? Which colour can I never spin? How can I describe the event “I spin yellow”? (impossible)

Repeat with connecting cubes or counters in an opaque bag (5 of one colour, 1 of another colour).

**Sort events into certain, likely, unlikely, and impossible using sorting circles.** Events to sort:

- We will go to Australia this summer.
- We will meet a blue lion on the way to school.
- My hair will grow.
- Snow will feel warm.
- We will have a test in math.
- It will rain today.
- Our next school trip will be to the zoo.
- I will eat breakfast tomorrow.
- Birds will sing in the morning.
- There will be school in August.

Have students add more events to the circles. **ASK:** How did you think of impossible and certain events in the last lesson? (by thinking of people and animals and how they behave) Could that strategy help here? You might also prompt students to think of a particular season or event: What do you always do in summer? What do you often do in summer? What do you never do? Distinguish between “always happens” and “has to happen.” Explain that although we might say “I always wear shorts in summer,” the event “I will wear shorts this summer” is not certain. **SAY:** Suppose somebody offers you a million dollars not to wear shorts this summer. Will you wear shorts?

**Introduce “very likely” and “very unlikely.”** Remind your students about the difference between events that cannot happen, like the sun setting in the east, and events that can happen but don’t happen often. Explain that events that can happen but that almost never do are called “very unlikely.” For example, it is unlikely that school will be cancelled two days in a row but it is very unlikely that school will be cancelled for a whole month. Similarly, events can be likely or very likely. For example, it isn’t certain that your parents will say good night to you tonight (for example, they might go out unexpectedly and forget) but it almost always happens so it is very likely.

**ACTIVITY**

Divide students into 6 groups. Give each group an expression of probability (certain, very likely, likely, unlikely, very unlikely, impossible) and have them create a poster with pictures and sentences describing events with that likelihood.
Describing Events

Review likelihood. Draw a line on the board and write the words “cannot happen” and “has to happen” at either end. Ask volunteers to place the index cards with the words “certain” and “impossible” on this line. Then ask volunteers to place the words “very unlikely,” “very likely,” “unlikely,” and “likely” along the continuum. Prompt students by asking them if likely is closer to certain or to impossible. Explain that when an event happens more often than another event, we say the first event is more likely. For example, it is more likely to have regular lessons on a school day (very likely) than to have a class party (unlikely). ASK: What do you do more often outdoors on cold winter afternoons: skate or play soccer? What is more likely for you on a winter afternoon: to go skating or to play soccer outside? Give students more such examples. Then look at pairs of events where one event is possible and the other impossible (to meet a teacher on the street or to meet a dinosaur) and pairs where one event is certain and the other is likely (the sun will rise tomorrow and you will go to school).

Ask students to order these events from less likely to more likely:
I will eat a mouse for lunch. I will eat chicken for lunch. I will have cake with lots of icing for lunch.

Order these events: I will see an alien in the lunch room, I will see my friends in the lunch room, I will see my mother in the lunch room, I will eat lunch in the lunch room.

**Bonus** Order these events: I will see an alien in the lunch room, I will see my friends in the lunch room, I will see my mother in the lunch room, I will eat lunch in the lunch room.

**ACTIVITY**

**Play Spinner (see ME1-2).** Students will need a cardboard coin or a two-part spinner with sides marked “more likely” and “less likely.” Give students 6 events with different probabilities on strips of paper.

**EXAMPLES** (for reference only, do not include it on the strips):
- I will eat my shoes with ketchup. (impossible)
- I will wear shorts in summer. (very likely)
- I will eat chicken with vegetables today. (likely)
- It will snow in summer. (very unlikely)
Miki has 10 cubes, one white and nine red, in his bag. He draws cubes without looking and places the cubes back into the bag. **ASK:** Is he likely to draw a white cube? A red cube? (He is very unlikely to draw a white cube. He is very likely to draw a red cube.) Yoko has 10 cubes, seven white and three red, in her bag. She plays the same game as Miki. Who is more likely to draw a white cube: Yoko or Miki? Why? (**PROMPTS:** How many white cubes does Miki have? How many white cubes does Yoko have? Which number is larger: the number of Miki’s white cubes or the number of Yoko’s white cubes?) What about red cubes? (Yoko is more likely to draw a white cube; Miki is more likely to draw a red cube. They both have the same number of cubes, but Miki has more red cubes than Yoko and Yoko has more white cubes than Miki.)

**Challenge:** Is it more likely that Miki will draw a red cube or that Yoko will draw a white cube? Ask students to draw coloured squares to represent Miki and Yoko’s cubes.

**SAY:** Yoko wants to draw a white cube, Miki wants to draw a red cube. Let’s pair all the cubes that are good for Miki (the red cubes) with the cubes that are good for Yoko (the white cubes). Have students circle the squares in pairs, as shown. **SAY:** These cubes are good for both, they don’t count. What is left? Look at Yoko’s cubes. Are they good for Yoko? (No; Yoko wants to pick white but all her leftover cubes are red.) Look at Miki’s cubes? Are there some cubes that are good for Miki? (yes) **Why?** (Because Miki has two more red cubes that he might draw from the bag.) Who has a better chance of drawing a cube of their favourite colour? (Miki)

**Extension**

Miki has 10 cubes, one white and nine red, in his bag. He draws cubes without looking and places the cubes back into the bag. **ASK:** Is he likely to draw a white cube? A red cube? (He is very unlikely to draw a white cube. He is very likely to draw a red cube.) Yoko has 10 cubes, seven white and three red, in her bag. She plays the same game as Miki. Who is more likely to draw a white cube: Yoko or Miki? Why? (**PROMPTS:** How many white cubes does Miki have? How many white cubes does Yoko have? Which number is larger: the number of Miki’s white cubes or the number of Yoko’s white cubes?) What about red cubes? (Yoko is more likely to draw a white cube; Miki is more likely to draw a red cube. They both have the same number of cubes, but Miki has more red cubes than Yoko and Yoko has more white cubes than Miki.)

**Challenge:** Is it more likely that Miki will draw a red cube or that Yoko will draw a white cube? Ask students to draw coloured squares to represent Miki and Yoko’s cubes.

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# Weather Calendar

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- rainy
- sunny
- cloudy (no rain)
- snow
- hail
- windy
3-Column Chart

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Graph Templates (1)

Title: ____________________________


Title: ____________________________


Title: ____________________________


Title: ____________________________


Graph Templates (2)

Title: ____________________

Title: ____________________
Events (1)

Coins will grow on trees.

Apple trees will blossom next spring.

Maple leaves will change colour in the fall.

Leaves will fall.

I will skate outside in summer.

I will breathe today.

I will walk through walls.

Cherry trees will flower in January.

An alien will teach our next lesson.

I will see a live whale shark at school.

I will go to the washroom today.
Events (2)

- Rain will fall upwards.
- A cow will jump over the moon.
- New Year will start on January 1st.
- I will meet a lion on my way home today.
- Friday will come after Thursday.
- I will grow taller.
- Grizzly bears will hibernate this winter.
- The moon will turn purple.
- A rabbit will eat a whole whale.
- A whale will eat a ship.
- We will have a class trip next year.
My Survey

Question: ____________________________________________

☐ Write the answers in the shaded column.
☐ Tally your results.

☐ Make a graph to show your data.
Attribute Blocks (1)
Attribute Blocks (2)
Attribute Blocks (3)
Attribute Blocks (4)
Attribute Blocks (5)
Sorting Circle
Sorting into Two Groups
Pattern Blocks
Blank Domino Cards

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Game Cards

I have

Who has

I have

Who has

I have

Who has

I have

Who has
Numbers Template
Hundreds Chart — One Row

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10
A Larger Hundreds Chart

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<tr>
<td>81</td>
<td>82</td>
<td>83</td>
<td>84</td>
<td>85</td>
<td>86</td>
<td>87</td>
<td>88</td>
<td>89</td>
<td>90</td>
</tr>
<tr>
<td>91</td>
<td>92</td>
<td>93</td>
<td>94</td>
<td>95</td>
<td>96</td>
<td>97</td>
<td>98</td>
<td>99</td>
<td>100</td>
</tr>
</tbody>
</table>
Hundreds Chart

1  2  3  4  5  6  7  8  9  10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50
51 52 53 54 55 56 57 58 59 60
61 62 63 64 65 66 67 68 69 70
71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90
91 92 93 94 95 96 97 98 99 100
Hundreds Chart — Five Rows

1  2  3  4  5  6  7  8  9  10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50

1  2  3  4  5  6  7  8  9  10
11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
31 32 33 34 35 36 37 38 39 40
41 42 43 44 45 46 47 48 49 50
Base Ten Materials
Hundreds Chart — Three Rows

1  2  3  4  5  6  7  8  9  10  
11 12 13 14 15 16 17 18 19 20  
21 22 23 24 25 26 27 28 29 30  

1  2  3  4  5  6  7  8  9  10  
11 12 13 14 15 16 17 18 19 20  
21 22 23 24 25 26 27 28 29 30  

1  2  3  4  5  6  7  8  9  10  
11 12 13 14 15 16 17 18 19 20  
21 22 23 24 25 26 27 28 29 30  

Blackline Master — Generic — Teacher’s Guide for Workbook 1.2
Blank Number Lines (1)

0  1  2  3  4  5  6  7  8  9  10

0  1  2  3  4  5  6  7  8  9  10

0  1  2  3  4  5  6  7  8  9  10

0  1  2  3  4  5  6  7  8  9  10
Blank Number Lines (2)
2-cm Grid Paper
Ten-Frames
Cubes
Ontario Curriculum Correlation: Grade 1

Contents

Number Sense and Numeration 3
Measurement 5
Geometry and Spatial Sense 7
Patterning and Algebra 9
Data Management and Probability 10
Notes

To ensure that the curriculum is fully covered, use the worksheets with the lessons plans in the Teacher’s Guide.

OCUP: Ontario Curriculum Unit Planner

JUMP Math workbook units are represented by:

- NS  Number Sense
- PA  Patterns and Algebra
- ME  Measurement
- G   Geometry
- PDM Probability and Data Management
Number Sense and Numeration

Overall Expectations
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>OCUP Code</th>
<th>Overall Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m8</td>
<td>read, represent, compare, and order whole numbers to 50, and use concrete materials to investigate fractions and money amounts;</td>
</tr>
<tr>
<td>1m9</td>
<td>demonstrate an understanding of magnitude by counting forward to 100 and backwards from 20;</td>
</tr>
<tr>
<td>1m10</td>
<td>solve problems involving the addition and subtraction of single-digit whole numbers, using a variety of strategies.</td>
</tr>
</tbody>
</table>

Quantity Relationships
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code</td>
<td>Specific Expectation</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1m11</td>
<td>represent, compare, and order whole numbers to 50, using a variety of tools and contexts;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1m12</td>
<td>read and print in words whole numbers to ten, using meaningful contexts;</td>
</tr>
<tr>
<td>1m13</td>
<td>demonstrate, using concrete materials, the concept of conservation of number;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1m14</td>
<td>relate numbers to the anchors of 5 and 10;</td>
</tr>
<tr>
<td>1m15</td>
<td>identify and describe various coins using coin manipulatives or drawings, and state their value;</td>
</tr>
<tr>
<td>1m16</td>
<td>represent money amounts to 20¢, through investigation using coin manipulatives;</td>
</tr>
<tr>
<td>1m17</td>
<td>estimate the number of objects in a set, and check by counting;</td>
</tr>
<tr>
<td>1m18</td>
<td>compose and decompose numbers up to 20 in a variety of ways, using concrete materials;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1m19</td>
<td>divide whole objects into parts and identify and describe, through investigation, equal-sized parts of the whole, using fractional names.</td>
</tr>
</tbody>
</table>
### Counting
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part</td>
</tr>
<tr>
<td>1m20 demonstrate, using concrete materials, the concept of one-to-one correspondence between number and objects when counting;</td>
<td>1</td>
</tr>
<tr>
<td>1m21 count forward by 1’s, 2’s, 5’s, and 10’s to 100, using a variety of tools and strategies;</td>
<td>1</td>
</tr>
<tr>
<td>1m22 count backwards by 1’s from 20 and any number less than 20, with and without the use of concrete materials and number lines;</td>
<td>2</td>
</tr>
<tr>
<td>1m23 count backwards from 20 by 2’s and 5’s, using a variety of tools;</td>
<td>2</td>
</tr>
<tr>
<td>1m24 use ordinal numbers to thirty-first in meaningful contexts.</td>
<td>1</td>
</tr>
<tr>
<td>1m25 solve a variety of problems involving the addition and subtraction of whole numbers to 20, using concrete materials and drawings;</td>
<td>2</td>
</tr>
<tr>
<td>1m26 solve problems involving the addition and subtraction of single-digit whole numbers, using a variety of mental strategies;</td>
<td>1</td>
</tr>
<tr>
<td>1m27 add and subtract money amounts to 10¢, using coin manipulatives and drawings.</td>
<td>2</td>
</tr>
</tbody>
</table>

### Operational Sense
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part</td>
</tr>
<tr>
<td>1m25 solve a variety of problems involving the addition and subtraction of whole numbers to 20, using concrete materials and drawings;</td>
<td>1</td>
</tr>
<tr>
<td>1m26 solve problems involving the addition and subtraction of single-digit whole numbers, using a variety of mental strategies;</td>
<td>1</td>
</tr>
<tr>
<td>1m27 add and subtract money amounts to 10¢, using coin manipulatives and drawings.</td>
<td>2</td>
</tr>
</tbody>
</table>
Measurement

Overall Expectations
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>OCUP Code</th>
<th>Overall Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m28</td>
<td>estimate, measure, and describe length, area, mass, capacity, time, and temperature, using non-standard units of the same size</td>
</tr>
<tr>
<td>1m29</td>
<td>compare, describe, and order objects, using attributes measured in non-standard units.</td>
</tr>
</tbody>
</table>

Attributes, Units and Measurement Sense
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part Unit Lesson</td>
</tr>
<tr>
<td>1m30 demonstrate an understanding of the use of non-standard units of the same size for measuring;</td>
<td>1 ME 9–11</td>
</tr>
<tr>
<td></td>
<td>2 ME 23</td>
</tr>
<tr>
<td>1m31 estimate, measure (i.e., by placing non-standard units repeatedly, without overlaps or gaps) and record lengths, heights, and distances;</td>
<td>1 ME 5, 8, 9, 11</td>
</tr>
<tr>
<td></td>
<td>2 ME 23</td>
</tr>
<tr>
<td>1m32 construct, using a variety of strategies, tools for measuring lengths, heights, and distances in non-standard units;</td>
<td>1 ME 9, 11–13</td>
</tr>
<tr>
<td></td>
<td>2 ME 22, 23</td>
</tr>
<tr>
<td>1m33 estimate, measure (i.e., by minimizing overlaps and gaps) and describe area, through investigation using non-standard units;</td>
<td>2 ME 33–38</td>
</tr>
<tr>
<td>1m34 estimate, measure, and describe the capacity and/or mass of an object, through investigation using non-standard units;</td>
<td>1 ME 18, 19</td>
</tr>
<tr>
<td>1m35 estimate, measure, and describe the passage of time, through investigation using non-standard units;</td>
<td>2 ME 25–28</td>
</tr>
<tr>
<td>1m36 read demonstration digital and analogue clocks, and use them to identify benchmark times and to tell and write time to the hour and half-hour in everyday settings;</td>
<td>2 ME 24, 29–31</td>
</tr>
<tr>
<td>1m37 name the months of the year in order, and read the date on a calendar;</td>
<td>2 ME 32</td>
</tr>
<tr>
<td>1m38 relate temperature to experiences of the seasons.</td>
<td>2 ME 32</td>
</tr>
</tbody>
</table>
### Measurement Relationships

By the end of Grade 1, students will:

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code</td>
<td>Specific Expectation</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------</td>
</tr>
<tr>
<td>1m39</td>
<td>compare two or three objects using measurable attributes and describe the objects using relative terms;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1m40</td>
<td>compare and order objects by their linear measurements, using the same non-standard unit;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1m41</td>
<td>use the metre as a benchmark for measuring length, and compare the metre with non-standard units;</td>
</tr>
<tr>
<td>1m42</td>
<td>describe, through investigation using concrete materials, the relationship between the size of a unit and the number of units needed to measure length.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Geometry and Spatial Sense

Overall Expectations
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>OCUP Code</th>
<th>Overall Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m43</td>
<td>identify common two-dimensional shapes and three-dimensional figures and sort and classify them by their attributes;</td>
</tr>
<tr>
<td>1m44</td>
<td>compose and decompose common two-dimensional shapes and three-dimensional figures;</td>
</tr>
<tr>
<td>1m45</td>
<td>describe the relative locations of objects using positional language.</td>
</tr>
</tbody>
</table>

Geometric Properties
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code</td>
<td>Specific Expectation</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1m46</td>
<td>identify and describe common two-dimensional shapes and sort and classify them by their attributes, using concrete materials and pictorial representations;</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>1m47</td>
<td>trace and identify the two-dimensional faces of three-dimensional figures, using concrete models;</td>
</tr>
<tr>
<td>1m48</td>
<td>identify and describe common three-dimensional figures and sort and classify them by their attributes, using concrete materials and pictorial representations;</td>
</tr>
<tr>
<td>1m49</td>
<td>describe similarities and differences between an everyday object and a three-dimensional figure;</td>
</tr>
<tr>
<td>1m50</td>
<td>locate shapes in the environment that have symmetry, and describe the symmetry.</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Geometric Relationships
By the end of Grade 1, students will:

<table>
<thead>
<tr>
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<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code</td>
<td>Specific Expectation</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
</tr>
<tr>
<td>1m51</td>
<td>compose patterns, pictures, and designs, using common two-dimensional shapes;</td>
</tr>
<tr>
<td>1m52</td>
<td>identify and describe shapes within other shapes;</td>
</tr>
<tr>
<td>1m53</td>
<td>build three-dimensional structures using concrete materials, and describe the two-dimensional shapes the structures contain;</td>
</tr>
</tbody>
</table>
Location and Movement

By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OCUP Code</strong></td>
<td><strong>Specific Expectation</strong></td>
</tr>
<tr>
<td>1m55</td>
<td>describe the relative locations of objects or people using positional language;</td>
</tr>
<tr>
<td>1m56</td>
<td>describe the relative locations of objects on concrete maps created in the classroom;</td>
</tr>
<tr>
<td>1m57</td>
<td>create symmetrical designs and pictures, using concrete materials, and describe the relative locations of the parts.</td>
</tr>
</tbody>
</table>
Patterning and Algebra

Overall Expectations
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>OCUP Code</th>
<th>Overall Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m58</td>
<td>identify, describe, extend, and create repeating patterns;</td>
</tr>
<tr>
<td>1m59</td>
<td>demonstrate an understanding of the concept of equality, using concrete materials</td>
</tr>
<tr>
<td></td>
<td>and addition and subtraction to 10.</td>
</tr>
</tbody>
</table>

Geometric Properties
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part</td>
</tr>
<tr>
<td>1m60 identify, describe, and extend, through investigation, geometric repeating patterns involving one attribute;</td>
<td>1</td>
</tr>
<tr>
<td>1m61 identify and extend, through investigation, numeric repeating patterns;</td>
<td>1</td>
</tr>
<tr>
<td>1m62 describe numeric repeating patterns in a hundreds chart;</td>
<td>1</td>
</tr>
<tr>
<td>1m63 identify a rule for a repeating pattern;</td>
<td>1</td>
</tr>
<tr>
<td>1m64 create a repeating pattern involving one attribute;</td>
<td>1</td>
</tr>
<tr>
<td>1m65 represent a given repeating pattern in a variety of ways.</td>
<td>1</td>
</tr>
</tbody>
</table>

Expressions and Equality
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
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</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part</td>
</tr>
<tr>
<td>1m66 create a set in which the number of objects is greater than, less than, or equal to the number of objects in a given set;</td>
<td>2</td>
</tr>
<tr>
<td>1m67 demonstrate examples of equality, through investigation, using a “balance” model;</td>
<td>2</td>
</tr>
<tr>
<td>1m68 determine, through investigation using a “balance” model and whole numbers to 10, the number of identical objects that must be added or subtracted to establish equality.</td>
<td>2</td>
</tr>
</tbody>
</table>
Data Management and Probability

Overall Expectations
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>OCUP Code</th>
<th>Overall Expectation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m69</td>
<td>collect and organize categorical primary data and display the data using concrete graphs and pictographs, without regard to the order of labels on the horizontal axis;</td>
</tr>
<tr>
<td>1m70</td>
<td>read and describe primary data presented in concrete graphs and pictographs;</td>
</tr>
<tr>
<td>1m71</td>
<td>describe the likelihood that everyday events will happen.</td>
</tr>
</tbody>
</table>

Collection and Organization of Data
By the end of Grade 1, students will:

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part</td>
</tr>
<tr>
<td>1m72 demonstrate an ability to organize objects into categories by sorting and classifying objects using one attribute, and by describing informal sorting experiences;</td>
<td>1</td>
</tr>
<tr>
<td>1m73 collect and organize primary data that is categorical (i.e., that can be organized into categories based on qualities such as colour or hobby), and display the data using one-to-one correspondence, prepared templates of concrete graphs and pictographs (with titles and labels), and a variety of recording methods.</td>
<td>2</td>
</tr>
</tbody>
</table>

Data Relationships
By the end of Grade 1, students will:

<table>
<thead>
<tr>
<th>ONTARIO CURRICULUM EXPECTATION</th>
<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>OCUP Code Specific Expectation</td>
<td>Part</td>
</tr>
<tr>
<td>1m74 read primary data presented in concrete graphs and pictographs, and describe the data using comparative language;</td>
<td>2</td>
</tr>
<tr>
<td>1m75 pose and answer questions about collected data.</td>
<td>2</td>
</tr>
</tbody>
</table>
## Probability

By the end of Grade 1, students will:

<table>
<thead>
<tr>
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<th>JUMP MATH WORKBOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OCUP Code</strong></td>
<td><strong>Specific Expectation</strong></td>
</tr>
<tr>
<td>1m76</td>
<td>describe the likelihood that everyday events will occur, using mathematical language (i.e., impossible, unlikely, less likely, more likely, certain).</td>
</tr>
</tbody>
</table>
WNCP Curriculum Correlation: Grade 1

JUMP Math

Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>Patterns and Relations</td>
<td>8</td>
</tr>
<tr>
<td>Shape and Space</td>
<td>10</td>
</tr>
</tbody>
</table>

jump math™
MULTIPLYING POTENTIAL.
Notes
To ensure that the curriculum is fully covered, use the worksheets with the lessons plans in the Teacher’s Guide.

WNCP Abbreviations:

[C] Communication
[CN] Connections
[ME] Mental Mathematics and Estimation
[PS] Problem Solving
[R] Reasoning
[T] Technology
[V] Visualization

JUMP Math workbook units are represented by:

NS Number Sense
PA Patterns and Algebra
ME Measurement
G Geometry
PDM Probability and Data Management
Number

General Outcome

- Develop number sense.

Develop Number Sense

It is expected that students will:

1. **WNCP CURRICULUM**
   
<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Say the number sequence, 0 to 100, by:</td>
<td></td>
</tr>
<tr>
<td>• 1s forward and backward between any two given numbers</td>
<td></td>
</tr>
<tr>
<td>• 2s to 20, forward starting at 0</td>
<td></td>
</tr>
<tr>
<td>• 5s and 10s to 100, forward starting at 0. [C, CN, V, ME]</td>
<td></td>
</tr>
<tr>
<td><strong>Achievement Indicators</strong></td>
<td></td>
</tr>
<tr>
<td>Recite forward by 1s the number sequence between two given numbers (0 to 100).</td>
<td></td>
</tr>
<tr>
<td>Recite backward by 1s the number sequence between two given numbers.</td>
<td></td>
</tr>
<tr>
<td>Record a given numeral (0 to 100) symbolically when it is presented orally.</td>
<td></td>
</tr>
<tr>
<td>Read a given numeral (0 to 100) when it is presented symbolically.</td>
<td></td>
</tr>
<tr>
<td>Skip count by 2s to 20 starting at 0.</td>
<td></td>
</tr>
<tr>
<td>Skip count by 5s to 100 starting at 0.</td>
<td></td>
</tr>
<tr>
<td>Skip count forward by 10s to 100 starting at 0.</td>
<td></td>
</tr>
<tr>
<td>Identify and correct errors and omissions in a given number sequence.</td>
<td></td>
</tr>
</tbody>
</table>

2. **WNCP CURRICULUM**
   
<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognize, at a glance, and name familiar arrangements of 1 to 10 objects or dots. [C, CN, ME, V]</td>
<td></td>
</tr>
<tr>
<td><strong>Achievement Indicators</strong></td>
<td></td>
</tr>
<tr>
<td>Look briefly at a given familiar arrangement of objects or dots and identify the number represented without counting.</td>
<td></td>
</tr>
<tr>
<td>Look briefly at a given familiar arrangement and identify how many objects there are without counting.</td>
<td></td>
</tr>
<tr>
<td>Identify the number represented by a given arrangement of objects or dots on a ten frame.</td>
<td></td>
</tr>
</tbody>
</table>
3. **WNCP CURRICULUM**

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Part</td>
</tr>
<tr>
<td>Demonstrate an understanding of counting by:</td>
<td>1</td>
</tr>
<tr>
<td>• indicating that the last number said identifies “how many”</td>
<td>2</td>
</tr>
<tr>
<td>• showing that any set has only one count</td>
<td></td>
</tr>
<tr>
<td>• using the counting on strategy</td>
<td></td>
</tr>
<tr>
<td>• using parts or equal groups to count sets. [C, CN, ME, R, V]</td>
<td></td>
</tr>
</tbody>
</table>

**Achievement Indicators**

- Answer the question, “How many are in the set?” using the last number counted in a given set.
- Identify and correct counting errors in a given counting sequence.
- Show that the count of the number of objects in a given set does not change regardless of the order in which the objects are counted.
- Count the number of objects in a given set, rearrange the objects, predict the new count and recount to verify the prediction.
- Determine the total number of objects in a given set, starting from a known quantity and counting on.
- Count quantity using groups of 2s, 5s or 10s and counting on.

4. **WNCP CURRICULUM**

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Part</td>
</tr>
<tr>
<td>Represent and describe numbers to 20 concretely, pictorially and symbolically. [C, CN, V]</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

- Represent a given number up to 20 using a variety of manipulatives, including ten frames and base ten materials.
- Read given number words to 20.
- Partition any given quantity up to 20 into 2 parts and identify the number of objects in each part.
- Model a given number using two different objects, e.g., 10 desks represents the same number as 10 pencils.
- Place given numerals on a number line with benchmarks 0, 5, 10 and 20.
### 5. WNCP CURRICULUM

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<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Part</strong></td>
<td><strong>Unit</strong></td>
</tr>
<tr>
<td>Compare sets containing up to 20 elements to solve problems using:</td>
<td></td>
</tr>
<tr>
<td>• referents</td>
<td>1 NS</td>
</tr>
<tr>
<td>• one-to-one correspondence. [C, CN, ME, PS, R, V]</td>
<td>7-10, 14, 15</td>
</tr>
</tbody>
</table>

**Achievement Indicators**
- Build a set equal to a given set that contains up to 20 elements.
- Build a set that has more, fewer or as many elements as a given set.
- Build several sets of different objects that have the same given number of elements in the set.
- Compare two given sets using one-to-one correspondence and describe them using comparative words, such as more, fewer or as many.
- Compare a set to a given referent using comparative language.
- Solve a given story problem (pictures and words) that involves the comparison of two quantities.

### 6. WNCP CURRICULUM

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part</strong></td>
<td><strong>Unit</strong></td>
</tr>
<tr>
<td>Estimate quantities to 20 by using referents. [C, ME, PS, R, V]</td>
<td></td>
</tr>
<tr>
<td>1 NS</td>
<td>20, 21</td>
</tr>
</tbody>
</table>

**Achievement Indicators**
- Estimate a given quantity by comparing it to a given referent (known quantity).
- Select an estimate for a given quantity by choosing between at least two possible choices and explain the choice.

### 7. WNCP CURRICULUM

<table>
<thead>
<tr>
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<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Part</strong></td>
<td><strong>Unit</strong></td>
</tr>
<tr>
<td>Demonstrate, concretely and pictorially, how a given number can be represented by a variety of equal groups with and without singles. [C, R, V]</td>
<td></td>
</tr>
<tr>
<td>2 NS</td>
<td>47</td>
</tr>
</tbody>
</table>

**Achievement Indicators**
- Represent a given number in a variety of equal groups with and without singles, e.g., 17 can be represented by 8 groups of 2 and one single, 5 groups of 3 and two singles, 4 groups of 4 and one single, and 3 groups of 5 and two singles.
### 7. Achievement Indicators

Recognize that for a given number of counters, no matter how they are grouped, the total number of counters does not change.

Group a set of given counters into equal groups in more than one way.

### 8. WNCP Curriculum JUMP Math Lessons

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>Part</th>
<th>Unit</th>
<th>Lesson</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the number, up to 20, that is one more, two more, one less and two less than a given number. [C, CN, ME, R, V]</td>
<td>1</td>
<td>NS</td>
<td>15, 18</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>NS</td>
<td>28, 41, 42, 52–56</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

Name the number that is one more, two more, one less or two less than a given number, up to 20.

Represent a number on a ten frame that is one more, two more, one less or two less than a given number.

### 9. WNCP Curriculum JUMP Math Lessons

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>Part</th>
<th>Unit</th>
<th>Lesson</th>
</tr>
</thead>
</table>
| Demonstrate an understanding of addition of numbers with answers to 20 and their corresponding subtraction facts, concretely, pictorially and symbolically by:  
  - using familiar and mathematical language to describe additive and subtractive actions from their experience  
  - creating and solving problems in context that involve addition and subtraction  
  - modelling addition and subtraction using a variety of concrete and visual representations, and recording the process symbolically. [C, CN, ME, PS, R, V] | 1    | NS   | 16–19  |
|                  | 2    | NS   | 31–34, 38–40 |

**Achievement Indicators**

Act out a given story problem presented orally or through shared reading.

Indicate if the scenario in a given story problem represents additive or subtractive action.

Represent the numbers and actions presented in a given story problem by using manipulatives, and record them using sketches and/or number sentences.
(continued)

9. **Achievement Indicators**

Create a story problem for addition that connects to student experience and simulate the action with counters.

Create a story problem for subtraction that connects to student experience and simulate the action with counters.

Create a word problem for a given number sentence.

Represent a given story problem pictorially or symbolically to show the additive or subtractive action and solve the problem.

<table>
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<tbody>
<tr>
<td><strong>Specific Outcome</strong></td>
<td><strong>Part</strong></td>
</tr>
<tr>
<td>Describe and use mental mathematics strategies (memorization not intended), such as:</td>
<td>2</td>
</tr>
<tr>
<td>• counting on and counting back</td>
<td>( \cdot )</td>
</tr>
<tr>
<td>• making 10</td>
<td>( \cdot )</td>
</tr>
<tr>
<td>• doubles</td>
<td>( \cdot )</td>
</tr>
<tr>
<td>• using addition to subtract to determine the basic addition facts to 18 and related subtraction facts. [C, CN, ME, PS, R, V]</td>
<td>( \cdot )</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

*It is not intended that students recall the basic facts but become familiar with strategies to mentally determine sums and differences.*

Use and describe a personal strategy for determining a given sum.

Use and describe a personal strategy for determining a given difference.

Write the related subtraction fact for a given addition fact.

Write the related addition fact for a given subtraction fact.
Patterns and Relations

General Outcomes
- Patterns: Use patterns to describe the world and solve problems.
- Variables and Equations: Represent algebraic expressions in multiple ways.

Patterns
It is expected that students will:

1. **WNCP CURRICULUM**
   - **Specific Outcome**
     - Demonstrate an understanding of repeating patterns (two to four elements) by:
       - describing
       - reproducing
       - extending
       - creating patterns using manipulatives, diagrams, sounds and actions.
       - [C, PS, R, V]
   - **Achievement Indicators**
     - Describe a given repeating pattern containing two to four elements in its core.
     - Identify errors in a given repeating pattern.
     - Identify the missing element(s) in a given repeating pattern.
     - Create and describe a repeating pattern using a variety of manipulatives, musical instruments and actions.
     - Reproduce and extend a given repeating pattern using manipulatives, diagrams, sounds and actions.
     - Identify and describe a repeating pattern in the environment, e.g., classroom, outdoors, using everyday language.
     - Identify repeating events, e.g., days of the week, birthdays, seasons.

2. **WNCP CURRICULUM**
   - **Specific Outcome**
     - Translate repeating patterns from one representation to another. [C, R, V]
   - **Achievement Indicators**
     - Represent a given repeating pattern using another mode, e.g., actions to sound, colour to shape, ABC ABC to blue yellow green blue yellow green.
     - Describe a given repeating pattern using a letter code, e.g., ABC ABC...
## Variables and Equations

It is expected that students will:

3. **WNCP CURRICULUM**

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<tbody>
<tr>
<td>Describe equality as a balance and inequality as an imbalance, concretely and pictorially (0 to 20). [C, CN, R, V]</td>
<td>2</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

- Construct two equal sets using the same objects (same shape and mass) and demonstrate their equality of number using a balance scale.
- Construct two unequal sets using the same objects (same shape and mass) and demonstrate their inequality of number using a balance scale.
- Determine if two given concrete sets are equal or unequal and explain the process used.

4. **WNCP CURRICULUM**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Record equalities using the equal symbol. [C, CN, PS, V]</td>
<td>2</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

- Represent a given equality using manipulatives or pictures.
- Represent a given pictorial or concrete equality in symbolic form.
- Provide examples of equalities where the given sum or difference is on either the left or right side of the equal symbol (=).
- Record different representations of the same quantity (0 to 20) as equalities.
Shape and Space

General Outcomes

• Measurement: Use direct or indirect measurement to solve problems.
• 3-D Objects and 2-D Shapes: Describe the characteristics of 3-D objects and 2-D shapes, and analyze the relationships among them.

Measurement

It is expected that students will:

1. Demonstrate an understanding of measurement as a process of comparing by:
   • identifying attributes that can be compared
   • ordering objects
   • making statements of comparison
   • filling, covering or matching. [C, CN, PS, R, V]

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<td>Specific Outcome</td>
<td>Part</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
</tr>
<tr>
<td>Demonstrate an understanding of measurement as a process of comparing by:</td>
<td>1</td>
</tr>
<tr>
<td>• identifying attributes that can be compared</td>
<td>2</td>
</tr>
<tr>
<td>• ordering objects</td>
<td></td>
</tr>
<tr>
<td>• making statements of comparison</td>
<td></td>
</tr>
<tr>
<td>• filling, covering or matching. [C, CN, PS, R, V]</td>
<td></td>
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Achievement Indicators

Identify common attributes, such as length (height), mass (weight), volume (capacity) and area, that could be used to compare a given set of two objects.

Compare two given objects and identify the attributes used to compare.

Determine which of two or more given objects is longest/shortest by matching and explain the reasoning.

Determine which of two or more given objects is heaviest/lightest by comparing and explain the reasoning.

Determine which of two or more given objects holds the most/least by filling and explain the reasoning.

Determine which of two or more given objects has the greatest/least area by covering and explain the reasoning.
## 3-D Objects and 2-D Shapes

It is expected that students will:

### 2. WNCP CURRICULUM

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Sort 3-D objects and 2-D shapes using one attribute, and explain the sorting rule. [C, CN, R, V]</td>
<td>Part 1 Unit G Lesson 1–6 1–7, 10, 11 14, 15, 17–19, 21</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

- Sort a given set of familiar 3-D objects or 2-D shapes using a given sorting rule.
- Sort a given set of familiar 3-D objects using a single attribute determined by the student and explain the sorting rule.
- Sort a given set of 2-D shapes using a single attribute determined by the student and explain the sorting rule.
- Determine the difference between two given pre-sorted sets of familiar 3-D objects or 2-D shapes and explain a possible sorting rule used to sort them.

### 3. WNCP CURRICULUM

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replicate composite 2-D shapes and 3-D objects. [CN, PS, V]</td>
<td>Part 1 Unit G Lesson 1 8, 9, 12 16, 21</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

- Select 2-D shapes from a given set of 2-D shapes to reproduce a given composite 2-D shape.
- Select 3-D objects from a given set of 3-D objects to reproduce a given composite 3-D object.
- Predict and select the 2-D shapes used to produce a composite 2-D shape, and verify by deconstructing the composite shape.
- Predict and select the 3-D objects used to produce a composite 3-D object, and verify by deconstructing the composite object.
### WNCP CURRICULUM

<table>
<thead>
<tr>
<th>Specific Outcome</th>
<th>JUMP MATH LESSONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compare 2-D shapes to parts of 3-D objects in the environment.</td>
<td>Part 2, Unit G</td>
</tr>
<tr>
<td>[C, CN, V]</td>
<td>Lesson 14, 15, 20, 21</td>
</tr>
</tbody>
</table>

**Achievement Indicators**

Identify 3-D objects in the environment that have parts similar to a given 2-D shape.