Unit 10  Number Sense: Division

Introduction

In this unit, students will learn about division as a method of sharing. They will model two ways of sharing: when the number of sets is known, and when the number of items in each set is known. They will learn how to divide by skip counting and how to write an addition sentence for each division sentence. They will discover the relationship between division and multiplication and learn when it is appropriate to multiply or divide. They will also solve word problems involving multiplication and division.

Meeting Your Curriculum

Alberta—All lessons in this unit are required. Extension 3 of Lesson NS3-54 is required for Alberta students.

British Columbia—All lessons in this unit are required.

Manitoba—All lessons in this unit are required. Extension 3 of Lesson NS3-54 is required for Manitoba students.

Ontario—All lessons in this unit are required.

Vocabulary and concepts. The names for the terms in a division sentence are as follows:

\[ 20 \div 4 = 5 \]

- **dividend**
- **divisor**
- **quotient**

These names are used occasionally in the lesson plans, for your benefit only. They do not need to be shared with students and probably shouldn’t be. With students, we will refer to what the numbers represent using the words **item**, **group**, and **set**. For example:

\[ 20 \div 4 = 5 \]

- **total number of items**
- **number in each set/group**
- **number of sets/groups**

Students will model division using pictures, circles and dots, arrays, and number lines. The various models will help students understand the following:

- Division sentences can be interpreted different ways. For example:
  \[ 20 \div 4 = 5 \]
  - 20 items divided into 4 groups, with 5 in each group, or
  - 20 items divided into groups of 4, so 5 groups in total.
  In other words, the labels for “4” and “5” in the second equation above can be transposed.
- Multiplication and division are related and lead to **fact families**, such as:
  \[ 20 \div 4 = 5 \quad 5 \times 4 = 20 \]
  \[ 20 \div 5 = 4 \quad 4 \times 5 = 20 \]
**Signalling.** In these lessons, we often suggest that all students signal their answers simultaneously (e.g., by flashing thumbs up or thumbs down for “yes” or “no,” or by holding up the number of fingers that corresponds to their answer). For a complete description of signalling, see p. A-15.

**Quizzes and Tests**

The following table indicates the lessons covered by a quiz or test for each curriculum.

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<td>Quiz</td>
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</table>
Goals

Students will learn how to share equally when the number of sets is known.

PRIOR KNOWLEDGE REQUIRED

Can add
Can multiply

MATERIALS

ball
raisins

Mental math minute. Review the doubles: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20. Remind students that multiplying by 2 finds one of the doubles. For example, 5 × 2 is the fifth double, 10. Remind students that the commutative property tells us that 5 × 2 and 2 × 5 are equal. Have the class stand up. Call out a multiplication question in which one of the factors is 2; for example, 6 × 2. Toss a ball to a student. The student will give the answer (12), toss the ball back to you, and then sit down. Continue until all students have had a chance to answer.

Sharing by distributing items one at a time into groups. Ask for four volunteers who like raisins to come to the front of the room. Ask for another volunteer to be the distributor of food. Give the distributor 12 raisins. SAY: We are going to share the raisins equally between the four people. Ask the distributor to give one raisin to the first person, two raisins to the second person, and three raisins to the next person. Pause for a few seconds to see the class react. Then, ask the distributor to give one raisin to the fourth person, two raisins to the first person, and three raisins to the second person. Turn to the distributor and ASK: Do you have any raisins left? (no) ASK: Did everyone get some raisins? (yes) Does it seem fair? (no) Why not? (not everyone got the same number of raisins) SAY: We want to share equally. We want each volunteer to get the same number of raisins. ASK: What is a better way of sharing raisins equally? (hand them out one at a time) SAY: Okay volunteers, you can eat your raisins.

Ask for four new volunteers and another distributor to come to the front of the room. This time, give the distributor 20 raisins. Ask the distributor to give one raisin to the first person, one raisin to the next person, and so on, until there are no more raisins. Ask the class to count out the total number of raisins as the distributor does his or her job. ASK: When did we stop distributing raisins? (when we reached 20) How many raisins did each volunteer get? (5) Does this seem fair? (yes) Why? (each volunteer got the same number of raisins) SAY: Okay volunteers, you can eat your raisins.
Draw five circles on the board and SAY: We want to share 15 raisins among five people. Each circle represents a person. I am going to place a dot in a circle for each raisin I give out.

○ ○ ○ ○ ○

Draw one dot in each circle, and then continue adding one dot per circle. Count the dots out loud as you add them to the circles, and have students say “stop” when you reach 15. The final picture should look like this:

○ ○ ○ ○ ○

ASK: What does each circle represent? (a person) What does each dot represent? (a raisin) If five people share 15 raisins, how many raisins does each person get? (3) SAY: We call the collection of dots in each circle a group or set.

ASK: If five people share 15 apples, how many apples does each person get? (3) If I use circles and dots to represent this sharing, what does each circle represent? (a person) What does each dot represent? (an apple)

Have the class do the following exercises. Take time to walk around the class to check on students.

**Exercises:** Draw circles and dots to find how many raisins each person gets.

a) 15 raisins, 5 people  
b) 12 raisins, 3 people  
c) 24 raisins, 4 people  
d) 3 people, 18 raisins  
e) 4 people, 20 raisins  
f) 6 people, 24 raisins

**Answers:** a) 3, b) 4, c) 6, d) 6, e) 5, f) 4

**Solving word problems that involve sharing.** Write on the board:

18 apples were shared by 3 people.

ASK: What was divided or shared into groups or sets? (apples) How many groups or sets? (3) If we use circles and dots to model this, what does each circle represent? (a person) What does each dot represent? (an apple)

Draw on the board:

○ ○ ○ ○ ○

Ask a volunteer to come to the board and draw dots one at a time in the three circles. Ask the volunteer to count out loud while drawing each dot, and ask the class to say “stop” at 18 dots. ASK: How many apples did each person get? (6)
Do the word problems in the following exercises with the class. Ask volunteers to read the questions. For each question, ASK: What is being shared? How many groups are there? Have students draw a circle to represent each group and then draw dots one at a time in each circle, until all the items have been shared. ASK: How many items are in each group?

Exercises

a) 24 tennis balls are shared by 4 tennis players. How many balls does each person get?

b) 15 people are divided equally into 5 cars. How many people are in each car?

c) 24 apples are divided equally into 3 baskets. How many apples are in each basket?

d) A student gets 20 hours of homework in 5 days. If the amount of homework is shared equally over the 5 days, how many hours of homework are done each day?

e) A teenager has an allowance of $35 each week. How much can he spend each day?

Answers: a) 6, b) 3, c) 8, d) 4, e) 5

Extensions

1. In each situation, the items cannot be shared equally. Find the smallest number of items that can be removed from the total so that the items that are left can be shared equally.

   a) 23 pears on 4 trees
   b) 14 books on 3 shelves
   c) $31 between 5 friends
   d) 52 cards between 8 players

   Answers: a) 3, b) 2, c) 1, d) 4

2. For each part in Extension 1, find the smallest number of items that can be added to the total so that the items can be shared equally.

   Answers: a) 1, b) 1, c) 4, d) 4
**Goals**

Students will learn how to find the number of sets when the number of items in each set is known.

**PRIOR KNOWLEDGE REQUIRED**

Can add
Can multiply
Can share equally when the number of sets is known

**MATERIALS**

ball
overhead projector
counters

**Mental math minute.** Review counting by 5s: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50. Remind students that multiplying by 5 finds one of these numbers. For example, $7 \times 5$ is the seventh number in this list, 35. Remind students that the commutative property tells us that $7 \times 5$ and $5 \times 7$ are equal. Point out that when we multiply 5 by an even number, the answer ends in zero. When we multiply 5 by an odd number, the answer ends in 5. Have the class stand up. Call out a multiplication question in which one of the factors is 5; for example, $6 \times 5$. Toss a ball to a student. The student will give the answer (30), toss the ball back to you, and then sit down. Continue until all students have had a chance to answer.

**Sharing by finding the number of groups.** Using an overhead projector, display 20 counters that have been placed randomly. SAY: I want to share these counters so that each person gets five counters. Ask for a volunteer to come to the overhead and arrange the counters into groups of five. ASK: How many people can each get five counters? (4) How many counters does each person get? (5) How many counters are there? (20)

Draw a row of 12 dots on the board. Have students copy the row of 12 dots in their notebooks. Tell students that these dots represent counters. Ask them to circle the dots to find how many people can share the counters so that each person gets the following numbers of counters:

- a) 2 counters each  
- b) 3 counters each  
- c) 4 counters each  
- d) 6 counters each

(see answers below)

- a) [●●●●●][●●●●●][●●●●●][●●●●●][●●●●●], 6 people
- b) [●●●][●●●][●●●][●●●][●●●][●●●][●●●][●●●], 4 people
- c) [●●●●●][●●●●●][●●●●●][●●●●●], 3 people
- d) [●●●●●][●●●●●][●●●●●], 2 people
Repeat the exercise on the board with the following arrangements of dots and numbers of counters. Ask volunteers to come up and write their answers on the board.

\[ \begin{align*}
\text{a)} & \quad \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet \bullet 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Exercises: Draw a picture to solve the problem.

a) A photo album has 30 pictures with 6 pictures on each page. How many pages are there?

b) A bike courier has to deliver 28 packages. He can deliver 7 packages per day. How many days will it take him to deliver the packages?

c) A bookcase has 24 books. 8 books fit on one shelf. How many shelves are needed to store the books?

Answers: a) 5, b) 4, c) 3

Extensions

1. Find the number of sets when 24 items are shared.
   a) 2 in each set  b) 3 in each set  c) 4 in each set  
   d) 6 in each set  e) 8 in each set  f) 12 in each set

   Answers: a) 12, b) 8, c) 6, d) 4, e) 3, f) 2

2. What happens to the number of sets in Extension 1 as the number in each set increases?

   Answer: the number of sets decreases
Goals
Students will identify in a word problem what is being divided into sets or groups, the number of sets, and the number of items in each set.

PRIOR KNOWLEDGE REQUIRED
Can share equally when the number of sets is known
Understands multiplication as finding the total number of items when the number of sets and the number of items in each set are known

MATERIALS
ball

Mental math minute. Review counting by 10s: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100. Remind students that multiplying by 10 finds one of these numbers. For example, $7 \times 10$ is the seventh number in this list, 70. Remind students that the commutative property tells us that $7 \times 10$ and $10 \times 7$ are equal. Point out that when we multiply a number by 10, the answer ends in zero. For example, $6 \times 10$ is 6 followed by a 0, or 60. Have the class stand up. Call out a multiplication question where one of the factors is 10; for example, $4 \times 10$. Toss a ball to a student. The student will give the answer (40), toss the ball back to you, and then sit down. Continue until all students have had a chance to answer.

Identifying the set and what is being divided into sets. SAY: In division problems, drawing a picture helps us to find out what the sets are and what the items being divided into sets are. Draw on the board:

10 apples in each basket

ASK: What is the set? (basket) What are the items in each set? (apples)

Write on the board:

a) 4 campers in each tent
b) 8 rowers in each boat
c) 25 students in each class
d) 10 pages in a notebook
e) 3 prizes for every person
For each of the situations above, ask students to draw a picture to represent the problem, and then identify the set and the items being divided into sets. (see sample pictures for parts a) and b) and answers in the table below)

<table>
<thead>
<tr>
<th>Set</th>
<th>Items Being Divided into Sets</th>
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<tbody>
<tr>
<td>a) tent</td>
<td>campers</td>
</tr>
<tr>
<td>b) boat</td>
<td>rowers</td>
</tr>
<tr>
<td>c) class</td>
<td>students</td>
</tr>
<tr>
<td>d) notebook</td>
<td>pages</td>
</tr>
<tr>
<td>e) person</td>
<td>prizes</td>
</tr>
</tbody>
</table>

Refer back to the situations you wrote on the board. SAY: Instead of drawing pictures, we can use a circle to represent the set and dots to represent the items. If we have four campers in each tent, we can draw this. Draw the picture in the margin on the board. Have students draw circles and dots to represent the situations in parts b) to e).

**Identifying what is being divided into sets, the number of sets, and the number of items in each set.** SAY: I have 12 quarters to share among three people. Draw on the board:

Ask for a volunteer to come to the board and, using dots to represent the quarters, share the quarters equally. ASK: What is being shared? (quarters) How many sets or groups are there? (3) How many items are in each set or group? (4) As an added challenge, ASK: How much money does each person get? (75¢)

**Exercises:** Identify the sets, the items being shared, and the number of items in each set.

a) 15 people, 3 cars, 5 people in each car
b) 20 stickers, 4 stickers on each page, 5 pages
c) 24 pencils, 4 people, 6 pencils for each person

**Bonus**

d) 15 people, 3 tables
e) 16 players, 4 teams
f) 12 jars, 4 cases
Answers

<table>
<thead>
<tr>
<th>Sets</th>
<th>Items Being Shared</th>
<th>Number of Items in Each Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) cars</td>
<td>people</td>
<td>5 people in each car</td>
</tr>
<tr>
<td>b) pages</td>
<td>stickers</td>
<td>4 stickers on each page</td>
</tr>
<tr>
<td>c) people</td>
<td>pencils</td>
<td>6 pencils for each person</td>
</tr>
</tbody>
</table>

Bonus

<table>
<thead>
<tr>
<th>Sets</th>
<th>Items Being Shared</th>
<th>Number of Items in Each Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>d) tables</td>
<td>people</td>
<td>5 people at each table</td>
</tr>
<tr>
<td>e) teams</td>
<td>players</td>
<td>4 players on each team</td>
</tr>
<tr>
<td>f) cases</td>
<td>jars</td>
<td>3 jars in each case</td>
</tr>
</tbody>
</table>

Extensions

1. A teacher shared 24 raisins among 6 students. Later, the teacher found 18 more raisins to share. What is the total number of raisins each student got?
   
   **Answer:** 7

2. A farmer has 40 apples to share among 8 people. How many more apples would each person get if there are only 5 people sharing them?
   
   **Answer:** 3
Two Ways of Sharing

Goals

Students will share items equally, or divide, when given either the number of sets or the number of objects in each set.

Students will interpret the divisor in a division sentence as either the number of sets or the number of objects in each set.

Prior Knowledge Required

Can find the number of items in each set when given the number of items and the number of sets

Can find the number of sets when given the number of items and the number of items in each set

Materials

ball
raisins
cups

Mental math minute. Review counting by 4s: 4, 8, 12, 16, 20, 24, 28, 32, 36, 40. Remind students that multiplying by 4 finds one of these numbers. For example, $5 \times 4$ is the fifth number in this list, 20. Remind students that the commutative property tells us that $5 \times 4$ and $4 \times 5$ are equal. Point out that one way of multiplying by 4 is to double twice. For example, to multiply $6 \times 4$, you double 6 to get 12 and then double 12 to get 24, so $6 \times 4 = 24$.

Have the class stand up. Call out a multiplication question in which one of the factors is 4; for example, $7 \times 4$. Toss a ball to a student. The student will give the answer (28), toss the ball back to you, and then sit down. Continue until all students have had a chance to answer.

Sharing by finding the number of sets. Ask for a volunteer, Volunteer A, to come to the front of the class. Give Volunteer A 24 raisins. Ask for six more volunteers to come to the front of the class to receive raisins. Have Volunteer A distribute the raisins one at a time to each person until they are gone. ASK: How many raisins did each person get? (4) Tell the volunteers they can eat the raisins and sit down. Tell the class you want to show what just happened by drawing dots and circles. ASK: What do the circles represent? (people) How many circles should I draw? (6) Draw on the board:

Ask for a volunteer to come to the board and draw dots one at a time in each circle. Have the volunteer count out loud, and ask the class to say “stop” when he should stop. ASK: How many dots are in each circle? (4)
How many raisins did each person eat? (4) The final picture should look like this:

![Raisins distributed among students]

**Sharing by finding the number in each set.** Ask another volunteer, Volunteer B, to come to the front of the class. Give Volunteer B 24 raisins and ask for six more volunteers to come up to the front of the class. Have Volunteer B give each person four raisins until they have run out. ASK: How many students got raisins? (6) How many raisins did each student get? (4) Tell the volunteers they can eat the raisins and sit down. SAY: We want to show what just happened by drawing dots and circles. Draw on the board:

```
  O  O  O  O  O  
```

Ask for a volunteer to come to the board and draw four dots in the first circle. Ask her to continue to draw four dots at a time in the circles, until she has drawn 24 dots in total. ASK: How many circles did we use? (6) How many students got to eat raisins? (6) The final picture should look like this:

```
  O  O  O  
```

Ask the class to skip count by 4s to 24, and write the total below each circle as you go:

```
  4  8  12  16  20  24 
```

SAY: Volunteer A and Volunteer B distributed the raisins in different ways. ASK: Did Volunteer A know the number of sets or the number of objects in each set? (the number of sets) Did Volunteer B know the number of sets or the number of objects in each set? (the number of objects in each set) Write on the board:

You can share in two ways.

a) Decide how many sets.
   Example:
   Share 12 apples among 4 people.

```
  O  O  O  O  
```

b) Decide how many items in each set.
   Example:
   Share 12 apples by giving each person 2 apples until you run out of apples.

```
  O  O  O  O  O  O  O  
```
Ask for a volunteer to come to the board and draw dots for part a). They should draw one dot at a time in each circle until they have drawn 12 dots. Ask for a different volunteer to draw dots for part b). They should draw two dots at a time in each circle until they have drawn 12 dots. The final pictures should look like this:

Exercises

1. Draw a picture to find the number of items in each group.
   a) 24 dots divided into 6 groups
   b) 18 dots divided into 3 groups
   c) 12 dots divided into 3 groups
   d) 35 dots divided into 7 groups
   
   **Answers:** a) 4, b) 6, c) 4, d) 5

2. Draw a picture to find the number of groups.
   a) 28 dots divided into groups of 7 each
   b) 36 dots divided into groups of 9 each
   c) 42 dots divided into groups of 6 each
   d) 48 dots divided into groups of 8 each
   
   **Answers:** a) 4, b) 4, c) 7, d) 6

3. Draw a picture to solve the problem. Use dots for objects and circles for groups.
   a) 24 bottles are in 3 cases. How many bottles are in each case?
   b) There are 5 rowers in each boat. There are 15 rowers. How many boats are there?
   c) 6 pencils are in each pencil case. There are 42 pencils. How many pencil cases are there?
   d) 42 players are on 7 teams. How many players are on each team?
   
   **Bonus:** Find the number of groups when 100 items are divided into groups of 25 each.
   
   **Answers:** a) 8, b) 3, c) 7, d) 6, Bonus: 4
Extensions

1. Find all the ways of sharing 24 cookies equally among different numbers of friends.

   **Answers**

<table>
<thead>
<tr>
<th>Number of Friends</th>
<th>24</th>
<th>12</th>
<th>8</th>
<th>6</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Cookies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>12</td>
<td>24</td>
</tr>
</tbody>
</table>

2. Find the number of items in each group when 1000 items are divided into 10 groups. Hint: Let each dot represent 10 items.

   **Answer:** 100
**Goals**

Students will solve division word problems that provide two pieces of information: the total number of items being divided and either the number of groups or the number in each group.

**PRIOR KNOWLEDGE REQUIRED**

Can share equally when the number of groups is known
Can share equally when the number of items in each group is known

**MATERIALS**

ball

**Mental math minute.** Review counting by 9s: 9, 18, 27, 36, 45, 54, 63, 72, 81, 90. Remind students that multiplying by 9 finds one of these numbers. For example, $6 \times 9$ is the sixth number in this list, 54. Remind students that the commutative property tells us that $6 \times 9$ and $9 \times 6$ are equal. Point out some patterns in the nine times table. One pattern is to get the next multiple of 9, you can add 10 then subtract 1. For example, to get the next multiple after 36, add 10 to 36 to get 46, and then subtract 1 to get 45. Another pattern is that the sum of the digits in every multiple of 9 is 9. For example, if you know $9 \times 7$ starts with a 6, ask yourself, “What can I add to 6 to get 9?” (3) So, $9 \times 7$ is 63. Have the class stand up. Call out a multiplication question in which one of the factors is 9; for example, $4 \times 9$. Toss a ball to a student. The student will give the answer (36), toss the ball back to you, and then sit down. Continue until all students have had a chance to answer.

**Identifying the items that have been shared, the number of groups or sets, and the number of items in each group or set.** Write on the board:

a) 15 people in 5 cars

3 people in each car

b) 15 people

5 people in each car

3 cars

Have students draw a picture in their notebooks to show each situation. (see sample answers below)

**ASK:** In part a), what is being divided into groups? (people) What are the groups? (cars) How many groups are there? (5) How many people are in each group? (3) In part b), what is being divided into groups? (people)
What are the groups? (cars) How many groups are there? (3) How many people are in each group? (5)

**Exercises:** Fill in what you know. Write a question mark for what you don’t know.

<table>
<thead>
<tr>
<th>What has been shared or divided into sets?</th>
<th>How many sets?</th>
<th>How many in each set?</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 24 riders on a roller coaster. 6 cars.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 riders in each car.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) 12 pencils placed in 4 boxes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) 20 cookies.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 cookies for each person.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) 24 hockey players on 4 teams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) 40 rowers in 5 rowboats</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Answers**

<table>
<thead>
<tr>
<th></th>
<th>riders</th>
<th>6</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>b) pencils</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) cookies</td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>d) hockey players</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) rowers</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Solving word problems that involve sharing.** Write on the board:

A basketball league has 35 players and 5 players on each team. How many teams are there?

Ask students to copy the problem into their notebooks. ASK: What is the group or set? (team) What is being divided here? (players) How many are in each set? (5)

Draw a circle on the board. SAY: We are going to use circles to show the teams and dots to show the players. Ask a volunteer to come to the board and draw five dots in the circle. Ask the volunteer to continue drawing circles with five dots inside each circle. Have them count out loud the total number of players being placed in teams as they go along. (5, 10, 15, and so on) Ask the class to say “stop” when the volunteer should stop (i.e., at 35).

The final picture should look like this:
ASK: How many teams are there in the basketball league? (7)

Write on the board:

At a family barbecue, 24 hot dogs are being shared among 8 people. How many hot dogs does each person get?

Ask students to copy the problem into their notebooks. ASK: What is the group or set? (people) What is being divided here? (hot dogs) How many groups are there? (8) SAY: We are going to draw dots and circles for this problem. What will the circles represent? (people) How many circles will we need? (8) What will the dots represent? (hot dogs) Ask for a volunteer to come to the board and draw the eight circles. Ask the volunteer to draw dots one at a time in each of the circles until 24 dots total are placed. The final picture should look like this:

![Diagram of circles and dots]

ASK: How many dots are in each circle? (3) How many hot dogs does each person get? (3)

Exercises: Find the missing information.

a) 32 marbles, 8 children, ___ marbles for each child
b) $48, $6 for each winner, ___ winners
c) 24 desks, 6 desks in each row, ___ rows
d) 72 apples, 8 trees, ___ apples on each tree
e) 40 pictures in a photo album, 8 pictures on each page, ___ pages

Answers: a) 4, b) 8, c) 4, d) 9, e) 5

Extensions

1. A batch of bran muffins is shared among 6 people. If it had been shared among 5 people, each person could have had 1 more bran muffin. How many muffins were in the batch?

   Answer: 30

2. A pencil case has fewer than 15 pencils inside. The pencils can be shared equally among 2, 3, 4, or 6 people. How many pencils are there?

   Answer: 12

3. A basket of tennis balls has fewer than 20 tennis balls. The tennis balls can be shared equally among 2, 3, 6, or 9 people. How many tennis balls are there?

   Answer: 18