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Eligible Content

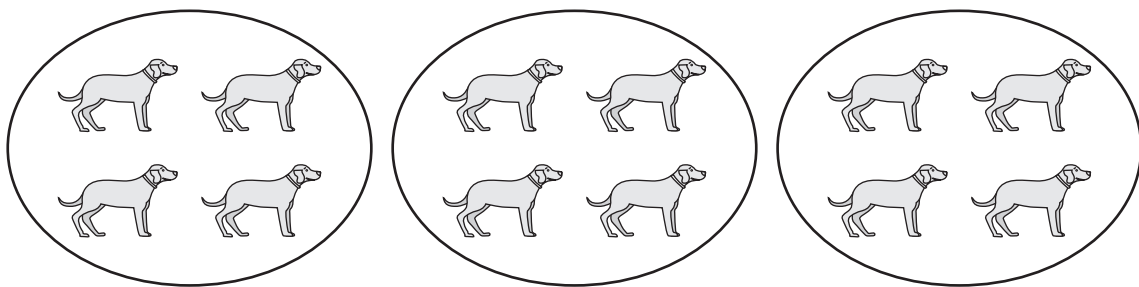
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Representing Multiplication

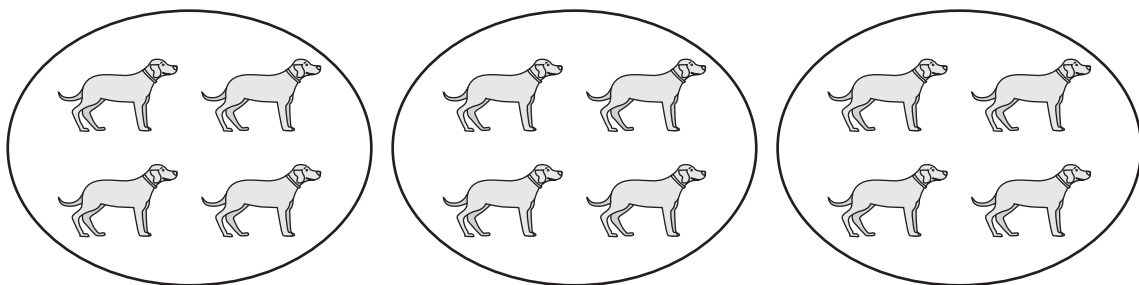
1 GETTING THE IDEA

Equal groups are groups that have the same number of objects.

In the picture below, there are 12 dogs in all. The dogs are in 3 groups. There are 4 dogs in each group.



When you combine equal groups, you are using **multiplication** to find the total number of objects.



12 equals 3 groups of 4.

12 equals 3 times 4.

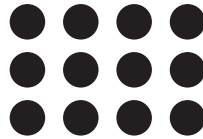
$$12 = 3 \times 4$$

The total number is the **product**. The numbers you multiply are **factors**.

$$\begin{array}{ccccccc}
 3 & \times & 4 & & = & 12 & \\
 \swarrow & & \nearrow & & & \uparrow & \\
 & & & & & \text{product} & \\
 \text{factors} & & & & & &
 \end{array}$$

You can show 12 dogs as 3 groups of 4 and as a product of the factors 3 and 4.

Another way to show a product is to make an array. An **array** is set of objects arranged in equal rows. This array shows a product of 12 as 3 rows of 4 objects or $12 = 3 \times 4$.

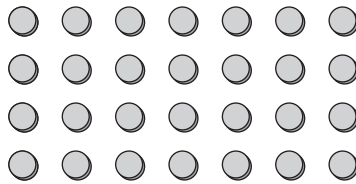


Example 1

Write a multiplication number sentence that describes the product 28.

Strategy Make an array.

Step 1 Make an array showing 28 objects.



Step 2 What does the array of 28 show?

The array shows 4 rows of 7 objects each.

This means that there are 4 equal groups of 7 objects each.

Step 3 Write a multiplication number sentence for the array.

The product is 28.

28 is 4 groups of 7.

$$\begin{array}{ccccccc} 28 & = & 4 & \times & 7 & & \\ \uparrow & & \swarrow & & \nearrow & & \\ \text{product} & & \text{factors} & & & & \end{array}$$

Solution $28 = 4 \times 7$

You can use an area model to help you describe a product.

An **area model** is a rectangle made of square tiles. It is similar to an array.



10 square tiles form 2 rows of 5 square tiles.

$$\begin{array}{ccccccc} 10 & = & 2 & \times & 5 \\ \uparrow & & \swarrow & & \nearrow \\ \text{product} & & \text{factors} & & \end{array}$$

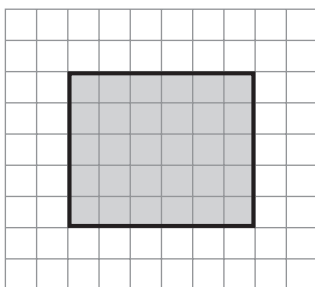
Example 2

Write a multiplication number sentence that describes the product 30.

Strategy Make an area model.

Step 1 Use grid paper to draw an area model.

Draw a rectangle that contains 30 square tiles.



Step 2 Find the number of rows and the number of square tiles in each row.

30 square tiles form 5 rows of 6 square tiles.

Solution $30 = 5 \times 6$

You know how to describe a product. You can also describe a context for a given expression.

Example 3

Describe a situation for the expression 5×9 .

Strategy Use the definition of multiplication.

Step 1 Identify the meaning of 5×9 .

5 and 9 are factors. They can mean 5 groups of 9 objects each.

The value of 5×9 is 45. The value can mean there are 45 objects in all.

Step 2 Think of a real-world situation.

There are 5 baseball teams with 9 players on each team.

There are 45 players in all.

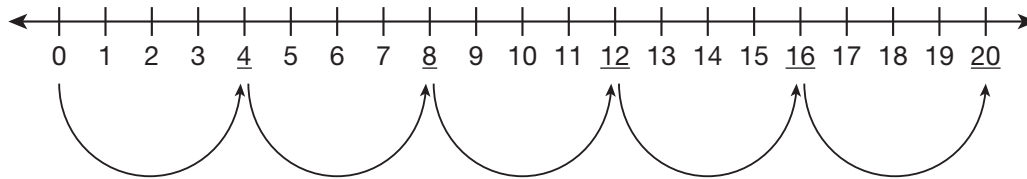
Solution The total number of players on 5 baseball teams, each with 9 players, matches the expression 5×9 . The value of the expression, 45, matches the total number of players.

2 COACHED EXAMPLE

Henry has 20 ink pens. He stores an equal number of pens in each box. If 20 is the product, what story and multiplication number sentence can describe 20?

Decide on the number of boxes and the number of pens in each box.

To help, you can draw equal groups of pens or you can use a number line.



Skip count.

There are _____ groups of _____ in 20.

Use the numbers to finish the story.

Henry has a total of _____ ink pens.

He stores the pens in _____ boxes. Each box contains _____ pens.

Write the number sentence.

_____ = _____ ○ _____

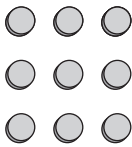
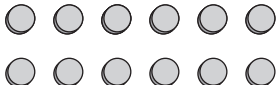
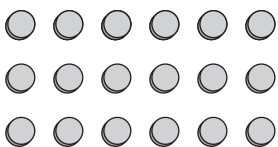
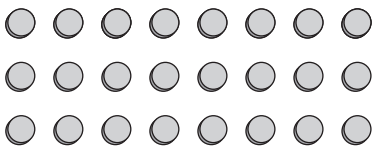
Henry has _____ ink pens. He stores the pens in _____ boxes.

Each box contains _____ pens. The equation is _____.

3 LESSON PRACTICE

- 1 Which array models the number sentence below?

$$18 = 3 \times 6$$

- A. 
- B. 
- C. 
- D. 

- 2 Which is one way to describe the expression below?



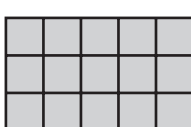
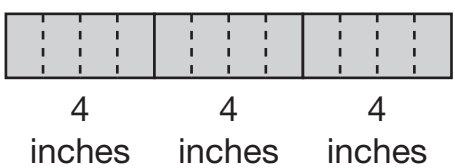
$$5 \times 8$$

- A. five fewer than eight
- B. five more than eight
- C. five less than eight
- D. five groups of eight

- 3 Which number sentence is missing a product of 36?





- A. $\square = 6 \times 5$ B. $\square = 8 \times 3$
 C. $\square = 9 \times 4$ D. $\square = 7 \times 5$

- 4 Which model could represent 4×5 ?

- A. 
- B. 
- C. 
- D. 

- 5 Which model describes the equation below?

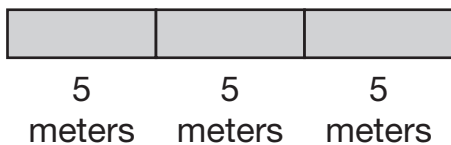
$$27 = 3 \times 7$$

- A. 
- B. 
- C. 
- D. 

6 Which story could describe the expression 3×4 ?

- A. Mary had 4 yards of fabric. She used 3 yards of fabric. How many yards of fabric does she have left?
- B. Mary has red fabric that is 3 yards long. She has yellow fabric that is 4 yards long. How many yards of fabric does Mary have?
- C. Mary has 3 pieces of red fabric. Each piece of fabric is 4 yards long. How many yards of fabric does Mary have?
- D. How much longer is Mary's 4 yards of blue fabric than her 3 yards of red fabric?

7 The model shows the product 15.



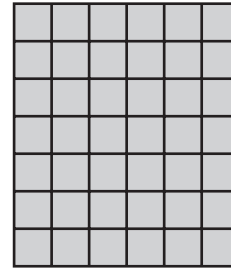
Which expression is another way to show 15?

- A. $3 + 5$
- B. 3×5
- C. $5 + 5$
- D. 5×5

8 Which number sentence is missing a product of 35?

- A. $\square = 7 \times 5$
- B. $\square = 5 + 7$
- C. $\square = 5 + 5$
- D. $\square = 7 \times 7$

9 Nicky made the area model below to describe the product 42.



Which statement is true about the area model?

- A. Add 7 tiles seven times to show the product.
- B. Multiply the factors 6 and 7 to show the product.
- C. Add $6 + 7 + 6 + 7$ to show the product.
- D. Add 7 and 6 to show the product.

10 Felipe made the array shown below to describe the product 30.



Which expression does this array represent?

- A. 5×2
- B. 5×4
- C. 5×6
- D. 6×6

- 11** Look at the number sentence below.

$$54 = 6 \times 9$$

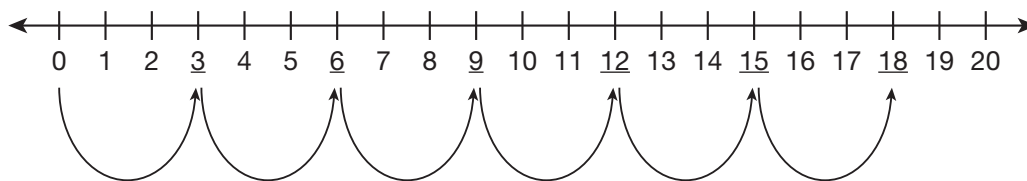
Which situation could be solved using this number sentence?

- A.** Max plants 6 rows of pumpkin seeds and 9 rows of tomato seeds. How many rows does he plant in all?
- B.** Cara reads 6 books in June and 9 in July. How many books does she read in all?
- C.** Raymond rides his bike 6 miles every day for 9 days. How many miles does he ride in all?
- D.** Jaika has 9 red pencils and 6 blue pencils. How many more red pencils than blue pencils does she have?

- 12** Which story best describes 8×6 ?

- A.** Max has 8 shells. He finds 6 more shells. How many shells does Max have in all?
- B.** Paula fills 8 baskets with 6 apples each. How many apples are in all the baskets?
- C.** An area model has 8 square tiles. Another area model has 6 square tiles. How many square tiles are in both area models?
- D.** There are 8 birds in an oak tree and 5 birds in a maple tree. How many more birds are in the oak tree?

- 13** Teo used the number line below to describe a product.



Which number sentence describes Teo's number line?

- A.** $21 = 18 + 3$
- B.** $12 = 18 - 6$
- C.** $18 = 6 \times 3$
- D.** $9 = 6 + 3$

- 14 Which is one way to describe 4×9 ?
- A. 4 groups of 9
 - B. 4 rows of 8
 - C. a group of 4 and a group of 9
 - D. a group of 4 fewer than 9

- 15 To model 28, Leah plans to put counters into groups of 7. How many counters should Leah put in each group?
- A. 4
 - B. 7
 - C. 21
 - D. 35

- 16 Shandra is thinking of the product 24.

Part A

Draw a picture or a number line to describe the product 24 and two factors.



Part B

Write a number sentence that goes with your picture.

