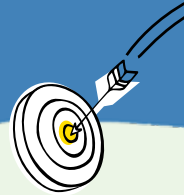# Explore Multiplying with 0, 1, 2, 5, and 10

Previously, you learned about the meaning of multiplication. This lesson will take a closer look at certain multiplication facts. Use what you know to try to solve the problem below.

> **Jenny draws 6 cartoon bugs. Each bug has 10 legs. How many legs did she draw?**

## Learning Targets
- Apply properties of operations as strategies to multiply and divide.
- Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division or properties of operations.

**SMP** 1, 2, 3, 4, 5, 6, 8

## TRY IT

### Math Toolkit
- base-ten blocks
- counters
- hundred charts
- multiplication models

## DISCUSS IT

**Ask your partner:** How did you get started?

**Tell your partner:** A model I used was . . . It helped me . . .
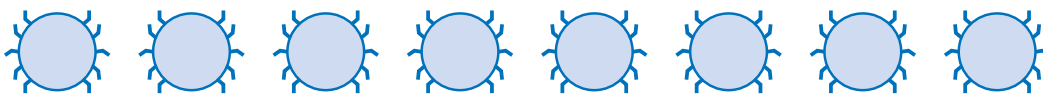
# CONNECT IT

**1** LOOK BACK

Explain how you found the number of legs Jenny drew for the 6 cartoon bugs.

**2** LOOK AHEAD

You can show and solve multiplication problems in different ways, such as using arrays or equal groups.

One way to find products when multiplying with 2, 5, or 10 is to use skip-counting.

Suppose Jenny draws 8 cartoon bugs with 10 legs each.

**a.** Show how you could use skip-counting to find the number of legs Jenny drew.

10, 20, ...........................................................................................

**b.** Write a multiplication fact to find the number of legs.

number of bugs    $\times$    legs on each bug    $=$    total number of legs

.................    $\times$    .................    $=$    .................

**3** REFLECT

Suppose you have 8 bugs with 8 legs each. What other method besides skip-counting can you use to find the total number of legs?

......................................................................................................

......................................................................................................

**A**                                                      # Correct _____

Solve.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 + 2 = | | 23 | 7 + 7 = | |
| 2 | 2 twos = | | 24 | 2 sevens = | |
| 3 | 5 + 5 = | | 25 | 9 + 9 = | |
| 4 | 2 fives = | | 26 | 2 nines = | |
| 5 | 2 + 2 + 2 = | | 27 | 8 + 8 = | |
| 6 | 3 twos = | | 28 | 2 eights = | |
| 7 | 2 + 2 + 2 + 2 = | | 29 | 3 + 3 + 3 = | |
| 8 | 4 twos = | | 30 | 3 threes = | |
| 9 | 5 + 5 + 5 = | | 31 | 4 + 4 + 4 = | |
| 10 | 3 fives = | | 32 | 3 fours = | |
| 11 | 5 + 5 + 5 + 5 = | | 33 | 3 + 3 + 3 + 3 = | |
| 12 | 4 fives = | | 34 | 4 threes = | |
| 13 | 2 fours = | | 35 | 4 fives = | |
| 14 | 4 + 4 = | | 36 | 4 + 4 + 4 + 4 + 4 = | |
| 15 | 2 threes = | | 37 | 3 sixes = | |
| 16 | 3 + 3 = | | 38 | 6 + 6 + 6 = | |
| 17 | 2 sixes = | | 39 | 3 eights = | |
| 18 | 6 + 6 = | | 40 | 8 + 8 + 8 = | |
| 19 | 5 twos = | | 41 | 3 sevens = | |
| 20 | 2 + 2 + 2 + 2 + 2 = | | 42 | 7 + 7 + 7 = | |
| 21 | 5 fives = | | 43 | 3 nines = | |
| 22 | 5 + 5 + 5 + 5 + 5 = | | 44 | 9 + 9 + 9 = | |

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**B**

Improvement _____          # Correct _____

Solve.

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5 + 5 = | | 23 | 8 + 8 = | |
| 2 | 2 fives = | | 24 | 2 eights = | |
| 3 | 2 + 2 = | | 25 | 7 + 7 = | |
| 4 | 2 twos = | | 26 | 2 sevens = | |
| 5 | 5 + 5 + 5 = | | 27 | 9 + 9 = | |
| 6 | 3 fives = | | 28 | 2 nines = | |
| 7 | 5 + 5 + 5 + 5 = | | 29 | 3 + 3 + 3 + 3 = | |
| 8 | 4 fives = | | 30 | 4 threes = | |
| 9 | 2 + 2 + 2 = | | 31 | 4 + 4 + 4 = | |
| 10 | 3 twos = | | 32 | 3 fours = | |
| 11 | 2 + 2 + 2 + 2 = | | 33 | 3 + 3 + 3 = | |
| 12 | 4 twos = | | 34 | 3 threes = | |
| 13 | 2 threes = | | 35 | 4 fives = | |
| 14 | 3 + 3 = | | 36 | 4 + 4 + 4 + 4 + 4 = | |
| 15 | 2 sixes = | | 37 | 3 sevens = | |
| 16 | 6 + 6 = | | 38 | 7 + 7 + 7 = | |
| 17 | 2 fours = | | 39 | 3 nines = | |
| 18 | 4 + 4 = | | 40 | 9 + 9 + 9 = | |
| 19 | 5 fives = | | 41 | 3 sixes = | |
| 20 | 5 + 5 + 5 + 5 + 5 = | | 42 | 6 + 6 + 6 = | |
| 21 | 5 twos = | | 43 | 3 eights = | |
| 22 | 2 + 2 + 2 + 2 + 2 = | | 44 | 8 + 8 + 8 = | |

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COMMON CORE

**Lesson 3:** Interpret the meaning of factors–the size of the group or the number of groups.

**Date:** 5/6/13

4

engage^ny

1.A.35

# Develop Multiplying with 2, 5, and 10
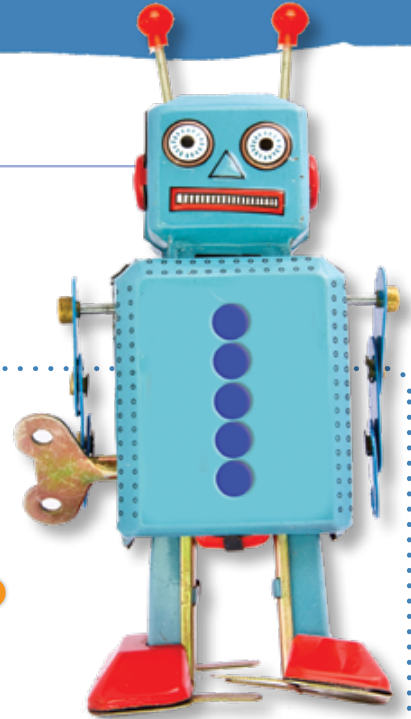
Read and try to solve the problem below.

**A company makes a toy robot that has 2 antennas and 5 buttons. How many antennas and buttons are needed for 6 robots?**

## TRY IT

### Math Toolkit
- counters
- cups
- 1-centimeter grid paper
- multiplication models

### DISCUSS IT

**Ask your partner:** Why did you choose this strategy?

**Tell your partner:** I started by . . .

Explore different ways to understand multiplying with 2, 5, and 10.

> **A company makes a toy robot that has 2 antennas and 5 buttons.**
> **How many antennas and buttons are needed for 6 robots?**

## MODEL IT

**You can use equal groups and skip-count.**

The drawings show the antennas and buttons of **6** robots.

You can skip-count by **twos** to find the number of antennas.

| 2 | 4 | 6 | 8 | 10 | 12 |

**6** groups of **2** antennas
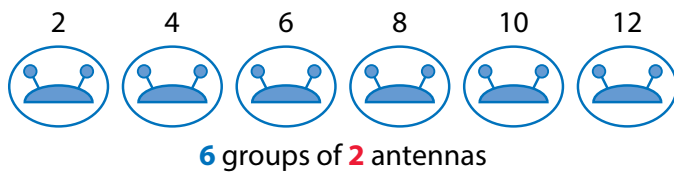
You can skip-count by **fives** to find the number of buttons.

| 5 | 10 | 15 | 20 | 25 | 30 |

**6** groups of **5** buttons
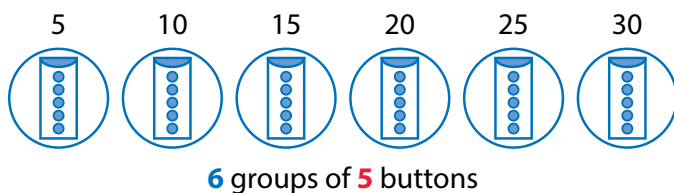
## MODEL IT

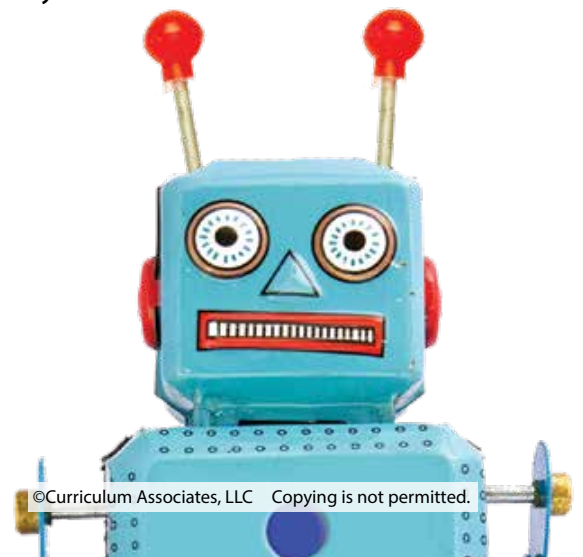**You can use arrays and skip-count.**

The left array shows the number of antennas. You can skip-count by **twos**.
The right array shows the number of buttons. You can skip-count by **fives**.

2
4
6
8
10
12

5
10
15
20
25
30
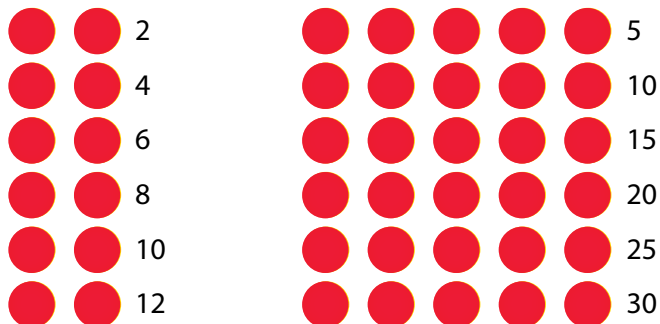
**6** rows of **2** antennas          **6** rows of **5** buttons

# CONNECT IT

**Now you will use the problem from the previous page to help you understand how to multiply with 2, 5, and 10.**

**1** Look at both **Model Its**. What multiplication equations can you write for the number of antennas and number of buttons?

**2** How do both models use skip-counting?

**3** If you take the antenna array in the second **Model It** and turn it, what would the equation be for each array?

**4** Did the order of the factors in problem 3 change the product? Explain why or why not.

**5** What addition doubles fact can you write for the turned array in problem 3? Why can you use a doubles fact when you multiply with 2?
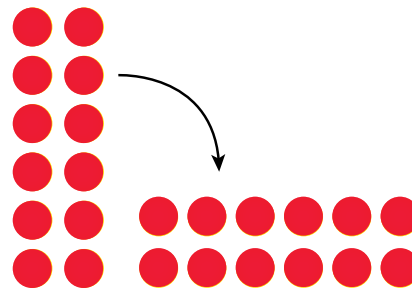
**6** REFLECT

Look back at your **Try It**, strategies by classmates, and **Model Its**. Which models or strategies do you like best for multiplying with 2 and 5? Explain.

...................................................................................................

...................................................................................................

...................................................................................................

# APPLY IT

**Use what you just learned to solve these problems.**

**7** How much is 5 groups of 10? Write a multiplication equation.
Show your work.

*Solution* ................................................................................................................

**8** How much is 10 groups of 5? Write a multiplication equation.
Show your work.

*Solution* ................................................................................................................

**9** Each cabin at camp has 5 beds. There are 4 cabins. How many beds are there
at camp? Show your work.

*Solution* ..........................................................................

## A
# Correct _____

Add or multiply.

| | | | | |
|---|---|---|---|---|
| 1 | 5 + 5 + 5 = | 23 | 3 + 3 + 3 + 3 = |
| 2 | 3 x 5 = | 24 | 4 x 3 = |
| 3 | 5 x 3 = | 25 | 3 x 4 = |
| 4 | 2 + 2 + 2 = | 26 | 3 + 3 + 3 = |
| 5 | 3 x 2 = | 27 | 3 x 3 = |
| 6 | 2 x 3 = | 28 | 3 + 3 + 3 + 3 + 3 = |
| 7 | 5 + 5 = | 29 | 5 x 3 = |
| 8 | 2 x 5 = | 30 | 3 x 5 = |
| 9 | 5 x 2 = | 31 | 7 + 7 = |
| 10 | 2 + 2 + 2 + 2 = | 32 | 2 x 7 = |
| 11 | 4 x 2 = | 33 | 7 x 2 = |
| 12 | 2 x 4 = | 34 | 9 + 9 = |
| 13 | 2 + 2 + 2 + 2 + 2 = | 35 | 2 x 9 = |
| 14 | 5 x 2 = | 36 | 9 x 2 = |
| 15 | 2 x 5 = | 37 | 6 + 6 = |
| 16 | 3 + 3 = | 38 | 6 x 2 = |
| 17 | 2 x 3 = | 39 | 2 x 6 = |
| 18 | 3 x 2 = | 40 | 8 + 8 = |
| 19 | 5 + 5 + 5 + 5 = | 41 | 2 x 8 = |
| 20 | 4 x 5 = | 42 | 8 x 2 = |
| 21 | 5 x 4 = | 43 | 7 + 7 + 7 + 7 = |
| 22 | 2 x 2 = | 44 | 4 x 7 = |

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**COMMON CORE**   Lesson 4:   Understand the meaning of the unknown as the size of the group in division.
Date:   5/6/13

**engage**^ny   1.B.9

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**B**          Improvement _____          # Correct _____

Add or multiply.

| | | | |
|---|---|---|---|
| 1 | 2 + 2 + 2 = | 23 | 4 + 4 + 4 = |
| 2 | 3 x 2 = | 24 | 3 x 4 = |
| 3 | 2 x 3 = | 25 | 4 x 3 = |
| 4 | 5 + 5 + 5 = | 26 | 4 + 4 + 4 + 4 = |
| 5 | 3 x 5 = | 27 | 4 x 4 = |
| 6 | 5 x 3 = | 28 | 4 + 4 + 4 + 4 + 4 = |
| 7 | 2 + 2 + 2 + 2 = | 29 | 4 x 5 = |
| 8 | 4 x 2 = | 30 | 5 x 4 = |
| 9 | 2 x 4 = | 31 | 6 + 6 = |
| 10 | 5 + 5 = | 32 | 6 x 2 = |
| 11 | 2 x 5 = | 33 | 2 x 6 = |
| 12 | 5 x 2 = | 34 | 8 + 8 = |
| 13 | 3 + 3 = | 35 | 2 x 8 = |
| 14 | 2 x 3 = | 36 | 8 x 2 = |
| 15 | 3 x 2 = | 37 | 7 + 7 = |
| 16 | 2 + 2 + 2 + 2 + 2 = | 38 | 2 x 7 = |
| 17 | 5 x 2 = | 39 | 7 x 2 = |
| 18 | 2 x 5 = | 40 | 9 + 9 = |
| 19 | 5 + 5 + 5 + 5 = | 41 | 2 x 9 = |
| 20 | 4 x 5 = | 42 | 9 x 2 = |
| 21 | 5 x 4 = | 43 | 6 + 6 + 6 + 6 = |
| 22 | 2 x 2 = | 44 | 4 x 6 = |

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**Solve.**

**3** Yuki has 21 flowers. She puts the same number of flowers on each of 7 pages in her scrapbook to dry them. Draw the flowers Yuki puts on the pages. Write a division equation and a multiplication equation for this problem.
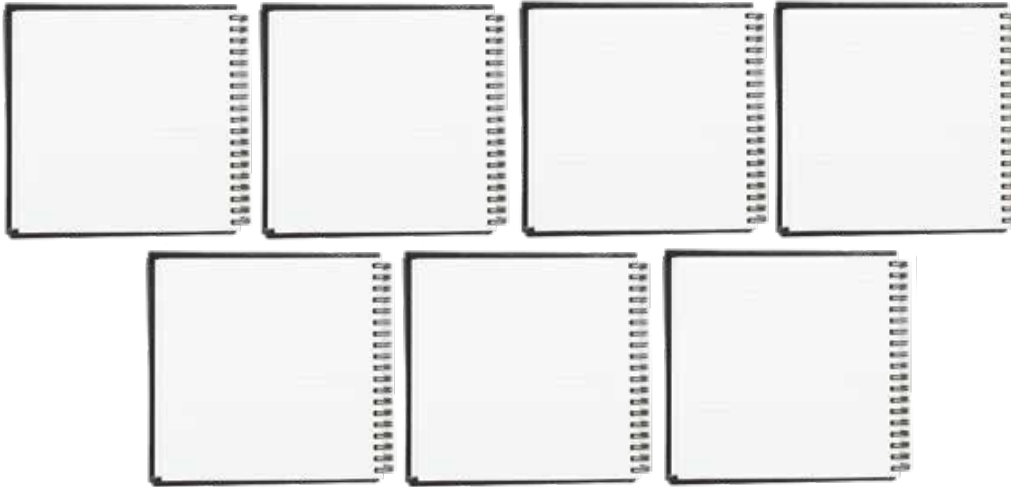
Division equation:            Multiplication equation:

...........................  .         ........................  .

**4** Explain how you could use a multiplication equation to find 21 ÷ 7.

**5** How is multiplication doing the reverse of division?

        

## Practice How Multiplication and Division Are Connected

**Study how the Example shows one way to relate multiplication and division. Then solve problems 1–12.**

### EXAMPLE

Marta bakes **15** muffins. She puts an equal number of muffins in **3** baskets.

She thinks, **3** times what number equals **15**?

$$3 \times ? = 15$$
$$3 \times 5 = 15$$

So, Marta puts **5** muffins in each basket.

**1** Draw an array of 15 muffins in 3 rows.

**2** How many muffins did you put in each row? .................

**3** Fill in the blanks to write a division equation for the array you drew.

.................. $\div$ .................. = ..................

**Use the array to complete the equations.**

**4** $2 \times$ .............. $= 12$   and   $12 \div 2 =$ ..............

**5** $6 \times$ .............. $= 12$   and   $12 \div 6 =$ ..............

Multiply.

| | | | |
|---|---|---|---|
| 3 x 1 = _____ | 3 x 2 = _____ | 3 x 3 = _____ | 3 x 4 = _____ |
| 3 x 5 = _____ | 3 x 1 = _____ | 3 x 2 = _____ | 3 x 1 = _____ |
| 3 x 3 = _____ | 3 x 1 = _____ | 3 x 4 = _____ | 3 x 1 = _____ |
| 3 x 5 = _____ | 3 x 1 = _____ | 3 x 2 = _____ | 3 x 3 = _____ |
| 3 x 2 = _____ | 3 x 4 = _____ | 3 x 2 = _____ | 3 x 5 = _____ |
| 3 x 2 = _____ | 3 x 1 = _____ | 3 x 2 = _____ | 3 x 3 = _____ |
| 3 x 1 = _____ | 3 x 3 = _____ | 3 x 2 = _____ | 3 x 3 = _____ |
| 3 x 4 = _____ | 3 x 3 = _____ | 3 x 5 = _____ | 3 x 3 = _____ |
| 3 x 4 = _____ | 3 x 1 = _____ | 3 x 4 = _____ | 3 x 2 = _____ |
| 3 x 4 = _____ | 3 x 3 = _____ | 3 x 4 = _____ | 3 x 5 = _____ |
| 3 x 4 = _____ | 3 x 5 = _____ | 3 x 1 = _____ | 3 x 5 = _____ |
| 3 x 2 = _____ | 3 x 5 = _____ | 3 x 3 = _____ | 3 x 5 = _____ |
| 3 x 4 = _____ | 3 x 2 = _____ | 3 x 4 = _____ | 3 x 3 = _____ |
| 3 x 5 = _____ | 3 x 3 = _____ | 3 x 2 = _____ | 3 x 4 = _____ |
| 3 x 3 = _____ | 3 x 5 = _____ | 3 x 2 = _____ | 3 x 4 = _____ |

COMMON CORE    Lesson 11:    Model division as the unknown factor in multiplication using arrays and tape diagrams.

Date:    5/6/13

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engage<sup>ny</sup>    1.D.8

Multiply.

| | | | |
|---|---|---|---|
| 3 x 1 = _____ | 3 x 2 = _____ | 3 x 3 = _____ | 3 x 4 = _____ |
| 3 x 5 = _____ | 3 x 6 = _____ | 3 x 7 = _____ | 3 x 8 = _____ |
| 3 x 9 = _____ | 3 x 10 = _____ | 3 x 5 = _____ | 3 x 6 = _____ |
| 3 x 5 = _____ | 3 x 7 = _____ | 3 x 5 = _____ | 3 x 8 = _____ |
| 3 x 5 = _____ | 3 x 9 = _____ | 3 x 5 = _____ | 3 x 10 = _____ |
| 3 x 6 = _____ | 3 x 5 = _____ | 3 x 6 = _____ | 3 x 7 = _____ |
| 3 x 6 = _____ | 3 x 8 = _____ | 3 x 6 = _____ | 3 x 9 = _____ |
| 3 x 6 = _____ | 3 x 7 = _____ | 3 x 6 = _____ | 3 x 7 = _____ |
| 3 x 8 = _____ | 3 x 7 = _____ | 3 x 9 = _____ | 3 x 7 = _____ |
| 3 x 8 = _____ | 3 x 6 = _____ | 3 x 8 = _____ | 3 x 7 = _____ |
| 3 x 8 = _____ | 3 x 9 = _____ | 3 x 9 = _____ | 3 x 6 = _____ |
| 3 x 9 = _____ | 3 x 7 = _____ | 3 x 9 = _____ | 3 x 8 = _____ |
| 3 x 9 = _____ | 3 x 8 = _____ | 3 x 6 = _____ | 3 x 9 = _____ |
| 3 x 7 = _____ | 3 x 9 = _____ | 3 x 6 = _____ | 3 x 8 = _____ |
| 3 x 9 = _____ | 3 x 7 = _____ | 3 x 6 = _____ | 3 x 8 = _____ |

COMMON CORE | Lesson 12: Interpret the quotient as the number of groups or the number of objects in each group using units of 2.
Date: 5/6/13
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engage<sup>ny</sup> 1.D.20