8

Objective

Solve multiplication and division equations.

Common Core State Standards

■ **6.EE.5** Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

■ **6.EE.6** Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

■ **6.EE.7** Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.

Expressions and Equations

Multiplication and Division Equations

Students use variables as placeholders for missing numbers in equations. Arrays demonstrate the inverse relationship between multiplication and division and provide a foundation for the use of symbolic representations to solve equations. To be fluent, students must recognize that a relationship may be expressed in different ways.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

■ **Ask:** *Why can you rewrite a multiplication equation as a division equation?*

■ **Ask:** *What does it mean when we say that division is the inverse of multiplication?*

■ **Ask:** *How can you solve* $p \div 7 = 8$ *using multiplication?*

Solve It

Reread the problem with students. Ask them to explain in writing how they used the relationship between multiplication and division to solve the problem. Have students use the models to help them. Remind students to write the solution to the multiplication equation.

More Ideas

For other ways to teach solving multiplication and division equations—

■ Use Color Tiles to make arrays to solve the problem. Some students may prefer to organize their work by counting out 32 tiles and placing each individual tile in the array.

■ Use Two-Color Counters to model related multiplication and division equations. Provide students with equations such as *6 × a = 66, b × 4 = 56, d ÷ 2 = 14*, and *48 ÷ e = 16.* Have students make stacks of counters to show the multiplication and division equations. Discuss how to use inverse relationships to find the solutions to the equations.

Formative Assessment

Have students try the following problem.

Which equation expresses the solution to n × 5 = 60?

A. 60 − 5 = 55   **C.** 5 × 60 = 300

B. 5 + 60 = 65   **D.** 60 ÷ 5 = 12

Try It!   20 minutes | Groups of 4

Here is a problem about solving multiplication and division equations.

Zoe has 4 bookshelves. If each shelf has the same number of books, and there are 32 books in all, how many books are on each shelf? Write a multiplication equation to represent the number of books on each shelf. Use division to solve the equation.

Introduce the problem. Then have students do the activity to solve the problem. Distribute Cuisenaire Rods, paper, and pencils to students. Suggest that *b* represent the number of books on each shelf.
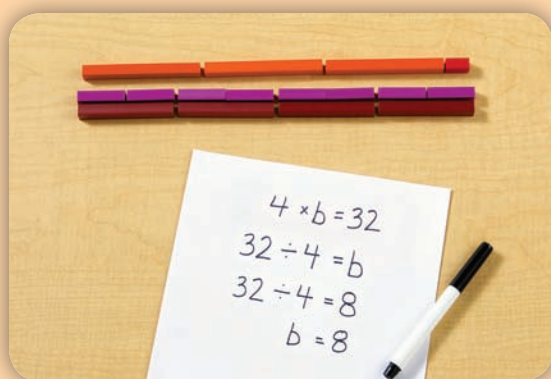
Materials
- Cuisenaire® Rods (2 sets per group)
- paper (1 sheet per group)
- pencils (1 per group)
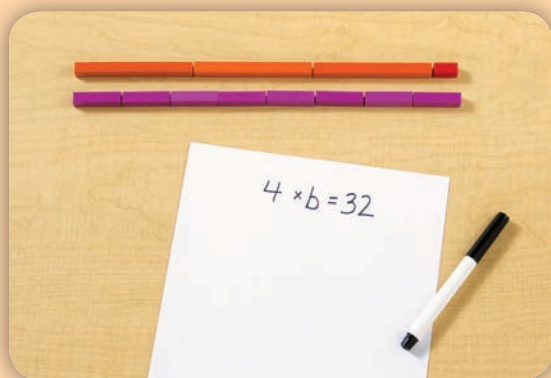
1. Write $4 \times b = 32$ on the board and have students discuss how the equation is related to the problem. Have students use rods to model the equation.
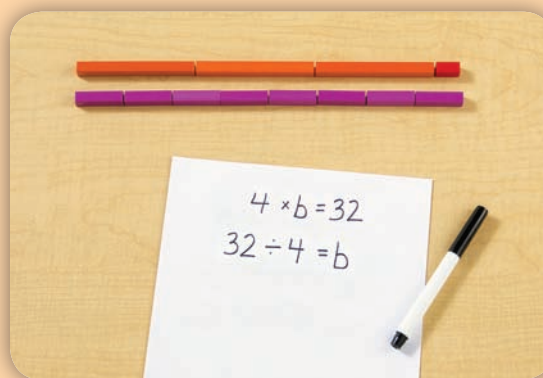
2. Ask: *How can you solve the problem using division? What division equation is shown by the model?* Write $32 \div 4 = b$ on the board.

3. Have students solve for *b*. Have them discuss what each purple rod represents. Tell students to use brown rods to make an alternate version of the model, and ask them to discuss what each brown rod represents.
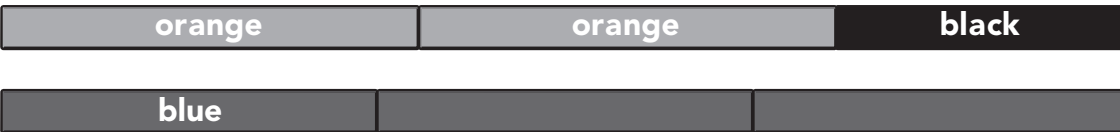
⚠ Look Out!

If students have trouble determining the division equation, they may find it helpful to review multiplication and division fact families. Have them write the four facts that use the numbers *3, 4,* and *12.* Then have them compare the four facts to see how they are alike and how they are different. Have students make a 3 × 4 array and explain how each fact is shown by the array.
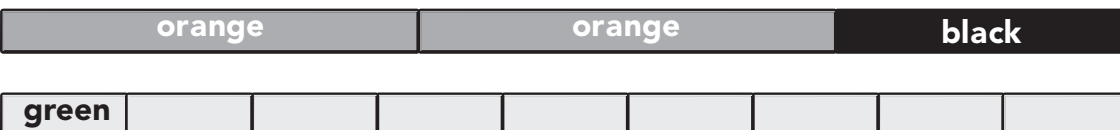
Use Cuisenaire Rods to model the equation. Write a multiplication equation with the variable *z*. Use multiplication or division to solve the equation.

(Check students' work.)

1.

orange	orange	black

blue		

$z \times 9 = 27; z = 3$

2.

orange	orange	black

green							

$z \times 3 = 27; z = 9$

Using Cuisenaire Rods, model the given equation. Sketch the model. Solve the equation.

3. $24 = 8 \times a$

$a = 3$

4. $35 = b \times 5$

$b = 7$

Solve each equation.

5. $12 \times d = 36$

$d = 3$

6. $55 = m \times 11$

$m = 5$

7. $40 = f \times 8$

$f = 5$

8. $9 \times g = 72$

$g = 8$

9. $6 \times h = 54$

$h = 9$

10. $5 \times k = 25$

$k = 5$

Download student pages at hand2mind.com/hosstudent.

Answer Key

Challenge!   How are multiplication and division related? How are the operations used to solve equations in this lesson? Show an example and draw a picture to help.

Challenge: (Sample) Multiplication and division are opposite operations. They "undo" each other when solving equations.

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Name _____

Use Cuisenaire Rods to model the equation. Write a multiplication equation with the variable z. Use multiplication or division to solve the equation.

1.

orange	orange	black

blue		

_____

2.

orange	orange	black

green								

_____

Using Cuisenaire Rods, model the given equation. Sketch the model. Solve the equation.

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Solve each equation.

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Name _____

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