TOPIC 8

LESSON 8.3a

Play It in Reverse

Objective Solving One-Step Multiplication Equations

Warm-Up

Rewrite each fraction as a whole number times a unit fraction.

1. $\frac{4}{5}$

2. $\frac{9}{2}$

GETTING STARTED

Form of 1

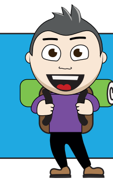
Consider the number 1. What comes to mind?

1. Write five different numeric expressions for the number 1.
Share your numeric expressions with your classmates.

2. Did you and your classmates use common strategies to write your expressions? How many possible numeric expressions could you write for this number?

EXPLORE 1

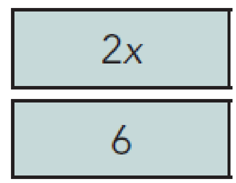
Reasoning About Multiplication Equations



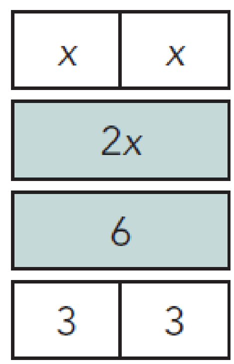
Just as with addition equations, solving multiplication equations involves determining the value for the variable that makes the statement true. You can use bar models to understand the structure of the equation and reason about the solution.

WORKED EXAMPLE

Consider the multiplication equation 2x = 6.
This equation states that for some value of x, the expression 2x is equal to 6.



You can decompose 2x by rewriting it as the equivalent expression 1x + 1x, or x + x.
To maintain equivalence, decompose 6 in a similar way. The bar model demonstrates that these two equations are equivalent.



2x = 6
x + x = 3 + 3

By examining the structure of the second equation, you can see that x = 3.

1. Why is the number 6 decomposed into the numeric expression 3 + 3?

Solve each equation using a bar model.

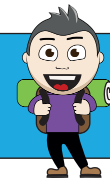
2. 3x = 12

3. 7x = 63

4. 4x = 6

EXPLORE 2

Solving Equations with Fractional Coefficients



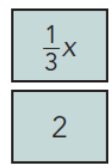
Multiplication equations often include numbers other than whole numbers.

Consider the equation $\frac{1}{3}x = 2$.

1. Explain how this equation compares to the equations in the previous activity.

WORKED EXAMPLE

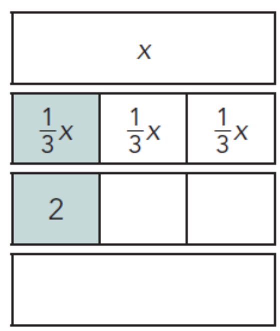
Represent $\frac{1}{3}x = 2$ as a bar model.



To solve this equation for x, compose 3 equally-sized parts to create the whole, x.

To maintain equivalence, compose 3 equally-sized parts for the other expression, too.

This structure allows you to see the value of x.



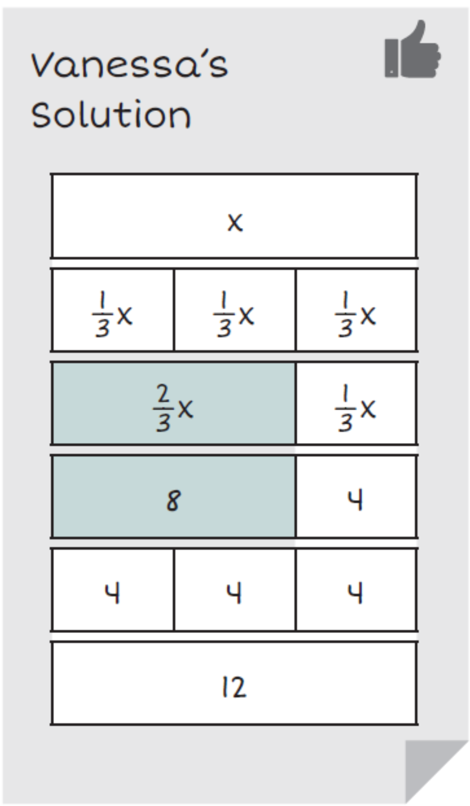
2. Complete the worked example by filling in the missing values.
Then write the solution to the equation $\frac{1}{3}x = 2$.

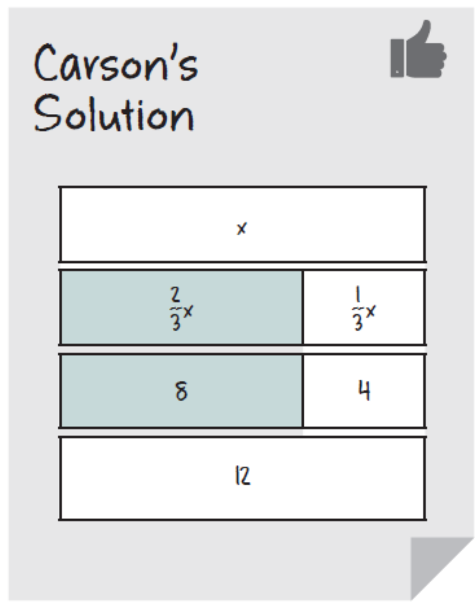
Solve each equation using a bar model.

3. $\frac{1}{4}x = 7$

4. $\frac{x}{4} = 5$

5. Consider how to use bar models to solve $\frac{2}{3}x = 8$.
Analyze each strategy.





a. How is Carson's solution strategy different from Vanessa's solution strategy?

b. What reasoning might Vanessa have used in her solution strategy?

Solve each equation using a bar model.

6. $\frac{4}{5}x = 12$

7. $\frac{3}{4}x = 8$

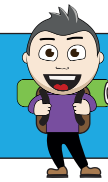
8. Consider the equation $\frac{8}{5}x = 64$.
a. How does this fractional coefficient compare to the fractional coefficients that you have seen in this lesson so far?

b. Create a bar model and solve for x.

Reflect on the equations you solved in this activity.
9. How were they similar? What was common in how you used the bar models?

EXPLORE 3

Solving More Complex Multiplication Equation



Consider the equation $\frac{4}{5}x = \frac{1}{10}$.

1. How is this equation different from the equation you solved in the previous activity?

Compare the two solution strategies proposed by Landon and Zoe.

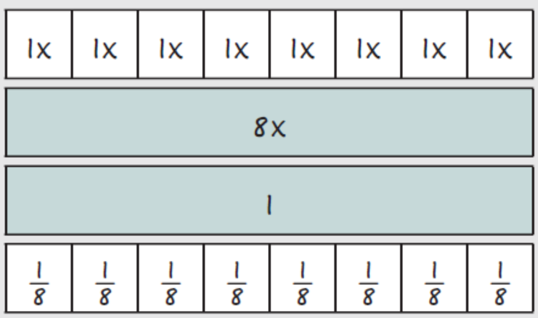
Landon's Solution

$\frac{4}{5}x = \frac{1}{10}$

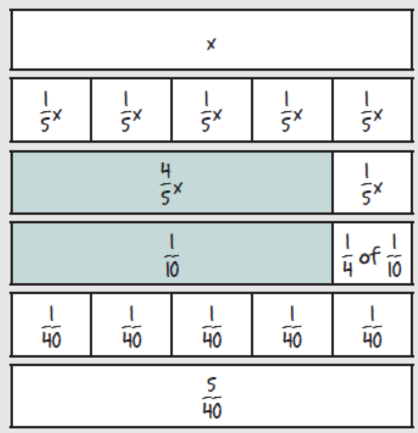
Scale $\frac{4}{5}$ up to $\frac{8}{10}$.

$\frac{8}{10}x = \frac{1}{10}$

$8x = 1$



Zoe's Solution



2. Explain Landon's solution strategy.

a. What type of reasoning did Landon use at the beginning of his solution?

b. How did he know to write 8x = 1?

c. Will scaling up always work?

3. Explain how Zoe's solution is similar to the other equations you have solved with bar models.

Use a bar model to solve each equation.

4. $\frac{3}{4}x = \frac{2}{5}$

5. $\frac{2}{7}x = \frac{4}{9}$

6. You learned to solve addition equations by first reasoning with bar models and then with inverse operations. Now that you have solved multiplication equations by reasoning with bar models, how do you think that you can solve these equations without using the bar models?

Name: ______________________ Date: ____________ Class: __________

HW Homework

LESSON 8.3a

Play It in Reverse

Objective Solving One-Step Multiplication Equations

Review

Solve each equation using a double number line model.

1. $4x - 5 = 7$

2. $\frac{1}{3}x + 2 = 5$

Evaluate each expression for the indicated value.

3. $-\frac{1}{2}a^2 + \frac{5}{6}a^2$, for $a = \frac{6}{7}$

4. $-5.3r - 7.6 + 0.4r$, for $r = -2.4$

Determine each quotient.

5. $2\frac{3}{8} \div -2\frac{1}{2}$

6. $-14.8 \div -1.2$