TOPIC 8

LESSON 8.3b

Formally Yours

7.EE.4a

Objective: Using Inverse Operations to Solve Equations

Warm-Up

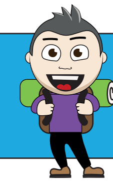
Solve each equation.

1. $2p = -16$

2. $\frac{2}{5}r = 10$

EXPLORE 3

Solving Equations with Efficiency



As you have seen, there are multiple ways to solve equations. Sometimes an efficient strategy involves changing the numbers in the equation—in mathematically appropriate ways!

1. Analyze each correct solution strategy to the equation

$1.1x + 4.3 = 6.2$

Sherry

$$1.1x + 4.3 = 6.2$$
$$1.1x + 4.3 - 4.3 = 6.2 - 4.3$$
$$1.1x = 1.9$$
$$x = \frac{1.9}{1.1}$$
$$x = \frac{19}{11}$$

Maya

$$1.1x + 4.3 = 6.2$$
$$11x + 43 = 62$$
$$11x + 43 - 43 = 62 - 43$$
$$11x = 19$$
$$x = \frac{19}{11}$$

a. Explain how the two solutions strategies are alike and how they are different.

b. What Property of Equality did Maya apply before she started solving the equation?

2. Use Maya's strategy to solve each equation. Then check your solution in the original equation.

a. $-9.6x + 1.8 = -12.3$

b. $2.99x - 1.4 = 13.55$

Now let's consider strategies to solve two different equations that contain fractions.

WORKED EXAMPLE

	$\frac{11}{3}x + 5 = \frac{17}{3}$	$\frac{1}{2}x + \frac{3}{4} = 2$
Step 1:	$3\left(\frac{11}{3}x + 5\right) = 3\left(\frac{17}{3}\right)$	$4\left(\frac{1}{2}x + \frac{3}{4}\right) = 4(2)$
Step 2:	$11x + 15 = 17$	$2x + 3 = 8$
Step 3:	$x = \frac{17 - 15}{11}$	$x = \frac{8 - 3}{2}$
	$= \frac{2}{11}$	$= \frac{5}{2}$

3. Answer each question about the strategies used to solve each equation in the worked example.

a. Explain Step 1. Why might this strategy improve your efficiency with solving equations?

b. What property was applied in Step 2?

c. Explain Step 3.

4. Louise used the strategy from the worked example to solve $3 = \frac{1}{4}x - \frac{1}{4}$. Identify her mistake and determine the correct solution.

Louise

$3 = \frac{1}{4}x - \frac{1}{4}$

$3 = 4\left(\frac{1}{4}x - \frac{1}{4}\right)$

$3 = x - 1$

$4 = x$

5. Use the strategy from the worked example to solve $\frac{2}{3}x + \frac{4}{5} = \frac{5}{3}$. Check your solution in the original equation.

Consider the solution strategies used to solve two more equations.

WORKED EXAMPLE

$-20x + 80 = 230$	$-38 = -6x - 14$
Step 1: $10(-2x + 8) = 10(23)$	$-2(19) = -2(3x + 7)$
Step 2: $-2x + 8 = 23$	$19 = 3x + 7$
Step 3: $x = \frac{23 - 8}{-2} = -\frac{15}{2}$	$\frac{19 - 7}{3} = x$
	$4 = x$

6. Answer each question about the strategies used to solve each equation in the worked example.

a. How is the strategy used in this pair of examples different from the strategies used in Questions 1 and 2?

b. When might you want to use this strategy?

c. Use the strategy from the worked example to solve 44x −24 = 216. Check your solution in the original equation.

Name: ______________________ Date: ____________ Class: __________

Homework HW

LESSON 8.3b

Formally Yours

Objective Using Inverse Operations to Solve Equations

Practice

2. Employees at Driscoll's Electronics earn a base salary plus a 20% commission on their total sales for the year. Suppose the base salary is $40,000.

a. Write an equation to represent the total earnings of an employee. Remember to define your variable(s).

b. Stewart wants to make $65,000 this year. How much must he make in sales to achieve this salary? Write and solve an equation to answer this question.

c. Describe the equation $52{,}000 + 0.3s = 82{,}000$ in terms of the problem situation.

3. The manager of a home store is buying lawn chairs to sell at his store. Each pack of chairs contains 10 chairs. The manager will sell each chair at a markup of 20% of the wholesale cost, plus a $2.50 stocking fee.

a. Write an equation that represents the retail price of a chair, r, in terms of the wholesale price, w.

b. Use your equation to calculate the retail price of the chair if the wholesale price is $8.40.

c. Use your equation to calculate the wholesale price if the retail price is $13.30.