Objective   Using Inverse Operations to Solve Equations

Warm-Up

Solve each equation using the double line method

1. $2.3p = -11.73$

2. $\frac{3}{4}r = 10$

How Does that Work?

Recall that to solve an equation means to determine the value or values for a variable that make the equation true. In the process of solving equations, you must always maintain equality, using the Properties of Equality.

Properties of Equality	For all numbers a, b, and c, . . .
Addition Property of Equality	if $a = b$, then $a + c = b + c$
Subtraction Property of Equality	if $a = b$, then $a - c = b - c$
Multiplication Property of Equality	if $a = b$, then $ac = bc$
Division Property of Equality	if $a = b$ and $c \neq 0$, then $a/c = b/c$

1. Solve $2x + 6 = 13$ using a double number line model.

2. Explain which Properties of Equality you used in the process of solving the equation.

Strategies for Applying Inverse Operations

Throughout this topic, you have written and solved two-step equations. A two-step equation requires two inverse operations, or applying two Properties of Equality, to isolate the variable.

Demaryius, Calvin, and Isaac each solved $2x + 6 = 13$ in a different way. Analyze their solution strategies.

Demaryius 👍

$2x + 6 = 13$

$\frac{2x + 6}{2} = \frac{13}{2}$

$\frac{2(x + 3)}{2} = \frac{13}{2}$

$x + 3 = 6.5$

$\underline{-3 = -3}$

$x = 3.5$

Calvin 👎

$2x + 6 = 13$

$\frac{2x}{2} + 6 = \frac{13}{2}$

$x + 6 = 6.5$

$\underline{-6 = -6}$

$x = 0.5$

Isaac 👍

$2x + 6 = 13$

$\underline{-6 = -6}$

$2x = 7$

$\frac{2x}{2} = \frac{7}{2}$

$\underline{}$

$x = 3.5$

1. Compare and explain the strategies used by Demaryius and Calvin.

2. Compare and explain the strategies used by Demaryius and Isaac.

3. Solve each equation by first applying either the Addition or Subtraction Property of Equality.

a. $56 = -10 + 2x$

b. $6x + 25 = 79$

c. $38 = 4x - 14$

d. $13 + \frac{x}{3} = 35$

4. Solve each equation by first applying either the Multiplication or Division Property of Equality.

a. $56 = -10 + 2x$

b. $6x + 25 = 79$

c. $38 = 4x - 14$

d. $13 + \frac{x}{3} = 35$

1. Shelly is throwing a graduation party. She is sending invitations to her friends and family. She finds a company that charges $6 for a 10-pack of personalized invitations, plus a $5 shipping fee for the entire order, no matter how many 10-packs are ordered. Shelly wants to calculate the cost of an
order, based on the number of packs of invitations she orders.

a. Define variables for the two quantities that are changing in this scenario.

b. Write an equation that represents the total cost of any order based on the number of packs of invitations.

c. Use your equation to determine how many packs of invitations are ordered if the total is $53. What about if the total is $29?

2. Pete's Garage charges $45 per hour for labor when performing auto repairs. The office manager must have the cost of parts and the hours of each job ticket to complete the bills for the customers.

a. Define variables for the three quantities that are changing in this scenario.

b. Write an equation that represents the total cost of the auto repairs.

c. Assume that for a given car, the cost of the parts is $101.
Use your equation to determine how many hours the mechanic worked on the car if the total bill was $269.75.

3. Felicia's Pet Grooming charges $15 for each dog washed and groomed on the weekend. The cost of the dog shampoo and grooming materials for a weekend's worth of grooming is $23.76. Felicia is interested in her weekend profits.

a. Define variables for the two quantities that are changing in this scenario.

b. Write an equation that represents the total profits based on the number of dogs groomed.

c. Use your equation to determine how many dogs Felicia groomed if her profits were $261.24.

LESSON 8.3a
Formally Yours

Homework HW

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Practice

1. Madison Middle School has a Math and Science Club that holds meetings after school. The club has decided to enter a two-day competition that involves different math and science challenges. The first day of competition involves solving multi-step math problems. Teams will receive two points for every problem they get correct in the morning session and three points for every question they get correct in the afternoon session.

a. Write an equation to represent the situation. Remember to define your variable(s).

b. The team scores four points in the morning session, but finishes the day with 28 points. Solve the equation and interpret the solution in the context of the problem.

c. The second day of the competition was the science portion, involving hands-on science problems.Each correct science problem is worth 5 points. If the team started the day with 28 points and ended with 53 points, how many science problems did they get correct? Write and solve an equation toanswer the question.