Solving Two-Step Equations

Warm Up

Solve.

1. $x + 12 = 35$ $x = 23$

2. $8x = 120$ $x = 15$

3. $\frac{y}{9} = 7$ $y = 63$

4. $-34 = y + 56$ $y = -90$

Solving Two-Step Equations

Problem of the Day

x is an odd integer. If you triple x and then subtract 7, you get a prime number. What is the smallest possible x? (*Hint:* What is the smallest prime number?)

$x = 3$

Solving Two-Step Equations

Essential Question

How do you solve two-step equations?

Standard:
MCC8.EE.7: Solve linear equations in one variable.

Remy has $447.50 in a savings account. Each week he deposits $7.50 from his earnings at his after-school job into the account. In how many weeks will Remy have $500 in his savings account?

A Write a two-step equation to represent the situation.

Let w = number of weeks Remy makes deposits.

$7.50w + 447.50 = 500$

B Use a table to help you solve the equation.

First, list the operations in the equation *by the order in which they are applied* to the variable. ↓

Then, undo the operations in the equation in the *reverse* order. ↓

Operations in the Equation	To Solve
1. First, w is _____ by 7.50.	**3.** First, _____ 447.50 from both sides of the equation.
2. Then, 447.50 is _____.	**4.** Then, _____ both sides by 7.50.

C Apply the steps in the "To Solve" column to solve the equation.

$7.50w + 447.50 = 500$ *Use the subtraction property of equality.*

$\quad -\square \quad -\square$ *Subtract.*

$7.50w \quad = \square$

$\frac{7.50w}{\square} = \frac{\square}{\square}$ *Use the division property of equality. Divide.*

$w = \square$

It will take Remy ____ weeks to have $500 in his savings account.

TRY THIS!

Solve each problem by writing and solving a two-step equation.

1a. The length of a backyard is 22 meters. That is 20 feet less than 3.5 times the width of the yard. How wide is the backyard?

$\square w - \square = 22$

$+\square \quad +\square$

$\square w = \square$

$\frac{\square w}{\square} = \frac{\square}{\square}$

$w = \square$

1b. The temperature in an Arctic village is −35°F. That is 10° warmer than 1.5 times as cold as it is in an Alaskan town. What is the temperature in the Alaskan town?

REFLECT

1c. For each problem above, tell which operations are applied to the variable and in what order. Then tell what operations you used to undo them, and in what order you used them.

Mo studied 40 minutes for an exam. That is 8 minutes longer than $\frac{1}{4}$ the number of minutes Leon studied. For how long did Leon study?

A Write a two-step equation to represent the situation.

Let m = number of minutes Leon studied for the exam.

$\frac{1}{4}m + 8 = 40$

B Use a table to help you solve the equation.

Operations in the Equation	To Solve
1. First, m is _____ by ____.	**3.** First, _____ 8 from both sides of the equation.
2. Then, ____ is _____.	**4.** Then, _____ both sides by ____.

C Apply the steps in the "To Solve" column to solve the equation.

$\frac{1}{4}m + 8 = 40$ *Use the subtraction property of equality to isolate the variable.*

$-\_\_\_\_ \quad -\_\_\_\_$ *Subtract the same number from both sides of the equation.*

$\frac{1}{4}m = \_\_\_\_$

$\_\_\_\_ \times \frac{1}{4}m = 32 \times \_\_\_\_$ *Use the multiplication property of equality to isolate the variable.*

$m = \_\_\_\_$ *Multiply both sides of the equation by the same number.*

$m =$ ____ *Multiply both sides of the equation by the same number.*

Leon studied for ____ minutes.

TRY THIS!

Solve each problem by writing and solving an equation.

2a. Leonard sold 15 tickets to his band's concert. That is 5 fewer than half of the number Vera sold. How many tickets did Vera sell?

$\frac{\square}{\square}n - \square = \square$

$+\square \quad +\square$

2b. Dimitri did 18 push-ups. That is 12 more than one-fifth the number Avi did. How many push-ups did Avi do?

$\frac{\square}{\square}n = \square$

$\left(\frac{\square}{\square}\right)\frac{\square}{\square}n = \square\left(\frac{\square}{\square}\right)$

$n = \square$

REFLECT

2c. For each problem above, tell *which operations* are applied to the variable and *in what order*. Then tell what operations you used to undo them, and in what order you used them.

PRACTICE

Tell which operations you will use and in which order you will use them to solve each equation.

1. $4.5n + 22 = 50$ _____

2. $2\frac{3}{4}y - 6 = 10$ _____

3. $25.5 = 2x + 2.75$ _____

Pedro runs a pedicab business that charges customers for rides through the park and around the city. The advertisement shows Pedro's prices.

Go with Pedro's Pedicabs!

Low, Low Prices! Friendly Drivers! Comfy Seats!

$20 for first hour

Name _____ Class _____ Date _____

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Additional Practice

1. The school purchased baseball equipment and uniforms for a total cost of $1762. The equipment costs $598 and the uniforms were $24.25 each. How many uniforms did the school purchase?

2. Carla runs 4 miles every day. She jogs from home to the school track, which is $\frac{3}{4}$ mile away. She then runs laps around the $\frac{1}{4}$-mile track. Carla then jogs home. How many laps does she run at the school?

Video

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Solve.

3. $\frac{a+5}{3}=12$ _____

4. $\frac{x+2}{4}=-2$ _____

5. $\frac{y-4}{6}=-3$ _____

6. $\frac{k+1}{8}=7$ _____

7. $0.5x-6=-4$ _____

8. $\frac{x}{2}+3=-4$ _____

9. $\frac{1}{5}n+3=6$ _____

10. $2a-7=-9$ _____

11. $\frac{3x-1}{4}=2$ _____

12. $-7.8=4.4+2r$ _____

13. $\frac{-4w+5}{-3}=-7$ _____

14. $1.3-5r=7.4$ _____

15. A phone call costs \$0.58 for the first 3 minutes and \$0.15 for each additional minute. If the total charge for the call was \$4.78, how many minutes was the call? _____

16. Seventeen less than four times a number is twenty-seven. Find the number. _____