

Solving Two-Step Equations

Know it!
Note

Lesson Objectives

Solve two-step equations

Additional Examples

Example 1

Solve.

$$9c + 3 = 39$$

$$\begin{array}{r} -3 \\ -3 \end{array}$$

Subtract 3 from both sides.

$$9c = 36$$

$$\begin{array}{r} 9 \\ 9 \end{array}$$

Divide both sides by 9.

$$c = 4 \quad \text{check. } 9 \cdot 4 + 3 = 39 \checkmark$$

P
E
MD
AS
↑
backwards

Example 2

Solve.

$$6 + \frac{y}{5} = 21$$

$$\begin{array}{r} -6 \\ -6 \end{array}$$

Subtract 6 from both sides.

$$\frac{y}{5} = 15$$

$$\begin{array}{r} 5 \\ 5 \end{array} \frac{y}{5} = \begin{array}{r} 5 \\ 5 \end{array} 15$$

Multiply both sides by 5.

$$y = 75 \quad \text{c: } 6 + \frac{75}{5} = 21 \checkmark$$

Example 3

Jamie rented a canoe while she was on vacation. She paid a flat rental fee of \$85.00 plus \$7.50 each day. Her total cost was \$130.00. For how many days did she rent the canoe?

Let d represent the number of days she rented the canoe.

$$7.5d + 85 = 130$$

$$\begin{array}{r} -85 \\ -85 \end{array}$$

Subtract 85 from both sides.

$$7.5d = 45$$

$$\begin{array}{r} 7.5 \\ 7.5 \end{array}$$

Divide both sides by 7.5.

$$d = 6$$

Jamie rented the canoe for 6 days.

Try This

1. Solve.

$$-6m - 8 = -50$$

$$\begin{array}{r} -6 \cdot 7 - 8 = -50 \checkmark \\ -6m - 8 = -50 \\ +8 \quad +8 \\ \hline -6m = -42 \\ \hline -6 \quad -6 \\ \hline m = 7 \end{array}$$

2. Solve.

$$8 + \frac{y}{2} = 48$$

3. Jack's father rented a car while they were on vacation. He paid a rental fee of \$20.00 per day plus 20¢ a mile. He paid \$25.00 for mileage and his total bill for renting the car was \$165.00. For how many days did he rent the car?

$x = \# \text{ of days}$

$$20x + 25 = 165$$

$$\begin{array}{r} 8 + \frac{y}{2} = 48 \\ -8 \quad -8 \\ \hline \frac{y}{2} = 40 \\ \hline y = 80 \end{array}$$

$$2 \cdot \frac{y}{2} = 40 \cdot 2$$

$$20x + 25 = 165$$

$$\underline{-25 \quad -25}$$

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$$20x = 140 \quad x = 7 \text{ days}$$

$$\underline{20 \quad 20}$$

LESSON

Reteach

12-1

Solving Two-Step Equations

You can solve two-step equations by undoing one operation at a time. First undo any addition or subtraction, then undo any multiplication or division.

Complete the steps to solve each equation.

1. $7x + 3 = 31$

$7x + 3 - \underline{\quad} = 31 - \underline{\quad}$ ← Subtract $\underline{\quad}$ from both sides to undo addition.

$$7x = 28$$

$\frac{7x}{\underline{7}} = \frac{28}{\underline{7}}$ ← Divide both sides by $\underline{\quad}$ to undo multiplication.

$$x = 4$$

Check

$$7x + 3 = 31$$

$7(\underline{4}) + 3 \stackrel{?}{=} 31$ ← Substitute $\underline{\quad}$ for x .

$$\underline{28} + 3 \stackrel{?}{=} 31$$

$31 \stackrel{?}{=} 31$ ✓ ← 4 is a solution.

2. $\frac{n}{6} - 8 = 4$

$$\frac{n}{6} - 8 + \underline{\quad} = 4 + \underline{\quad}$$

$$\frac{n}{6} = 12$$

$$\cancel{6} \cdot \frac{n}{\cancel{6}} = \underline{\quad} \cdot 12$$

$$n = \underline{\quad}$$

3. $8a - 5 = 11$

$$8a - 5 + \underline{\quad} = 11 + \underline{\quad}$$

$$8a = \underline{\quad}$$

$$\frac{8a}{\underline{8}} = \frac{16}{\underline{8}}$$

$$a = \underline{\quad}$$

4. $9 + \frac{w}{2} = 12$

$$9 - \underline{\quad} + \frac{w}{2} = 12 - \underline{\quad}$$

$$\frac{w}{2} = \underline{\quad}$$

$$\cancel{2} \cdot \frac{w}{\cancel{2}} = \underline{\quad} \cdot 3$$

$$w = \underline{\quad}$$

Solve.

5. $4n + 11 = 27$

6. $\frac{z}{7} - 6 = 3$

$$3 - 2(5) = -7$$

$$7. 3 - 2k = -7$$

$$\underline{-3 \quad -3}$$

$$\underline{-2k = -10}$$

$$\underline{-2 \quad -2}$$

$$k = 5$$

LESSON 12-1 Practice A
Solving Two-Step Equations

Solve each equation. Cross out each number in the box that matches a solution.

- | | | | | | | | | | | |
|---|----|----|----|-----|----|---|---|---|---|----|
| 6 | -8 | -4 | -6 | -18 | -3 | 2 | 4 | 8 | 3 | 18 |
|---|----|----|----|-----|----|---|---|---|---|----|

1. $5x + 8 = 23$ ✓
 $5 \cdot 3 + 8 = 23$

$$\begin{array}{r} 5x + 8 = 23 \\ -8 \quad -8 \\ \hline 5x = 15 \\ \frac{5}{5} \quad \frac{5}{5} \\ \hline x = 3 \end{array}$$

2. $-2p - 4 = 2$ ✓
 $-2 \cdot (-3) - 4 = 2$

$$\begin{array}{r} -2p - 4 = 2 \\ +4 \quad +4 \\ \hline -2p = 6 \\ \frac{-2}{-2} \quad \frac{-2}{-2} \\ \hline p = -3 \end{array}$$

3. $6a - 11 = 13$

4. $4n + 12 = 4$

5. $9g + 2 = 20$

6. $\frac{k}{6} + 8 = 5$

$$\begin{array}{r} \frac{k}{6} + 8 = 5 \\ -8 \quad -8 \\ \hline \frac{k}{6} = -3 \\ 6 \cdot \frac{k}{6} = -3 \cdot 6 \\ \hline k = -18 \end{array}$$

7. $\frac{s}{3} - 4 = 2$

8. $\frac{c}{2} + 5 = 1$

9. $9 + \frac{a}{6} = 8$

Solve. Check each answer.

10. $3v - 12 = 15$

11. $8 + 5x = -2$

12. $\frac{d}{4} - 9 = -3$

$$\begin{array}{r} \frac{d}{4} - 9 = -3 \\ +9 \quad +9 \\ \hline \frac{d}{4} = 6 \\ 4 \cdot \frac{d}{4} = 6 \cdot 4 \\ \hline d = 24 \end{array}$$

13. An electrician charges \$50 to come to your house. He also charges \$25 for each hour he spends at your house. The electrician charges you a total of \$125. How many hours did he spend at your house?

$x = \# \text{ of hours } x = 3 \text{ hrs}$

$$\begin{array}{r} 25x + 50 = 125 \\ -50 \quad -50 \\ \hline 25x = 75 \end{array}$$