



Solving Two-Step Equations

CA Standards
AF 1.1
AF 4.1

Goal: Solve two-step equations.

EXAMPLE 1 Solving Two-Step Equations

Solve the equation. Check your solution.

a. $2x - 3 = 5$

b. $5x + 1 = 26$

Solution

a. $2x - 3 = 5$
 $2x - 3 + \boxed{3} = 5 + \boxed{3}$

$$2x = \boxed{8}$$

$$\frac{2x}{\boxed{2}} = \frac{\boxed{8}}{\boxed{2}}$$

$$x = \boxed{4}$$

Answer The solution is $\boxed{4}$.

✓ **Check** $2(\boxed{4}) - 3 \stackrel{?}{=} 5$
 $\boxed{5} = 5$ ✓

b. $5x + 1 = 26$
 $5x + 1 - \boxed{1} = 26 - \boxed{1}$

$$5x = \boxed{25}$$

$$\frac{5x}{\boxed{5}} = \frac{\boxed{25}}{\boxed{5}}$$

$$x = \boxed{5}$$

Answer The solution is $\boxed{5}$.

✓ **Check** $5(\boxed{5}) + 1 = 26$
 $\boxed{26} = 26$ ✓

Write original equation.

Add $\boxed{3}$ to each side. (Addition property of equality)

Simplify.

Divide each side by $\boxed{2}$. (Division property of equality)

Simplify.

Substitute $\boxed{4}$ for x .

Solution checks.

Write original equation.

Subtract $\boxed{1}$ from each side. (Subtraction property of equality)

Simplify.

Divide each side by $\boxed{5}$. (Division property of equality)

Simplify.

Substitute $\boxed{5}$ for x .

Solution checks.

EXAMPLE 2 Multiple Choice Practice

Sightseeing Your family paid \$180 to rent a plane to tour the Grand Canyon. The tour company charged \$35 per hour, plus a fuel fee of \$75. How many hour(s) did your family rent the plane?

- (A) $\frac{1}{2}$ hour (B) 1 hour
 (C) 2 hours (D) 3 hours

Solution

Write and solve a two-step equation to find h , the number of hours your family rented the plane. Begin by writing a verbal model.

$$\boxed{\text{Total cost}} = \boxed{\text{Cost per hour}} \cdot \boxed{\text{Number of hours}} + \boxed{\text{Fuel fee}}$$

$$\boxed{180} = 35h + \boxed{75} \quad \text{Write an algebraic model.}$$

$$\boxed{180} - \boxed{75} = 35h + \boxed{75} - \boxed{75} \quad \text{Subtract } \boxed{75} \text{ from each side.}$$

$$\boxed{105} = 35h \quad \text{Simplify.}$$

$$\frac{\boxed{105}}{\boxed{35}} = \frac{35h}{\boxed{35}} \quad \text{Divide each side by } \boxed{35}.$$

$$\boxed{3} = h \quad \text{Simplify.}$$

Answer: Your family rented the plane for $\boxed{3}$ hours. The correct answer is \boxed{D} . (A) (B) (C) (D)

Guided Practice Complete the following exercise.

1. Your family paid \$224 to rent a boat to tour Chesapeake Bay. The marina charged \$26 per hour plus a fuel fee of \$42. For how many hours did your family rent the boat?

EXAMPLE 3 Solving with a Variable in the Numerator

$$\frac{x}{5} - 11 = 4 \quad \text{Original equation}$$

$$\frac{x}{5} + 11 = 4 + 11 \quad \text{Add 11 to each side (Addition property of equality)}$$

$$\frac{x}{5} = 15 \quad \text{Simplify.}$$

$$\frac{x}{5} \cdot 5 = 15 \cdot 5 \quad \text{Multiply each side by 5. (Multiplication property of equality)}$$

$$x = 75 \quad \text{Simplify.}$$

EXAMPLE 4 Solving with a Negative Coefficient

$$6 = 18 - 4x \quad \text{Original equation}$$

$$6 - 18 = 18 - 4x - 18 \quad \text{Subtract 18 from each side. (Subtraction property of equality)}$$

$$-12 = -4x \quad \text{Simplify.}$$

$$\frac{-12}{-4} = \frac{-4x}{-4} \quad \text{Divide each side by -4 (Division property of equality)}$$

$$3 = x \quad \text{Simplify.}$$

Guided Practice Solve the equation. Check your answer.

2. $17 = 10 + \frac{a}{2}$

3. $\frac{y}{3} - 1 = 9$

4. $-8x + 5 = 29$

5. $2 = 11 - t$

Homework