

3.2

Solve Two-Step Equations

Goal • Solve two-step equations.

Your Notes

IDENTIFYING OPERATIONS

Identify the operations involved in the equation $3x + 7 = 19$.

Operations performed on x	Operations to isolate x
1. Multiply by ____.	1. Subtract ____.
2. Add ____.	2. Divide by ____.

When solving a two-step equation, apply the inverse operations in the reverse order of the order of operations.

Example 1 Solve a two-step equation

Solve $3x + 7 = 19$.

Solution

$$3x + 7 = 19$$

$$3x + 7 - \underline{\quad} = 19 - \underline{\quad}$$

$$3x = \underline{\quad}$$

$$\frac{3x}{\square} = \frac{12}{\square}$$

$$x = \underline{\quad}$$

The solution is ____.

CHECK

$$3x + 7 = 19$$

$$3(\underline{\quad}) + 7 \stackrel{?}{=} 19$$

$$\underline{\quad} + 7 \stackrel{?}{=} 19$$

$$\underline{\quad} = 19 \checkmark$$

Write original equation.

Subtract ____ from each side.

Simplify.

Divide each side by ____.

Simplify.

Write original equation.

Substitute ____ for x .

Multiply 3 by ____.

Simplify. Solution checks.

Your Notes

✓ **Checkpoint** Solve the two-step equation. Check your solution.

1. $\frac{r}{4} - 12 = -5$	2. $7k - 14 = 42$
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Example 2 Solve a two-step equation by combining like terms

Solve $4a + 3a = 63$.

Solution

$$4a + 3a = 63$$

Write original equation.

$$\underline{\hspace{2cm}} = 63$$

Combine like terms.

$$\frac{\boxed{}}{\boxed{}} = \frac{63}{\boxed{}}$$

Divide each side by $\underline{\hspace{1cm}}$.

$$a = \underline{\hspace{1cm}}$$

Simplify.

The solution is $\underline{\hspace{1cm}}$.

CHECK

$$4a + 3a = 63$$

Write original equation.

$$4(\underline{\hspace{1cm}}) + 3(\underline{\hspace{1cm}}) \stackrel{?}{=} 63$$

Substitute $\underline{\hspace{1cm}}$ for a .

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} \stackrel{?}{=} 63$$

Multiply 4 by $\underline{\hspace{1cm}}$ and 3 by $\underline{\hspace{1cm}}$.

$$\underline{\hspace{1cm}} = 63 \checkmark$$

Add. Solution checks.

✓ **Checkpoint** Solve the equation. Check your solution.

3. $5z + 4z = 36$	4. $5b - 2b = 9$
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Your Notes

Example 3 Find an input of a function

The output of a function is 2 more than 4 times the input. Find the input when the output is 14.

Solution

Step 1 Write an equation for the function. Let x be the input and y be the output.

$$y = \underline{\hspace{2cm}} \quad y \text{ is 2 more than 4 times } x.$$

Step 2 Solve the equation when $y = 14$.

$$y = \underline{\hspace{2cm}} \quad \text{Write original function.}$$

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} \quad \text{Substitute } \underline{\hspace{1cm}} \text{ for } y.$$

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} \quad \text{Subtract } \underline{\hspace{1cm}} \text{ from each side.}$$

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} \quad \text{Simplify.}$$

$$\frac{\boxed{\hspace{1cm}}}{\boxed{\hspace{1cm}}} = \frac{\boxed{\hspace{1cm}}}{\boxed{\hspace{1cm}}}$$

$$\text{Divide each side by } \underline{\hspace{1cm}}.$$

$$\underline{\hspace{2cm}} = x \quad \text{Simplify.}$$

An input of $\underline{\hspace{1cm}}$ produces an output of $\underline{\hspace{1cm}}$.

CHECK

$$y = \underline{\hspace{2cm}} \quad \text{Write original function.}$$

$$\underline{\hspace{2cm}} \stackrel{?}{=} \underline{\hspace{2cm}} \quad \text{Substitute } \underline{\hspace{1cm}} \text{ for } y \text{ and } \underline{\hspace{1cm}} \text{ for } x.$$

$$\underline{\hspace{2cm}} \stackrel{?}{=} \underline{\hspace{2cm}} \quad \text{Multiply } \underline{\hspace{1cm}} \text{ and } \underline{\hspace{1cm}}.$$

$$\underline{\hspace{2cm}} = \underline{\hspace{2cm}} \quad \checkmark \quad \text{Simplify. Solution checks.}$$

Checkpoint Solve the equation. Check your solution.

Homework

5. The output of a function is 3 less than 6 times the input. Find the input when the output is 15.