3.4 Solve Equations with Variables on Both Sides

Goal • Solve equations with variables on both sides.

Your Notes

VOCABULARY

Identity

Example 1 *Solve an equation with variables on both sides*

Solve $15 + 4a = 9a - 5$.

Solution

Collect variables on one side of the equation and constant terms on the other to solve equations with variables on both sides.

$15 + 4a = 9a - 5$	Write original equation.
$\quad\quad\quad\quad = \quad\quad\quad\quad$	Subtract ____ from each side.
$15 = \_\_\_\_ - 5$	Simplify.
$\quad\quad\quad\quad =$	Add ___ to each side.
$\_\_\_\_ = \_\_\_\_$	Simplify.
$\frac{\square}{\square} = \frac{\square}{\square}$	Divide each side by ___.
$\_\_\_ = a$	Simplify.

The solution is ___.

CHECK

$15 + 4a = 9a - 5$	Write original equation.
$15 + 4(\_\_\_) \stackrel{?}{=} 9(\_\_\_) - 5$	Substitute ___ for a.
$15 + \_\_\_\_ \stackrel{?}{=} \_\_\_\_ - 5$	Multiply.
$\_\_\_\_ = \_\_\_\_$ ✓	Solution checks.

Example 2 *Solve an equation with grouping symbols*

Solve $4t - 12 = 6(t + 3)$.

Solution

$4t - 12 = 6(t + 3)$	Write original equation.
$4t - 12 =$ ____ + ____	Distributive property
$=$	Subtract ____ from each side.
____ $=$ ____	Subtract ____ from each side.
____ $= t$	Divide each side by ____.

Checkpoint Solve the equation. Check your solution.

1. $3b + 7 = 8b + 2$	2. $6d - 6 = \frac{3}{4}(4d + 8)$

Example 3 *Identify the number of solutions of an equation*

Solve the equation, if possible.

a. $4x + 5 = 4(x + 5)$ b. $6x - 3 = 3(2x - 1)$

Solution

a. $4x + 5 = 4(x + 5)$ **Original equation**

$4x + 5 =$ _____ **Distributive property**

The equation $4x + 5 =$ _____ is _____ because the number $4x$ _____ equal to 5 more than itself and ____ more than itself. So, the equation has ____ solution.

b. $6x - 3 = 3(2x - 1)$ **Original equation**

$6x - 3 =$ _____ **Distributive property**

The statement $6x - 3 =$ _____ is _____ for all values of x. So, the equation is an _____.

Your Notes

Checkpoint Solve the equation, if possible.

3. $\frac{1}{2}(4t - 6) = 2t$

4. $10m - 4 = -2(2 - 5m)$

3.4 Notes

Checkpoint

① $3b + 7 = 8b + 2$

② $6d - 6 = \frac{3}{4}(4d + 8)$

③ $\frac{1}{2}(4t - 6) = 2t$

④ $10m - 4 = -2(2 - 5m)$