3.3 Solve Multi-Step Equations

Goal • Solve multi-step equations.

Your Notes

Example 1 *Solve an equation by combining like terms*

Solve $3t + 5t - 5 = 11$.

Solution

$3t + 5t - 5 = 11$	Write original equation.
$\underline{8t} - 5 = 11$	Combine like terms.
$\underline{8t} - 5 + \underline{5} = 11 + \underline{5}$	Add $\underline{5}$ to each side.
$\underline{8t} = \underline{16}$	Simplify.
$\dfrac{\boxed{8t}}{\boxed{8}} = \dfrac{\boxed{16}}{\boxed{8}}$	Divide each side by $\underline{8}$.
$t = \underline{2}$	Simplify.

Example 2 *Solve an equation using the distributive property*

Solve $5a + 3(a + 2) = 22$.

Solution

When solving an equation, you may feel comfortable doing some steps mentally. Method 2 shows a solution where some steps are done mentally.

Method 1
Show All Steps

$5a + 3(a + 2) = 22$

$5a + \underline{3a} + \underline{6} = 22$

$\underline{8a} + \underline{6} = 22$

$\underline{8a + 6 - 6} = 22 - \underline{6}$

$\underline{8a} = 16$

$\dfrac{\boxed{8a}}{\boxed{8}} = \dfrac{16}{\boxed{8}}$

$a = \underline{2}$

Method 2
Do Some Steps Mentally

$5a + 3(a + 2) = 22$

$5a + \underline{3a} + \underline{6} = 22$

$\underline{8a} + \underline{6} = 22$

$\underline{8a} = 16$

$a = \underline{2}$

✔ *Guided Practice* Solve the equation. Check your solution.

1. $9d - 4d - 2 = 18$ $d = 4$	**2.** $2x + 7(x - 3) = 6$ $x = 3$
3. $3w + 4 + w = 36$ $w = 8$	**4.** $40 = 2(10 + 4k) + 2k$ $k = 2$

Example 3   *Multiply by a reciprocal to solve an equation*

Solve $\frac{3}{4}(a - 5) = 9$.

Solution

$$\frac{3}{4}(a - 5) = 9 \qquad \text{Write original equation.}$$

$$\left(\frac{4}{3}\right) \cdot \frac{3}{4}(a - 5) = \left(\frac{4}{3}\right) \cdot 9 \qquad \text{Multiply each side by } \frac{4}{3}.$$

$$a - 5 = \underline{12} \qquad \text{Simplify.}$$

$$a - 5 + \underline{5} = 12 + \underline{5} \qquad \text{Add } \underline{5} \text{ to each side.}$$

$$a = \underline{17} \qquad \text{Simplify.}$$

✔ *Guided Practice* Solve the equation. Check your solution.

Homework

5. $\frac{1}{2}(4x - 2) = 7$ $x = 4$	**6.** $\frac{5}{6}(2y + 4) = 10$ $y = 4$