EXAMPLE 4 Solve an equation using the distributive property

Solve $3(5x - 8) = -2(-x + 7) - 12x$.

$3(5x - 8) = -2(-x + 7) - 12x$ — Write original equation.

$15x - 24 = 2x - 14 - 12x$ — Distributive property

$15x - 24 = -10x - 14$ — Combine like terms.

$25x - 24 = -14$ — Add $10x$ to each side.

$25x = 10$ — Add 24 to each side.

$x = \frac{2}{5}$ — Divide each side by 25 and simplify.

▶ The solution is $\frac{2}{5}$.

CHECK $3\left(5 \cdot \frac{2}{5} - 8\right) \stackrel{?}{=} -2\left(-\frac{2}{5} + 7\right) - 12 \cdot \frac{2}{5}$ — Substitute $\frac{2}{5}$ for x.

$3(-6) \stackrel{?}{=} \frac{4}{5} - 14 - \frac{24}{5}$ — Simplify.

$-18 = -18$ ✓ — Solution checks.

EXAMPLE 5 Solve a work problem

CAR WASH It takes you 8 minutes to wash a car and it takes a friend 6 minutes to wash a car. How long does it take the two of you to wash 7 cars if you work together?

Solution

STEP 1 **Write** a verbal model. Then write an equation.

Your rate (cars/minute)	·	Time (minutes)	+	Friend's rate (cars/minute)	·	Time (minutes)	=	Cars washed (cars)
$\frac{1 \text{ car}}{8 \text{ min}}$	·	t min	+	$\frac{1 \text{ car}}{6 \text{ min}}$	·	t min	=	7 cars

STEP 2 **Solve** the equation for t.

$\frac{1}{8}t + \frac{1}{6}t = 7$ — Write equation.

$24\left(\frac{1}{8}t + \frac{1}{6}t\right) = 24(7)$ — Multiply each side by the LCD, 24.

$3t + 4t = 168$ — Distributive property

$7t = 168$ — Combine like terms.

$t = 24$ — Divide each side by 7.

AVOID ERRORS
Be sure to multiply *both* sides of the equation by the LCD, not just one side.

▶ It will take 24 minutes to wash 7 cars if you work together.

CHECK You wash $\frac{1}{8} \cdot 24 = 3$ cars and your friend washes $\frac{1}{6} \cdot 24 = 4$ cars in 24 minutes. Together, you wash 7 cars. ✓

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