

# Rewriting Literal Equations

An equation that has two or more variables is called a **literal equation**. To rewrite a literal equation, solve for one variable in terms of the other variable(s).

**Example 1** Solve each literal equation for  $y$ .

a.  $3x + 5y = 45$

$$3x - 3x + 5y = 45 - 3x \quad \text{Subtract } 3x \text{ from each side.}$$

$$5y = 45 - 3x \quad \text{Simplify.}$$

$$\frac{5y}{5} = \frac{45 - 3x}{5} \quad \text{Divide each side by 5.}$$

$$y = 9 - \frac{3}{5}x \quad \text{Simplify.}$$

► The rewritten literal equation is  $y = 9 - \frac{3}{5}x$ .

b.  $2xy + 5y = 7$

$$y(2x + 5) = 7 \quad \text{Distributive Property}$$

$$\frac{y(2x + 5)}{2x + 5} = \frac{7}{2x + 5} \quad \text{Divide each side by } 2x + 5.$$

$$y = \frac{7}{2x + 5} \quad \text{Simplify.}$$

► The rewritten literal equation is  $y = \frac{7}{2x + 5}$ .

c.  $2x = \frac{3 + y}{y}$

$$2x \cdot y = \frac{3 + y}{y} \cdot y \quad \text{Multiply each side by } y.$$

$$2xy = 3 + y \quad \text{Simplify.}$$

$$2xy - y = 3 + y - y \quad \text{Subtract } y \text{ from each side.}$$

$$2xy - y = 3 \quad \text{Simplify.}$$

$$y(2x - 1) = 3 \quad \text{Distributive Property}$$

$$\frac{y(2x - 1)}{2x - 1} = \frac{3}{2x - 1} \quad \text{Divide each side by } 2x - 1.$$

$$y = \frac{3}{2x - 1} \quad \text{Simplify.}$$

► The rewritten literal equation is  $y = \frac{3}{2x - 1}$ .

## Practice

Check your answers at [BigIdeasMath.com](http://BigIdeasMath.com).

Solve the literal equation for  $y$ .

1.  $x + 3y = 9$

2.  $4x - 2y = 16$

3.  $2x + 7y = 5$

4.  $2x + 3y = 6$

5.  $5x - 4y = 10$

6.  $x - 2y = 8$

7.  $2xy - 6 = 8x$

8.  $4x = 9y + xy$

9.  $4yz = 3y - 8x$

10.  $2xy = 3z + 4y$

11.  $\frac{2 + 7y}{y} = x$

12.  $3x = \frac{5 + y}{y}$