Name _____ Date _____

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. $3x + 5y = 45$

$3x - 3x + 5y = 45 - 3x$ Subtract $3x$ from each side.

$5y = 45 - 3x$ Simplify.

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

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

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

b. $2xy + 5y = 7$

$y(2x + 5) = 7$ Distributive Property

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

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

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

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

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

$2xy = 3 + y$ Simplify.

$2xy - y = 3 + y - y$ Subtract y from each side.

$2xy - y = 3$ Simplify.

$y(2x - 1) = 3$ Distributive Property

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

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

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

Practice

Check your answers at BigIdeasMath.com.

Solve the literal equation for y.

1. $x + 3y = 9$
   $y = 3 - \frac{1}{3}x$
2. $4x - 2y = 16$
   $y = -8 + 2x$
3. $2x + 7y = 5$
   $y = \frac{5}{7} - \frac{2}{7}x$
4. $2x + 3y = 6$
   $y = 2 - \frac{2}{3}x$
5. $5x - 4y = 10$
   $y = -\frac{5}{2} + \frac{5}{4}x$
6. $x - 2y = 8$
   $y = -4 + \frac{1}{2}x$
7. $2xy - 6 = 8x$
   $y = \frac{3}{x} + 4$
8. $4x = 9y + xy$
   $y = \frac{4x}{x + 9}$
9. $4yz = 3y - 8x$
   $y = \frac{8x}{3 - 4z}$
10. $2xy = 3z + 4y$
    $y = \frac{3z}{2(x - 2)}$
11. $\frac{2 + 7y}{y} = x$
    $y = \frac{2}{x - 7}$
12. $3x = \frac{5 + y}{y}$
    $y = \frac{5}{3x - 1}$