

Solving For a Variable Guided Practice

Definitions

- An Equation is a mathematical sentence that contains an equal sign (=).
Ex: $2x+3=10$
- A Formula is an equation that states a rule for the relationship between certain quantities.
Ex: $y=mx+b$

Examples

1. Solve $-5x - y = -56$ for x.

$$\begin{array}{r} -y \quad -y \\ -5x = -56 - y \\ \hline -5 \quad -5 \\ \boxed{x = \frac{-56 - y}{-5}} \end{array}$$

2. Solve $2x - y = 7$ for x.

$$\begin{array}{r} +y \quad +y \\ 2x = 7 + y \\ \hline 2 \quad 2 \\ \boxed{x = \frac{7 + y}{2}} \end{array}$$

3. Solve $\frac{y+1}{a} = b$ for y.

$$\begin{array}{r} y+1 = \frac{b}{a} - 1 \\ \hline \boxed{y = \frac{b}{a} - 1} \end{array}$$

4. Solve $\frac{b-4x}{7} = a$ for b.

$$\begin{array}{r} \cancel{7} \cdot \frac{b-4x}{\cancel{7}} = 7(a) \\ b-4x = 7a \\ +4x \quad +4x \\ \boxed{b = 7a + 4x} \end{array}$$

On Your Own... Solve for the given variable.

1. $P = \frac{4w}{h^2}$ for w.

$$\begin{array}{r} h^2 \cdot P = \frac{4w}{4} \\ \boxed{w = \frac{h^2 \cdot P}{4}} \end{array}$$

2. $P = 2l + 2w$ for l.

$$\begin{array}{r} P - 2w = 2l \\ \hline 2 \quad 2 \\ \boxed{l = \frac{P - 2w}{2}} \end{array}$$

3. $8c = 4d + 12$ for d.

$$\begin{array}{r} 8c - 12 = 4d \\ \hline 4 \quad 4 \\ \boxed{d = \frac{8c - 12}{4} = 2c - 3} \end{array}$$

simplified

4. $\frac{3z}{2} + y = 5 + 5z$ for z.

Combine like terms

$$\begin{array}{r} \frac{3z}{2} + y = 5 + 5z \\ -\frac{3z}{2} \quad -\frac{3z}{2} \\ \hline y = 5 + 2z \\ -5 \quad -5 \\ \hline \boxed{y - 5 = 2z} \\ \hline 2 \quad 2 \\ \boxed{z = \frac{y - 5}{2}} \end{array}$$

Solve each equation or formula for the variable indicated.

1. $A = \frac{h(a+b)}{2}$, solve for h

$$\frac{2A}{(a+b)} = \frac{h(a+b)}{(a+b)}$$

$$\frac{2A}{(a+b)} = h$$

2. $xy + w = 9$, solve for y
 $-w -w$

$$\frac{xy}{x} = \frac{9-w}{x}$$

$$y = \frac{9-w}{x}$$

3. $\frac{p+9}{5} = r$, solve for p

$$\frac{p+9}{-9} = \frac{5r}{-9}$$

$$p = 5r - 9$$

4. $kn + 4f = 9v$, solve for n
 $-4f -4f$

$$\frac{kn}{k} = \frac{9v-4f}{k}$$

$$n = \frac{9v-4f}{k}$$

Literal Equations – Worksheet #1



SHOW ALL WORK!!



Regular Equations

1a) $x - 7 = 8$
 $+7 +7$

$$\boxed{x = 15}$$

2a) $4x = -12$
 $\frac{\quad}{4} \quad \frac{\quad}{4}$

$$\boxed{x = -3}$$

3a) $2x - 5 = 11$
 $+5 +5$

$$\frac{2x}{2} = \frac{16}{2}$$
$$\boxed{x = 8}$$

4a) $\frac{1}{2}(4x) = -20 \cdot 2$

$$\frac{4x}{4} = \frac{-40}{4}$$
$$x = -10$$

5a) $\frac{x}{-8} = 11 \cdot -8$

$$\boxed{x = -88}$$

Literal Equations

1b) Solve for x: $x - b = a$
 $+b +b$

$$\boxed{x = a + b}$$

2b) Solve for k: $-3k = m$
 $\frac{\quad}{-3} \quad \frac{\quad}{-3}$

$$\boxed{k = \frac{m}{-3}}$$

3b) Solve for b: $2b - 9 = d$
 $+9 +9$

$$\frac{2b}{2} = \frac{d+9}{2}$$

$$\boxed{b = \frac{d+9}{2}}$$

4b) Solve for g: $\frac{aeg}{ac} = \frac{10}{ae}$

$$\boxed{g = \frac{10}{ae}}$$

5b) Solve for y: $3 \cdot \frac{y}{3} = h \cdot 3$

$$\boxed{y = 3h}$$

Literal Equations – Worksheet #1

6a) $14 = 2x + 26$
 $\begin{array}{r} -26 \\ \hline -12 = 2x \\ \frac{-12}{2} = \frac{2x}{2} \\ -6 = x \end{array}$

7a) $-30 = 4 - 8x$
 $\begin{array}{r} -4 \\ \hline -34 = -8x \\ \frac{-34}{-8} = \frac{-8x}{-8} \\ \frac{17}{4} = x \end{array}$

8a) $\frac{3(x-4)}{3} = \frac{12}{3}$
 $\begin{array}{r} x-4 = 4 \\ +4 \quad +4 \\ \hline x = 8 \end{array}$

6b) Solve for v: $3d = 7v + 8$
 $\begin{array}{r} -5 \quad -5 \\ \hline 3d - 5 = 7v \\ \frac{3d-5}{7} = \frac{7v}{7} \\ \frac{3d-5}{7} = v \end{array}$

7b) Solve for h: $7a = 10 - 2h$
 $\begin{array}{r} -10 \quad -10 \\ \hline 7a - 10 = -2h \\ \frac{7a-10}{-2} = \frac{-2h}{-2} \\ h = \frac{7a-10}{-2} \end{array}$

8b) Solve for p: $\frac{5(4x+p)}{5} = \frac{w}{5}$
 $\begin{array}{r} 4x+p = \frac{w}{5} \\ -4x \quad -4x \\ \hline p = \frac{w}{5} - 4x \end{array}$

Which of the following is equivalent to:

$$7a - 8b = 10x$$

A. $a = \frac{18xb}{7}$ $\frac{7a}{7} = \frac{10x+8b}{7}$

B. $a = \frac{10x+8b}{7}$ $a = \frac{10x+8b}{7}$

C. $a = \frac{10x-8b}{7}$

Which of the following is equivalent to:

$$4ab + k = 13$$

A. $k = \frac{13}{4ab}$

B. $k = \frac{13-ab}{4}$

C. $k = 13 - 4ab$

Name: _____

Literal Equation Practice

For each of the following equations, solve for each variable specified.
SHOW YOUR WORK TO RECEIVE CREDIT.

Equation	Solve for a.	Solve for b.	Solve for c.	Solve for d.
$a + b = c + d$	$a = c + d - b$	$b = c + d - a$	$c = a + b - d$	$d = a + b - c$
$ab = cd$	$a = \frac{cd}{b}$	$b = \frac{cd}{a}$	$c = \frac{ab}{d}$	$d = \frac{ab}{c}$
$a/b = cd$	$\frac{a}{b} = cd \cdot b$ $a = cd \cdot b$	Be Careful on this one! $\frac{a}{b} = cd \cdot b$ $\frac{a}{cd} = \frac{cd \cdot b}{cd}$ $\frac{a}{cd} = b$	$\frac{a}{b} = cd$ $\frac{a}{b} = c$ $\frac{a}{bd} = c$	$d = \frac{a}{bc}$

Equation	Solve for w.	Solve for x.	Solve for y.	Solve for z.
$x + 2y = z + w$	$x + 2y = z + w$ $-z -z$ $x + 2y - z = w$ $w = x + 2y - z$	$x = z + w - 2y$	$y = \frac{z + w - x}{2}$	$z = x + 2y - w$
$xw = 3yz$	$w = \frac{3yz}{x}$	$x = \frac{3yz}{w}$	$y = \frac{xw}{yz}$	$z = \frac{xw}{3y}$
$(3y/x) = -z + w$	$\frac{3y}{x} = -z + w$ $x \cdot \frac{3y}{x} = x(-z + w)$ $3y = (-z + w)x$ $w = \frac{3y}{x} + z$	Be Careful on this one! $\frac{3y}{x} = (-z + w)x$ $3y = (-z + w)x$ $\frac{3y}{3} = \frac{(-z + w)x}{3}$ $y = \frac{x(-z + w)}{3}$	$\frac{3y}{x} = (-z + w)x$ $3y = (-z + w)(x)$ $y = \frac{x(-z + w)}{3}$	$z = w - \frac{3y}{x}$

$$x = \frac{3y}{(-z + w)}$$