

Algebra 1 2.8

Solve equations for given variables.
Use formulas to solve real-world problems

variable
equation
literal equation
solve for...
formula
dimensional analysis

How do we solve equations?

$$2(x-3) = 5x + 13$$
$$\begin{array}{rcl} 2x + -6 & = & 5x + 13 \\ -2x & & -2x \\ \hline -6 & = & 3x + 13 \end{array}$$
$$-13 \quad -13$$
$$X = \frac{19}{3} \quad \underline{-\frac{19}{3}} = \frac{3x}{3}$$

$$\begin{array}{rcl} x + 3 & = & 5 \\ -3 & & -3 \\ \hline x & = & 2 \end{array}$$

$$\begin{array}{rcl} 2n & = & 12 \\ 2 & & 2 \\ \hline n & = & 6 \end{array}$$
$$\begin{array}{rcl} 2x + 5 & = & 9 \\ -5 & & -5 \\ \hline 2x & = & 4 \\ 2 & & 2 \\ \hline x & = & 2 \end{array}$$
$$\begin{array}{rcl} x - 2 & = & 0 \\ +2 & & +2 \\ \hline x & = & 2 \end{array}$$

Example 1 Solve for a Specific Variable

Solve $4m - 3n = 8$ for m .

$$\begin{array}{rcl} 4m - 3n & = & 8 \\ +3n & & +3n \\ \hline 4m & = & 3n + 8 \\ \frac{4m}{4} & = & \frac{3n}{4} + \frac{8}{4} \\ m & = & \frac{3}{4}n + 2 \end{array}$$

Solve each equation for the variable indicated.

1A. $15 = 3n + 6p$, for n $m = .75n + 2$ 1B. $\frac{k-2}{5} = 11j$, for k

$$\begin{array}{rcl} -6p & -6p \\ \hline -6p + 15 & = & 3n \\ \frac{-6p}{3} & & \frac{3n}{3} \\ -2p + 5 & = & n \end{array}$$

$$\begin{array}{l} \cancel{5} \cdot \cancel{\frac{(k-2)}{5}} = 11j - 5 \\ 1(k-2) = 55j \\ k-2 = 55j \\ k = 55j + 2 \end{array}$$

$$8. u = vw + z, \text{ for } v$$

$$10. fg - 9h = 10j, \text{ for } g$$

$$u = \cancel{vw} + z$$

$$\frac{u-z}{w} = \frac{v\cancel{w}}{\cancel{w}}$$

$$\sqrt{ } = \frac{u}{w} - \frac{z}{w}$$

$$9. x = b - cd, \text{ for } c$$

$$11. 10m - p = -n, \text{ for } m$$

$$\frac{x}{-b} = \frac{b}{-b} - \cancel{cd}$$

$$\frac{x-b}{d} = \frac{-cd}{d} \quad -c = -1c$$

$$-\frac{x-b}{d} = \frac{-1c}{-1}$$

$$c = \frac{x}{-d} + \frac{b}{d}$$

$$\begin{array}{rcl} \cancel{f g} - 9h & = & 10j \\ + 9h & & + 9h \end{array}$$

$$\frac{\cancel{f g}}{f} = \frac{10j}{f} + \frac{9h}{f}$$

$$g = \frac{10j}{f} + \frac{9h}{f}$$

$$\begin{array}{rcl} \cancel{10m} - p & = & -n \\ + p & & + p \end{array}$$

$$\frac{10m}{10} = \frac{p - n}{10}$$

$$m = \frac{p}{10} - \frac{n}{10}$$

$$12. r = \frac{2}{3}t + v, \text{ for } t$$

$$14. \frac{10ac - x}{11} = -3, \text{ for } a$$

$$13. \frac{5}{9}v + w = z, \text{ for } v$$

$$15. \frac{df + 10}{6} = g, \text{ for } f$$

$$\begin{aligned} r &= \left(\frac{2}{3}t + v \right) + \checkmark \\ -\cancel{v} &\quad -\cancel{v} \\ \frac{3}{2}r - \cancel{\sqrt{\frac{3}{2}}}t &= \cancel{\frac{2}{3}}t + \cancel{\frac{2}{3}} \\ \cancel{\frac{3}{2}}r - \cancel{\frac{3}{2}\sqrt{\frac{3}{2}}}t &= \cancel{\frac{2}{3}}t \\ \therefore \frac{3}{2}r - \cancel{\frac{3}{2}\sqrt{\frac{3}{2}}}t &= \cancel{\frac{2}{3}}t \end{aligned}$$