

Your Name

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Notes

## LESSON 1.5

# SOLVING FOR A VARIABLE

Objective: To be able to solve for  $y$  in a linear equation in standard form.

Skill: Linear and other functions can come in different forms and you will need to be able to solve for  $y$  in future chapters.

Life Lesson: If you understand how things work, you can manipulate (not in a bad way) the situation to get what you need and so it is clear what to do.

Getting y Variable by Itself  
Standard form to Slope Intercept form

Solve for y.

1. Move the x term over using + or -
2. Divide by the coefficient of y, Number in front of y  
make sure to distribute the division.

$3x + y = 7$ , for y  
 $\begin{array}{r} 3x + y = 7 \\ -3x \quad -3x \\ \hline y = -3x + 7 \end{array}$

Write the x term last  
\* can't combine

$6x - 3y = 12$ , for y  
 $\begin{array}{r} 6x - 3y = 12 \\ -6x \quad -6x \\ \hline -3y = -6x + 12 \\ \hline -3 \quad -3 \\ \hline y = \frac{-6x}{-3} + \frac{12}{-3} \\ y = 2x + -4 \\ \text{or } y = 2x - 4 \end{array}$

divide entire side each term gets divided

### Wednesday Bellringer

Solve for y

$3x - 6y = 18$

$\begin{array}{r} 3x - 6y = 18 \\ -3x \quad -3x \\ \hline -6y = -3x + 18 \\ \hline -6 \quad -6 \\ \hline y = \frac{3}{6}x + -3 \\ y = \frac{1}{2}x - 3 \end{array}$

Objective: To be able to solve for any variable in any formula.

Skill: In other scientific formulas you will need to solve for the missing variable.

Life Lesson: If you understand how things work, you can manipulate (not in a bad way) the situation to get what you need and in a formula, having the variable solved for makes it clear what you need to do.

Getting any Variable by Itself

pinpoint that variable, and anything added or subtracted makes it grouped separately. Undo in the opposite order of PEMDAS to that variable

$$15 = 3n + 6p, \text{ for } n$$

$$\begin{array}{r} -6p \quad -6p \\ \hline -6p + 15 = 3n \\ \hline 3 \quad 3 \end{array}$$

$$-2p + 5 = n$$

$$\boxed{n = -2p + 5}$$

get n alone  
1st  $\cdot 3$  undo 2nd  
2nd  $+ 6p$  undo 1st

Your turn!

$$\frac{5}{1} \cdot \left( \frac{k-2}{5} \right) = (11j) \cdot 5, \text{ for } k$$

$$\begin{array}{r} k-2 = 55j \\ +2 \quad +2 \\ \hline \end{array}$$

$$\boxed{k = 55j + 2}$$

1st  $-2$  undo 2nd  
2nd  $\div 5$  undo 1st

Solving for variables in Formulas

Speed is how far you drive in a certain amount of time

$$s = \frac{d}{t}$$

distance  
per  
time

Solve for d, the distance.

(You are writing the formula so that you have distance in regards to speed and time)

$$2.5 = \left(\frac{x}{2}\right) \cdot \frac{1}{1}$$

$$10 = x$$

$$t \cdot s = \left(\frac{d}{t}\right) \cdot \frac{t}{t}$$

$$t \cdot s = d$$

$$\underline{d = s \cdot t}$$

distance is speed times time

Solve for t the time

60mph for 230 miles how long will it take

$$t \cdot s = \left(\frac{d}{t}\right) \cdot t$$

$$\frac{t \cdot s}{s} = \frac{d}{s}$$

s = 60 mph  
d = 230 miles

$$t = \frac{d}{s}$$

$$t = \frac{(230)}{(60)}$$

$$t = 3.8 \text{ hours}$$

Solving for variables in Formulas

Solve for the h height of the cylinder

$$V = \frac{\pi \cdot r^2 \cdot h}{\pi r^2}$$

π r<sup>2</sup>

$$h = \frac{V}{\pi r^2}$$

Solve for b

$$A = \frac{1}{2} h \cdot b + c$$

$$2(A - c) = \left(\frac{1}{2} h \cdot b\right) 2$$

$$\frac{2A - 2c}{h} = \frac{h \cdot b}{h}$$

$$\frac{2A - 2c}{h} = b$$

or

$$b = \frac{2A - 2c}{h}$$

$$s = \frac{1}{2}at^2$$

This formula represents the distance  $s$  that a free-falling object will fall near a planet or the moon in a given time  $t$ . Where  $a$  represents the acceleration due to gravity.

Solve for  $a$ .

$$\frac{2}{1}(s) = \left(\frac{1}{2}at^2\right) \frac{2}{1}$$


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$$\frac{2s}{t^2} = \frac{at^2}{t^2}$$


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$$\frac{2s}{t^2} = a$$

When the variable is tied up

I have 2-y amount of m's  
 \* put variable first

When the variable is multiplied with another variable, factor it out.

$$2m - t = ym + 5, \text{ for } m$$

$$\begin{array}{r} -ym \quad -ym \\ \hline (2-y)m - t = 5 \\ \quad +t \quad +t \\ \hline (2-y)m = \frac{t+5}{2-y} \\ \hline m = \frac{t+5}{2-y} \end{array}$$

- 1) get m's to one side
- 2) move everything else
- 3) since we can't combine m's 2ndly we factored
- 4) divide out stuff multiplied to m

$$d + 5cd = 3d - 1, \text{ for } d$$

$$\begin{array}{r} -3d \quad -3d \text{ get d's together} \\ -2d + 5cd = -1 \\ \hline d(-2+5c) = -1 \\ \hline (-2+5c) \quad (-2+5c) \text{ factor out} \\ \hline d = \frac{-1}{-2+5c} \end{array}$$

$$6q - 18 = qrs, \text{ for } q$$

$$\begin{array}{r} -6q \quad -6q \\ -18 = qrs - 6q \\ \hline -18 = q(rs-6) \\ \hline (rs-6) \quad (rs-6) \\ \hline \frac{-18}{rs-6} = q \end{array}$$