

Sept 22, 2016

Unit 1: Linear Equations  
Day 6: Isolating a Variable/  
Working with Formulas

Today we will....

1. Learn how to write an equation with one variable in terms of another.
2. Learn how to rearrange a formula to solve for the variable needed.

The ability to rearrange formulas or rewrite them in different ways is a very important skill.

Because formulas are just equations, all of the same principles of rearranging equations apply to rearranging formulas.

Ex. 1 Solve each of the formulas for the variable indicated.

1 a)  $-12y = \underline{3x} - a$  for  $a$   $\rightarrow$  want  $a =$  \_\_\_\_\_

$$\begin{array}{r} -12y - 3x = -a \\ \frac{-12y - 3x}{-1} = \frac{-a}{-1} \\ 12y + 3x = a \\ a = 12y + 3x \end{array}$$

$x = 3$   
 $3 = x$

b)  $P = 2l + 2w$  for  $w$   $w =$  \_\_\_\_\_

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

*Formula for perimeter of a rectangle*

c)  $V = \frac{1}{3}lwh$  for  $h$   $\rightarrow h =$  \_\_\_\_\_

$$\begin{array}{r} 3(V) = 3\left(\frac{1}{3}lwh\right) \\ \frac{3V}{lw} = \frac{lw \cdot h}{lw} \\ \frac{3V}{lw} = h \\ h = \frac{3V}{lw} \end{array}$$

Example 2.

The total cost of a restaurant meal can be modeled using the formula:  $C = m + 0.08m + 0.05m + 0.15m$  where  $C$  is the total cost in dollars,  $m$  is the total menu price of food in dollars, 0.08 is the PST rate, 0.05 is the GST rate and 0.15 is the tip rate.

Find the total menu price when the total cost is \$17.60.

$$C = m + 0.08m + 0.05m + 0.15m$$

$$\frac{C}{1.28} = \frac{1.28m}{1.28}$$

$$m = \frac{C}{1.28}$$

$$m = \frac{17.60}{1.28}$$

$$m = 13.75$$

∴ The menu price is \$13.75

Ex. 3 The formula  $F = \frac{9}{5}C + 32$  relates temperature measured in degrees Fahrenheit,  $F$ , to temperature measured in degrees Celsius,  $C$ .

a) What temperature in degrees Fahrenheit is equivalent to  $15^\circ\text{C}$ ?

$$F = \frac{9}{5}(15) + 32 \rightarrow F = 59^\circ\text{F}$$

$$F = 9(3) + 32$$

$$F = 27 + 32$$

b) Rearrange the formula  $F = \frac{9}{5}C + 32$  to solve for C. Use this formula to find the temperature in degrees Celsius that is equivalent to  $86^\circ\text{F}$ .

$$F = \frac{9}{5}C + 32$$

$$5(F) = 5\left(\frac{9}{5}C\right) + 5(32)$$

$$5F = 9C + 160$$

$$\frac{5F - 160}{9} = \frac{9C}{9}$$

$$C = \frac{5}{9}F - \frac{160}{9}$$

$$C = \frac{5}{9}(86) - \frac{160}{9}$$

calculator!

$$C = 47.8 - 17.8$$

$$C = 30^\circ$$

Homework:  
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