

Name: _____

Sec. 3.8: Rewrite Equations and Formulas

Consider the equations $4x + 6 = 18$ and $5x + 2 = -12$. Both of these equations have the general form $ax + b = c$. Note that we have replaced the _____ and _____ with _____.

Literal equation: an equation in which coefficients and constants have been replaced with letters

We can rewrite a literal equation to solve for the variable we want. Apply _____ operations, as we have done with multi-step equations.

$$ax + b = c$$

$$ax = c - b$$

$$x = \frac{c-b}{a}$$

We can also rewrite formulas to solve for a given variable. For example, you might be familiar with the formula

$$C = \frac{5}{9}(F - 32)$$

which is used to convert from degrees Fahrenheit to degrees Celsius. But what if we want to go the other direction—we know the temperature in _____ and want to convert to _____?

$$C = \frac{5}{9}(F - 32)$$

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

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

We can word the process we just followed in several different ways:

- We solved the original equation _____.
- We rewrote the original equation _____.
- We wrote Fahrenheit as _____.

Examples

1. Solve the literal equation for x . Then use the solution to solve the specific equation.
 $a - bx = c$; $8 - 3x = -20$
2. Write $y = 2x - 8$ so that x is a function of y .
3. The area of a triangle is given by the formula $A = \frac{1}{2}bh$, where b is the base and h is the height. Solve the formula for the height h , and then find the height of a triangle that has a corresponding base of 12 cm and an area of 144 cm^2 .
4. Solve the equation $8y = 4(3x - 8)$ for x .
5. One of the most famous equations in physics is $F = ma$, where F is force, m is mass, and a is acceleration. Solve this equation for a .

Sec. 3.8 Practice Problems

Solve the literal equation for x . Then use the solution to solve the specific equation.		
1) $ax = bx - c; 9x = 4x - 10$	2) $a(x + b) = c; 4(x + 2) = 11$	
Write the equation so that y is a function of x .		
3) $3x + y = 8$	4) $15 = 12x - 3y$	5) $16x - 2y = 30$
6) $-7x + 7y = -21$	7) $4 + 4x = 12 + 8y$	8) $10 - \frac{1}{2}y = \frac{5}{2}x$
9) The perimeter of a rectangle can be represented by the equation $p = 2l + 2w$. Solve the formula for the width of the rectangle.		
10) The surface area of a prism is given in the formula $S = 2B + h$, where B is the area of the base and h is the height. Solve for h .		

11) The Ideal Gas Law states that $PV = nRT$, where P is the pressure, V is the volume, n is the number of moles of gas, T is the temperature, and R is the ideal gas constant. Solve for T .

12) The distance formula is $d = rt$, where d is the distance traveled, r is the rate, and t is the time. Solve for t .

13) CHALLENGE: Solve the literal equation for a .

$$x = \frac{a+b+c}{a}$$

REVIEW: Simplify.

14) $2(3x + 6)$

15) $-3(4y + 9)$

16) $-2(5q - 7)$

17) $4x(3x - 6)$

18) $(4y + 2)(3y)$

19) $(7k - 6)(-3k)$

ANSWERS to Sec. 3.8 Practice Problems

1) $x = \frac{-c}{a-b}; x = -2$

2) $x = \frac{c}{a} - b; x = \frac{3}{4}$

3) $y = -3x + 8$ (or $y = 8 - 3x$)

4) $4x - 5 = y$

5) $y = 8x - 15$

6) $y = x - 3$

7) $-1 + \frac{1}{2}x = y$

8) $y = -5x + 20$

9) $w = \frac{p-2l}{2}$

10) $h = S - 2B$

11) $T = \frac{PV}{nR}$

12) $t = \frac{d}{r}$

13) $a = \frac{b+c}{x-1}$

14) $6x + 12$

15) $-12y - 27$

16) $-10q + 14$

17) $12x^2 - 24x$

18) $12y^2 + 6y$

19) $-21k^2 + 18k$