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# MATH 11009: Solutions of linear equations

## Section 2.1

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**REMEMBER:** When solving an equation, whatever you do to one side of the equation, you must do to the other side of the equation.

**Example 1.** Solve:  $4(7x - 2) + 3(2 - 3x) = 3(4x - 5) - 6$

**Example 2.** Solve:  $\frac{1}{2}(3x - 4) + \frac{3}{4} = 2$

**Example 3.** Solve:  $\frac{2x + 3}{7} = \frac{x}{4} - \frac{1}{2}$

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**Example 4.** Solve:  $-\frac{1}{2}(x - 12) + \frac{1}{4}(x + 2) = x + 4$

- **Zero:** Any number  $a$  for which  $f(a) = 0$  is called a **zero** of the function  $f$ . If  $a$  is real, then  $a$  is an  $x$ -intercept of the graph of the function. NOTE: The zeros of a function are values that make the function equal to zero, so they are also solutions to the equation  $f(x) = 0$ .

- The following three concepts are numerically the same:

The  $x$ -intercepts of the graph of  $y = f(x)$

The real zeros of the function  $f$

The real solutions to the equation  $f(x) = 0$

**Example 5.** The equation  $5F - 9C = 160$  gives the relationship between Fahrenheit and Celsius temperature measurements.

a) What Fahrenheit measure is equivalent to a Celsius measurement of  $20^\circ$ ?

b) At what temperature are the Fahrenheit and Celsius temperature scales the same?

**Example 6.** It is hard for people to pay off credit card debts in a reasonable period of time because of high interest rates. The interest paid on \$10,000 debt over 3 years is approximated by  $y = 175.393x - 116.287$  dollars when the interest rate is  $x\%$ . What is the interest rate if the interest is \$1637.60?

**Literal Equation:** An equation that contains two or more letters that represent constants or variables is called a **literal equation**.

**Example 7.** Solve for  $h$ :  $V = \frac{1}{3}\pi r^2 h$

**Example 8.** Solve for  $x$ :  $4(a - 2x) = \frac{5xc}{3}$

**Example 9.** Solve for  $b$ :  $F = \frac{Gab}{r^2}$

**Simple Interest:** The formula for the future value  $A$  of a simple interest investment is

$$A = P + Prt,$$

where  $P$  is the original investment,  $r$  is the annual interest rate, and  $t$  is the time in years.

**Example 10.** Solve the simple interest formula for  $P$ .

**Example 11.** If an investment of 7% simple interest has a future value of \$5888 in 12 years, what was the original investment?