

## Solving Simple Equations 1.1

An equation is a statement that two expressions are equal.

A linear equation in one variable is an equation that can be written in the form  $ax + b = 0$ , where  $a$  and  $b$  are constants and  $a \neq 0$ .

A solution of an equation is a value that makes the equation true.

Inverse operations are two operations that undo each other.

Equivalent equations are equations that have the same solution(s).

When solving equations, you want to find all the values of the variable that make the equation a true statement. Some algebraic properties apply:

- Addition Property of Equality: Adding the same number to each side of an equation produces an equivalent equation.

For any numbers  $a, b$  &  $c$ ;

$$\text{If } a = b, \text{ then } a + c = b + c$$

\* What you do to one side of an equation, you must do to the other!

$$\begin{aligned} 7 &= 7 \\ 7 + 3 &= 7 + 3 \\ 10 &= 10 \end{aligned}$$

- Subtraction Property of Equality: Subtracting the same number from each side of an equation produces an equivalent equation.

$$\text{If } a = b, \text{ then } a - c = b - c$$

$$\begin{aligned} 17 &= 17 \\ 17 - 9 &= 17 - 9 \\ 8 &= 8 \end{aligned}$$

Example 1: Solve each equation using  $+/ -$ .

$$\begin{array}{r} \text{a. } x - 3 = -5 \\ +3 \quad +3 \\ \hline \boxed{x = -2} \end{array}$$

$$\begin{array}{r} \text{b. } 0.9 = y + 2.8 \\ -2.8 \quad -2.8 \\ \hline \boxed{-1.9 = y} \end{array}$$

$$\begin{array}{r} \text{c. } g - \frac{1}{3} = -\frac{2}{3} \\ +\frac{1}{3} \quad +\frac{1}{3} \\ \hline g = -\frac{2}{3} + \frac{1}{3} \\ \boxed{g = -\frac{1}{3}} \end{array}$$



Other algebraic properties that apply to find all values of the variable that make the equation a true statement:

- Multiplication Property of Equality: Multiplying each side of an equation by the same nonzero number produces an equivalent equation.

$$\text{If } a = b, \text{ then } a \cdot c = b \cdot c$$

$$\begin{aligned} 6 &= 6 \\ 6 \cdot 2 &= 6 \cdot 2 \\ 12 &= 12 \end{aligned}$$

- Division Property of Equality: Dividing each side of an equation by the same nonzero number produces an equivalent equation.

$$\text{If } a = b, \text{ then } \frac{a}{c} = \frac{b}{c}$$

$$\begin{aligned} 15 &= 15 \\ \frac{15}{3} &= \frac{15}{3} \\ 5 &= 5 \end{aligned}$$

Example 2: Solve each equation using  $\cdot / \div$ .

a.  $\cancel{-5} \left( -\frac{n}{5} \right) = (-3) \cdot \cancel{-5}$

$$\boxed{n = 15}$$

b.  $\frac{\pi x}{\pi} = \frac{-2\pi}{\pi}$  \*  $\pi$  is a known number not a variable

$$\boxed{x = -2}$$

c.  $\frac{1.3z}{1.3} = \frac{5.2}{1.3}$

$$\boxed{z = 4.76}$$

Homework:

