

Lesson 1.1:

Solving Simple Equations

Essential Question

How can you use inductive reasoning to discover rules in mathematics? How can you test a rule?



Key Ideas

Addition Property of Equality

Words Adding the same number to each side of an equation produces an equivalent equation.

Algebra If $a = b$, then $a + c = b + c$.

Subtraction Property of Equality

Words Subtracting the same number from each side of an equation produces an equivalent equation.

Algebra If $a = b$, then $a - c = b - c$.

The GOLDEN RULE!!!

a. Solve $x - 7 = -6$.

$$\begin{array}{r|l} +7 & +7 \\ \hline x - 7 & \\ \hline x & = 1 \end{array}$$

$$1 - 7 = -6 \checkmark$$

b. Solve $y + 3.4 = 0.5$.

$$\begin{array}{r|l} -3.4 & -3.4 \\ \hline y + 3.4 & \\ \hline y & = -2.9 \end{array}$$

$$0.5 - 3.4$$

$$\begin{array}{r} 2 \\ 1 \\ 4 \\ - 0.5 \\ \hline 2.9 \end{array}$$

c. Solve $h + 2\pi = 3\pi$.

$$\begin{array}{r|l} -2\pi & -2\pi \\ \hline h + 2\pi & \\ \hline h & = \pi \end{array}$$

Solve the equation. Check your solution.

$$1. \quad b + 2 = -5$$

$$\begin{array}{r|l} -2 & +2 \\ \hline b & = -7 \end{array}$$

$$2. \quad g - 1.7 = -0.9$$

$$\begin{array}{r|l} +1.7 & +1.7 \\ \hline g & = 0.8 \end{array}$$

$$3. \quad -3 = k + 3$$

$$\begin{array}{r|l} +3 & -3 \\ \hline -6 & = k \end{array}$$

$$\begin{array}{r} 7.7 \\ -0.9 \\ \hline 0.8 \end{array}$$

Solve the equation. Check your solution.

$$4. \quad r - \pi = \pi$$

$$\begin{array}{r|l} +\pi & +\pi \\ \hline r & = 2\pi \end{array}$$

$$5. \quad t - \frac{1}{4} = -\frac{3}{4}$$

$$\begin{array}{r|l} +\frac{1}{4} & +\frac{1}{4} \\ \hline t & = -\frac{1}{2} \end{array}$$

$$6. \quad 5.6 + z = -8$$

$$\begin{array}{r|l} -5.6 & -5.6 \\ \hline z & = -13.6 \end{array}$$

$$2\pi - \pi = \pi \checkmark$$

$$-\frac{1}{2} + \frac{1}{4} = -\frac{3}{4} \checkmark$$

$$\begin{array}{r} 8.0 \\ +5.6 \\ \hline 13.6 \end{array}$$

$$5.6 + (-13.6) = -8 \checkmark$$



Key Ideas

Multiplication Property of Equality

Words Multiplying each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \cdot c = b \cdot c$.

Division Property of Equality

Words Dividing each side of an equation by the same number produces an equivalent equation.

Algebra If $a = b$, then $a \div c = b \div c$, $c \neq 0$.

The GOLDEN RULE!!!

a. Solve $-\frac{3}{4}n = -2$

$$\begin{array}{l} \cdot (-\frac{4}{3}) \quad | \quad \cdot (-\frac{4}{3}) \\ \hline n = 2\frac{2}{3} \end{array}$$

Remember! You can either divide a fraction or multiply by its reciprocal. (Keep-Change-Flip)

$$-2 \cdot \frac{-4}{3} = +\frac{8}{3} = 2\frac{2}{3}$$

b. Solve $\pi x = 3\pi$

$$\begin{array}{l} \div \pi \quad | \quad \div \pi \\ \hline x = 3 \end{array}$$

$$\pi \cdot 3 = 3\pi \checkmark$$

Solve the equation. Check your solution.

$$7. \frac{y}{4} = -7$$

$$\begin{array}{r|l} \cdot 4 & \cdot 4 \\ \hline y & = -28 \end{array}$$

$$\frac{-28}{4} = -7 \checkmark$$

$$8. 6\pi = \pi x$$

$$\begin{array}{r|l} \div \pi & \div \pi \\ \hline 6 & = x \end{array}$$

$$6\pi = \pi \cdot 6 \checkmark$$

$$9. 0.09w = 1.8$$

$$\begin{array}{r|l} \div 0.09 & \div 0.09 \\ \hline w & = 20 \end{array}$$

$$\frac{1.8}{0.09} = \frac{180}{9} = 20$$

$$0.09 \cdot 20 = 1.8 \checkmark$$

What value of k makes the equation $k + 4 \div 0.2 = 5$ true?

-15

(B) -5

(C) -3

(D) 1.5

$$\frac{4}{0.2} = \frac{40}{2} = 20$$

$$k + 4 \div 0.2 = 5$$

$$k + 20 = 5$$

$$\begin{array}{r|l} -20 & -20 \\ \hline k & = -15 \end{array}$$

The *melting point* of a solid is the temperature at which the solid becomes a liquid. The melting point of bromine is $\frac{1}{30}$ of the melting point of nitrogen. Write and solve an equation to find the melting point of nitrogen.

Se Selenium 78.96 [3d ¹⁰ 4s ² 4p ⁴] 8.7524	35 Br Bromine 79.904 [Ar]3d ¹⁰ 4s ² 4p ⁵ 11.8138	36 Kr Krypton 83.798 [Ar]3d ¹⁰ 4s ² 4p ⁶ 13.9998
	53 I Iodine	54 Xe Xenon

The melting point of bromine is -7°C .

Br is $\frac{1}{30}$ of N

$$-7 = \frac{1}{30} \cdot N$$

$$\begin{array}{r} .30 \quad .30 \\ \hline -210 = N \end{array} \quad -210^\circ\text{C}$$

10. Solve $p + 8 \div \frac{1}{2} = -3$

$$\begin{array}{r} p + (-16) = -3 \\ -(-16) \quad +(+16) \\ \hline p = 13 \end{array}$$

11. Solve $q + |-10| = 2$

$$\begin{array}{r} q + 10 = 2 \\ -10 \quad -10 \\ \hline q = -8 \end{array}$$

12. The melting point of mercury is about $\frac{1}{4}$ of the melting point of krypton. The melting point of mercury is -39°C . Write and solve an equation to find the melting point of krypton.

$$\begin{array}{r} M = \frac{1}{4} \cdot K \\ -39 = \frac{1}{4} K \\ .4 \quad .4 \\ \hline -156 = K \end{array}$$

$$\begin{array}{r} 339 \\ \times 4 \\ \hline 156 \end{array} \quad -156^\circ\text{C}$$