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 $x - 7 = -6$.

$+7 \quad +7$

$x = 1$

$1 - 7 = -6$ ✓

b. Solve $y + 3.4 = 0.5$.

$-3.4 \quad -3.4$

$y = -2.9$

$0.5 - 3.4$

-0.5

2.9

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

$-2\pi \quad -2\pi$

$h = \pi$

Solve the equation. Check your solution.

1. $b + 2 = -5$

$-2 \quad -2$

$b = -7$

2. $g - 1.7 = -0.9$

$+1.7 \quad +1.7$

$g = 0.8$

0.8
$+1.7$
-0.9
0.8

3. $-3 = k + 3$

$+3 \quad -3$

$-6 = k$

Solve the equation. Check your solution.

4. $r - \pi = \pi$

$+\pi \quad +\pi$

$r = 2\pi$

$2\pi - \pi = \pi$ ✓

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

$+\frac{1}{4} \quad +\frac{1}{4}$

$t = -\frac{1}{2}$

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

6. $5.6 + z = -8$

$-5.6 \quad -5.6$

$z = -13.6$

8.0
$+5.6$
13.6

$5.6 + (-13.6) = -8$ ✓

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 $-\frac{3}{4}n = -2$

$\cdot(-\frac{4}{3}) \quad \cdot(-\frac{4}{3})$

$n = 2\frac{2}{3}$

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

$\frac{-2}{1} \cdot -\frac{4}{3} = +\frac{8}{3} = 2\frac{2}{3}$

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

$\div\pi \quad \div\pi$

$x = 3$

$\pi \cdot 3 = 3\pi$ ✓

Solve the equation. Check your solution.

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

$\cdot 4 \quad \cdot 4$

$y = -28$

$\frac{-28}{4} = -7$ ✓

8. $6\pi = \pi x$

$\div\pi \quad \div\pi$

$6 = x$

$6\pi = \pi \cdot 6$ ✓

9. $0.09w = 1.8$

$\div 0.09 \quad \div 0.09$

$w = 20$

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

$0.09 \cdot 20 = 1.8$ ✓

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

A −15 B −5 C −3 D 1.5

$k + 4 \div 0.2 = 5$

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

$k + 20 = 5$

$-20 \quad -20$

$k = -15$

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.

The melting point of bromine is −7°C.

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

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

$\cdot 30 \quad \cdot 30$

$-210 = N$ $-210°C$

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

$p + (-16) = -3$

$-(-16) \quad +(16)$

$p = 13$

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

$q + 10 = 2$

$-10 \quad -10$

$q = -8$

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.

$M = \frac{1}{4} \cdot K$

$-39 = \frac{1}{4} K$

$\cdot 4 \quad \cdot 4$

$-156 = K$

$39 \times 4 = 156$ $-156°C$