Name _____   Date _____

Properties of Equality

Addition Property of Equality

Words   When you add the same number to each side of an equation, the two sides remain equal.

Numbers $6 + 4 = 6 + 4$

$10 = 10$

Algebra $x - 5 + 5 = 3 + 5$

$x = 8$

Subtraction Property of Equality

Words   When you subtract the same number from each side of an equation, the two sides remain equal.

Numbers $7 - 2 = 7 - 2$

$5 = 5$

Algebra $y + 3 - 3 = 1 - 3$

$y = -2$

Multiplication Property of Equality

Words   When you multiply each side of an equation by the same nonzero number, the two sides remain equal.

Numbers $\dfrac{6}{3} \cdot 3 = 2 \cdot 3$

$6 = 6$

Algebra $\dfrac{z}{3} \cdot 3 = 2 \cdot 3$

$z = 6$

Division Property of Equality

Words   When you divide each side of an equation by the same nonzero number, the two sides remain equal.

Numbers $6 \cdot 2 \div 2 = 12 \div 2$

$6 = 6$

Algebra $\dfrac{2w}{2} = \dfrac{12}{2}$

$w = 6$

Example 1   Solve each equation. Tell which algebraic property of equality you used.

a. $c - 3 = -2$

$c - 3 + 3 = -2 + 3$ Addition Property of Equality

$c = 1$ Simplify.

▶   The solution is $c = 1$. The property is the Addition Property of Equality.

b. $\dfrac{d}{5} = 7$

$\dfrac{d}{5} \cdot 5 = 7 \cdot 5$ Multiplication Property of Equality

$d = 35$ Simplify.

▶   The solution is $d = 35$. The property is the Multiplication Property of Equality.

Practice

Check your answers at BigIdeasMath.com.

Solve the equation. Tell which algebraic property of equality you used.

1. $h - 6 = 2$ $h = 8$; Addition

2. $\dfrac{j}{3} = 9$ $j = 27$; Multiplication

3. $k + 8 = -9$ $k = -17$; Subtraction

4. $4m = 12$ $m = 3$; Division

5. $n + 2 = 6$ $n = 4$; Subtraction

6. $\dfrac{p}{6} = -2$ $p = -12$; Multiplication

7. $q - 3 = -8$ $q = -5$; Addition

8. $8r = 48$ $r = 6$; Division

9. $s + 9 = 5$ $s = -4$; Subtraction

10. $6t = 48$ $t = 8$; Division

11. $w + 3 = 29$ $w = 26$; Subtraction

12. $\dfrac{z}{7} = 7$ $z = 49$; Multiplication