

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 $\frac{6}{3} \cdot 3 = 2 \cdot 3$
 $6 = 6$

Algebra $\frac{z}{3} \cdot 3 = 2 \cdot 3$
 $z = 6$

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 $\frac{2w}{2} = \frac{12}{2}$
 $w = 6$

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. $\frac{d}{5} = 7$

$\frac{d}{5} \cdot 5 = 7 \cdot 5$ 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. $h - 6 = 2$

2. $\frac{j}{3} = 9$

3. $k + 8 = -9$

4. $4m = 12$

5. $n + 2 = 6$

6. $\frac{p}{6} = -2$

7. $q - 3 = -8$

8. $8r = 48$

9. $s + 9 = 5$

10. $6t = 48$

11. $w + 3 = 29$

12. $\frac{z}{7} = 7$