

1-4 Identity and Equality Properties (Pages 21–25)

You can use the following properties to justify the steps you use when you evaluate an expression.

Additive Identity Property	The sum of any number and 0 is equal to that number. For any number a , $a + 0 = 0 + a = a$.
Multiplicative Identity Property	Since the product of any number and 1 is equal to the number, 1 is called the multiplicative identity. For any number a , $a \cdot 1 = 1 \cdot a = a$.
Multiplicative Property of Zero	For any number a , $a \cdot 0 = 0 \cdot a = 0$.
Multiplicative Inverse Property	Two numbers whose product is 1 are called multiplicative inverses or reciprocals. For every nonzero number $\frac{a}{b}$, where $a, b \neq 0$, there is exactly one number $\frac{b}{a}$ such that $\frac{a}{b} \cdot \frac{b}{a} = 1$.
Reflexive Property of Equality	The reflexive property of equality says that any number is equal to itself. For any number a , $a = a$.
Symmetric Property of Equality	The symmetric property of equality says that if one quantity equals a second quantity, then the second quantity also equals the first. For any numbers a and b , if $a = b$, then $b = a$.
Transitive Property of Equality	For any numbers a , b , and c , if $a = b$ and $b = c$, then $a = c$.
Substitution Property of Equality	If $a = b$, then a may be replaced by b in any expression.

Practice

Name the multiplicative inverse of each number or variable. Assume that no variable represents zero.

1. 5 2. $\frac{3}{5}$ 3. $\frac{4}{c}$ 4. $1\frac{1}{3}$

Name the property or properties illustrated by each statement.

5. $x \cdot 1 = x$ 6. $\frac{15}{3} + 4 = 5 + 4$ 7. $\frac{2}{3} \cdot \frac{3}{2} = 1$
 8. $3 \cdot 0 = 0$ 9. $11 - 2 = 11 - 2$ 10. $0 + n = n$
 11. If $13 = 4 + 9$, then $4 + 9 = 13$.
 12. If $x + 5 = 3$ and $3 = y$, then $x + 5 = y$.
 13. **Standardized Test Practice** Name the multiplicative inverse of $\frac{x + 2}{5}$.

- Assume that $x + 2 \neq 0$.
 A $x + \frac{5}{2}$ B $\frac{5}{x + 2}$ C $\frac{5}{x} + 2$ D $\frac{1}{x} + \frac{5}{2}$

Answers: 1. $\frac{1}{5}$ 2. $\frac{5}{3}$ 3. $\frac{c}{4}$ 4. $\frac{3}{4}$ 5. multiplicative inverse 6. substitution property of equality 7. multiplicative inverse 8. multiplicative property of zero 9. reflexive property of equality 10. additive identity 11. symmetric property of equality 12. transitive property of equality 13. B