

1-3 Study Guide and Intervention

Properties of Numbers

Properties of Equality and Identity The identity and equality properties in the chart below can help you solve algebraic equations and evaluate mathematical expressions.

Additive Identity	For any number a , $a + 0 = a$.
Additive Inverse	For any number a , $a + (-a) = 0$.
Multiplicative Identity	For any number a , $a \cdot 1 = a$.
Multiplicative Property of 0	For any number a , $a \cdot 0 = 0$.
Multiplicative Inverse Property	For every number, where $a, b \neq 0$, there is exactly one number such that $\cdot = 1$.
Reflexive Property	For any number a , $a = a$.
Symmetric Property	For any numbers a and b , if $a = b$, then $b = a$.
Transitive Property	For any numbers a , b , and c , if $a = b$ and $b = c$, then $a = c$.
Substitution Property	If $a = b$, then a may be replaced by b in any expression.

Example: Evaluate $24 \cdot 1 - 8 + 5(9 \div 3 - 3)$. Name the property used in each step.

$$\begin{aligned}
 24 \cdot 1 - 8 + 5(9 \div 3 - 3) &= 24 \cdot 1 - 8 + 5(3 - 3) && \text{Substitution; } 9 \div 3 = 3 \\
 &= 24 \cdot 1 - 8 + 5(0) && \text{Substitution; } 3 - 3 = 0 \\
 &= 24 - 8 + 5(0) && \text{Multiplicative Identity; } 24 \cdot 1 = 24 \\
 &= 24 - 8 + 0 && \text{Multiplicative Property of Zero; } 5(0) = 0 \\
 &= 16 + 0 && \text{Substitution; } 24 - 8 = 16 \\
 &= 16 && \text{Additive Identity; } 16 + 0 = 16
 \end{aligned}$$

Exercises

Evaluate each expression. Name the property used in each step.

1. $15 \cdot 1 - 9 + 2(15 \div 3 - 5)$

3. $2(3 \cdot 5 \cdot 1 - 14) - 4 \cdot$

4. $18 \cdot 1 - 3 \cdot 2 + 2(6 \div 3 - 2)$

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