Sec. 1-4 Identity and Equality Properties

Additive Identity: For any number a, the sum of a and 0 is a.

    ex. $5 + 0 = 5$ $ex.\ 0 + x = x$

Additive Inverses: Two numbers with a sum of zero.

    ex. $6 + (-6) = 0$ $ex.\ (-x) + x = 0$

Multiplicative Identity: For any number a, the product of a and 1 is a.

    ex. $x \cdot 1 = x$ $ex.\ 8 \cdot 1 = 8$

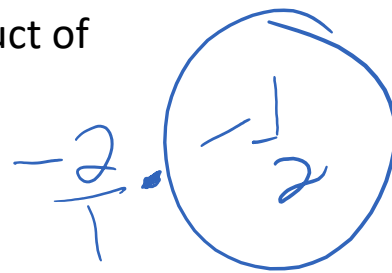**Multiplicative Property of Zero:** For any number a, the product of a and 0 is 0.

    ex. $7 \cdot 0 = 0$ $ex.\ 0(x) = 0$

Multiplicative Inverses or Reciprocals: For every number $\frac{a}{b}$, where a, b ≠ 0, there is exactly one number $\frac{b}{a}$ such that the product of $\frac{a}{b}\ and\ \frac{b}{a}\ is\ 1$.

    ex. $\frac{a}{b} \cdot \frac{b}{a} = 1$ $ex. \frac{4}{5} \cdot \frac{5}{4} = 1$

Reflexive: Any quantity is equal to itself.

    ex. a = a   ex. 2 + 3 = 2 + 3

Symmetric: If one quantity equals a second quantity, then the second quantity equals the first quantity.

ex. If a = b, then b = a.   ex. If 3 + 5 = 8 , then 8 = 3 + 5

Transitive: If one quantity equals a second quantity and the second quantity equals a third quantity, then the first quantity equals the third quantity.
     ex. If a = b and b = c, then a = c.

     ex. If 2 + 4 = 6 and 6 = 1 + 5, then 2 + 4 = 1 + 5

Substitution: A quantity may be substituted for its equal in any expression.
     ex. If a = b, then a may be replaced by b in any expression

     ex. If n = 15, then 3n = 3(15)

Evaluate:

$2(3 \cdot 2 - 5) + 3 \cdot \dfrac{1}{3}.$ *Name the property used in each step.*

$2(6 - 5) + 3 \cdot \dfrac{1}{3}$ SUBSTITUTION PROP

$2(1) + 3 \cdot \dfrac{1}{3}$ SUBSTITUTION PROP

$2 + 3 \cdot \dfrac{1}{3}$ MULT. IDENTITY

$2 + 1$ MULT. INVERSE

3 SUBSTITUTION

3 SUBSTITUTION

Evaluate:

$$6 \cdot \frac{1}{6} + 5(12 \div 4 - 3)$$

$6 \cdot \frac{1}{6} + 5(3 - 3)$ SUBSTITUTION

$6 \cdot \frac{1}{6} + 5(0)$ ADDITIVE INVERSE

$1 + 5(0)$ Mult. Inverse

$1 + 0$ Mult. Property of Zero

1 ADDITIVE ID

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