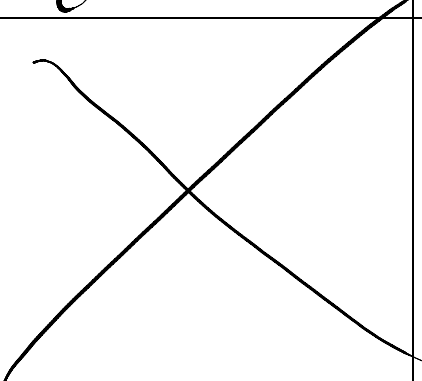


Properties of Numbers

Properties of Equality

Property	Words	Symbols	Examples
Reflexive Property	Any quantity is equal to itself	$x = x$	$5 = 5$ $4 + 7 = 4 + 7$
Symmetric Property	If one quantity equals a second then the second equals the first	If $a = b$ then $b = a$	If $2 + 6 = 8$ then $8 = 2 + 6$
Transitive Property		If $a = b$ and $b = c$ then $a = c$	If $2 + 3 = 4 + 1$ and $4 + 1 = 5$ then $2 + 3 = 5$
Substitution Property	Any quantity can be replaced for it's equal.	If $a = b$ then a can replace b anywhere	$(4 + 6)w$ $=$ $10w$

Addition Properties

Additive Identity	The sum of any number and zero stays the same	$a + 0 = a$ $0 + a = a$	$5 + 0 = 5$
Additive Inverse	A number and it's opposite	$a + (-a) = 0$	$3 + (-3) = 0$

Multiplication Properties

Multiplicative Identity	The product of a and 1 is a	$a \cdot 1 = a$ $1 \cdot a = a$	$9 \cdot 1 = 9$
Multiplicative Property of zero	The product of any number and zero is zero	$a \cdot 0 = 0$ $0 \cdot a = 0$	$5 \cdot 0 = 0$
Multiplicative Inverse	Number times reciprocal is 1	$a \cdot \frac{1}{a} = 1$ $\frac{a}{b} \cdot \frac{b}{a} = 1$	$5 \cdot \frac{1}{5} = 1$ $\frac{4}{3} \cdot \frac{3}{4} = 1$

BIG 3:

① Commutative Property

- order

- The order in which you add or multiply does not change the answer.

$$- a + b + c = c + b + a \quad ab = ba$$

② Associative Property

- grouping

- The way we group numbers when adding or multiplying does not change the answer

$$- (a + b) + c = a + (b + c)$$

$$(a + b) + c = (b + a) + c \rightarrow \text{Commutative}$$

③ Distributive Property

$$* a(b + c) = ab + ac$$

$$* (x + y)z = xz + yz$$

$$* 2(x - 5) = 2x - 10$$