# Properties

| Name | Hints | Example | Notes |
|------|-------|---------|-------|
| **Associative** "Grouping" | You "associate" with different groups. | $5 + (15 + 4) =$ $(5 + 15) + 4$ | Works with addition and multiplication, not subtraction or division. |
| **Commutative** "Ordering" | Since Commutative has an "o" in it, think "order". | $5 + 4 + 3 =$ $4 + 3 + 5$ | Works with addition and multiplication, not subtraction or division. |
| **Distributive** "Distributing or Pushing Through Parentheses" | Think of "distributing" something to your friends. | $5 \times (3 + 4) =$ $5 \times 3 + 5 \times 4 =$ $15 + 20 = 35$ $5 - 2(x - 3) =$ $5 - 2x + 6$ $5x + 7x =$ $(5 + 7)x = 12x$ | When negatives are on the outside of the parenthesis, make sure you distribute the negatives to second number, too. Remember that multiplying two negatives results in a positive. |
| **Identity** "Staying the Same" | You always come back to your "identity". | $9 + 0 = 9$ $9 \times 1 = 9$ | Additive identity is 0. Multiplicative identity is 1. |
| **Inverse** "Undoing" | When you put your car in "inverse", you go backwards. | $9 + -9 = 0$ $9 \times \frac{1}{9} = 1$ | Additive inverse is $-a$, since $-a + a = 0$. Multiplicative inverse is $\frac{1}{a}$, since $\frac{1}{a} \times \frac{a}{1} = 1$ . Note that the inverse of $\frac{a}{b}$ is $\frac{b}{a}$, since $\frac{a}{b} \times \frac{b}{a} = 1$ . |

# L5-1 Properties

## A) Associative - grouping

| $+$ | $\times$ |
|---|---|
| $5+(15+4)=(5+15)+4$ | $2(4\cdot1)=(2\cdot4)1$ |
| $5+19 \quad = \quad 20+4$ | $2(4) = (8)(1)$ |
| $\boxed{24 \quad = \quad 24}$ | $\boxed{8 \quad = \quad 8}$ |

## B) Commutative - ORDER

| $+$ | $\times$ |
|---|---|
| $5+4+3=4+3+5$ | $5(4)(3)=(4)(3)(5)$ |
| $9+3 = 7+5$ | $20(3) = 12(5)$ |
| $\boxed{12 \quad = 12} \ \smile$ | $\boxed{60 = 60} \ \textcircled{!}$ |