

Identity Properties $\Rightarrow$ Keep the identity of the number the same.

- ① IP of Addition $\Rightarrow a + 0 = a$ Adding zero does not change a number.
- ② IP of Multiplication $\Rightarrow a \cdot 1 = a$ Mult. by one does not change a number.

Multiplication Property of Zero $\Rightarrow$ Zero times anything is zero

③ MPOZ $\Rightarrow a \cdot 0 = 0$

Properties of Equality $\Rightarrow$ Notice, NO $+$, $-$, $\cdot$, $\div$ in these properties
ONLY $=$ sign.

- ④ Reflexive $\Rightarrow$ ANYTHING EQUALS ITSELF
POE $a = a$ A number looking at itself in a mirror = reflection
- ⑤ Symmetric $\Rightarrow$ does matter which side of the equal sign a term is on.
POE if $a = b$ then $b = a$ Symmetric $\Rightarrow$ same on both sides.
- ⑥ Transitive $\Rightarrow$ if $a = b$ and $b = c$ then $a = c$
POE the equality is "transported" from the 1st to the 3rd term.
- ⑦ Substitution $\Rightarrow$ if $a = b$ then you can use a in place of b or b in place of a
POE

- ⑧ Multiplicative Inverse Property A.K.A. "The Reciprocal Property"
 $\Rightarrow$ Any number times its reciprocal is positive ONE

$$\frac{a}{b} \cdot \frac{b}{a} = \frac{ab}{ba} = \frac{ab}{ab} = 1 \quad \text{Ex) } \frac{2}{1} \cdot \frac{1}{2} = \frac{2}{2} = 1 \quad \text{Ex) } -\frac{2}{3} \cdot -\frac{3}{2} = \frac{-6}{-6} = 1$$

- ⑨ Commutative Property of Addition and Multiplication

$$a + b = b + a \quad a \cdot b = b \cdot a$$

It doesn't matter what order you do ADDITION (IF all you have is addition) or MULTIPLICATION (or mult.)
 A "Commute" to school or work is your trip to and from.

- ⑩ Associative Property of Addition and Multiplication

$$a + (b + c) = (a + b) + c \quad a \cdot (b \cdot c) = (a \cdot b) \cdot c$$

It doesn't matter how you group ADDITION or MULTIPLICATION (if that's all you have)
(ASSOCIATE)

Associates are who you hang out with

- ⑪ The DP $\Rightarrow$ THE DISTRIBUTIVE PROPERTY AKA the DP of Multiplication over Addition

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

use arrows $a(b + c)$ to get b and c out of "parentheses jail"

THE BIG 11