Pre-Algebra
Properties of Algebra

Properties of Addition and Multiplication. For any real numbers **a**, **b**, and **c**:

Property	Definition for Addition	Definition for Multiplication
Closure Property	$a + b$ is a real number	$a \cdot b$ is a real number
Identity Property	$a + 0 = 0 + a = a$	$a \cdot 1 = 1 \cdot a = a$
Inverse Property	$a + (-a) = (-a) + a = 0$	$For\ a \neq 0,\ a \cdot \frac{1}{a} = \frac{1}{a} \cdot a = 1$
Commutative Property	$a + b = b + a$	$a \cdot b = b \cdot a$
Associative Property	$(a + b) + c = a + (b + c)$	$(a \cdot b) \cdot c = a \cdot (b \cdot c)$
Distributive Property	$a \cdot (b + c) = (a \cdot b) + (a \cdot c)$	

Properties of Zero. For any real number **a**:

Multiplication by 0	$a \cdot 0 = 0 \cdot a = 0$
0 Divided by Something	$For\ a \neq 0,\ \frac{0}{a} = 0$
Division by 0	$\frac{a}{0}$ is undefined (even if a $= 0$)

Properties of Equality. For any real numbers **a**, **b**, and **c**:

Property	Definition
Addition Property	$If\ a = b, then\ a + c = b + c$
Subtraction Property	$If\ a = b, then\ a - c = b - c$
Multiplication Property	$If\ a = b, then\ a \cdot c = b \cdot c$
Division Property	$If\ a = b\ and\ c \neq 0, then\ a \div c = b \div c$