Properties of the Real Numbers

Let a, b and c be Real Numbers

	Addition	Multiplication
I Closure	$a+b$ is a unique Real Number	ab is a unique Real Number
II Commutative	$a + b = b + a$	$ab = ba$
Example:	$2 + 3 = 3 + 2$ $5 = 5$	$2 \cdot 3 = 3 \cdot 2$ $6 = 6$
III Associative	$(a + b) + c = a + (b + c)$	$(ab)c = a(bc)$
Example:	$(2 + 3) + 4 = 2 + (3 + 4)$ $5 + 4 = 2 + 7$ $9 = 9$	$(2 \cdot 3)4 = 2(3 \cdot 4)$ $6 \cdot 4 = 2 \cdot 12$ $24 = 24$
IV Identity	$a + 0 = 0 + a = a$ 0 is the Additive Identity	$a \cdot 1 = 1 \cdot a = a$ 1 is the Multiplicative Identity
Example:	$6 + 0 = 0 + 6 = 6$	$6 \cdot 1 = 1 \cdot 6 = 6$
V Inverse	$a + (-a) = (-a) + a = 0$ $-a$ is the Additive Inverse $-a$ is the Opposite of a	$a \cdot \frac{1}{a} = \frac{1}{a} \cdot a = 1$ for $a \neq 0$ $\frac{1}{a}$ is the Multiplicative Inverse $\frac{1}{a}$ is the Reciprocal of a
Example:	$5 + (-5) = (-5) + 5 = 0$	$2 \cdot \frac{1}{2} = \frac{1}{2} \cdot 2 = 1$
VI Distributive	$a(b + c) = ab + ac$	
Example:	$2(x + 3) = 2x + 2 \cdot 3$ $2(x + 3) = 2x + 6$	
Example:	$-(x - 4) = -x + 4$	