Commutative and Associative Properties

Commutative Property of Addition	Commutative Property of Multiplication
Words In a sum, you can add terms in any order.	**Words** In a product, you can multiply factors in any order.
Numbers $5 + (-6) = -6 + 5$	**Numbers** $4(-7) = -7(4)$
Algebra $a + b = b + a$	**Algebra** $ab = ba$
Associative Property of Addition	**Associative Property of Multiplication**
Words Changing the grouping of terms will not change the sum.	**Words** Changing the grouping of factors will not change the product.
Numbers $(9 + 8) + 6 = 9 + (8 + 6)$	**Numbers** $(2 \cdot 3) \cdot 4 = 2 \cdot (3 \cdot 4)$
Algebra $(a + b) + c = a + (b + c)$	**Algebra** $(ab)c = a(bc)$

Inverse and Identity Properties

Inverse Property of Addition	Inverse Property of Multiplication
Words The sum of a number and its **additive inverse**, or opposite, is 0.	**Words** The product of a nonzero number and its **multiplicative inverse**, or reciprocal, is 1.
Numbers $5 + (-5) = 0$	**Numbers** $\dfrac{3}{4} \cdot \dfrac{4}{3} = 1$
Algebra $a + (-a) = 0$	**Algebra** For nonzero integers a and b, $\dfrac{a}{b} \cdot \dfrac{b}{a} = 1$.
Identity Property of Addition	**Identity Property of Multiplication**
Words The sum of a number and the **additive identity**, 0, is the number.	**Words** The product of a number and the **multiplicative identity**, 1, is the number.
Numbers $-7 + 0 = -7$	**Numbers** $9 \cdot 1 = 9$
Algebra $a + 0 = a$	**Algebra** $a(1) = a$

The Distributive Property

Algebra For all numbers a, b, and c, $a(b + c) = ab + ac$ and $a(b - c) = ab - ac$.

Numbers $8(10 + 4) = 8(10) + 8(4)$ and $3(4 - 2) = 3(4) - 3(2)$