



## Using Properties to Simplify Expressions

<b>Commutative Property of Addition</b>	$a + b = b + a$	$b + c + d = d + b + c$	$3 + 5 = 5 + 3$
<b>Commutative Property of Multiplication</b>	$a \cdot b = b \cdot a$	$abc = cba$	$2 \cdot 3 \cdot 4 = 4 \cdot 3 \cdot 2$
<b>Associative Property of Addition</b>	$(a + b) + c = a + (b + c)$		$(4 + 3) + 7 = 4 + (3 + 7)$
<b>Associative Property of Multiplication</b>	$(a \times b) \times c = a \times (b \times c)$		$(3 \cdot 5) \cdot 4 = 3 \cdot (5 \cdot 4)$
<b>Identity Property of Addition</b>	$a + 0 = a$		$78 + 0 = 78$
<b>Identity Property of Multiplication</b>	$b \cdot 1 = b$		$654 \cdot 1 = 654$
<b>Multiplicative Property of Zero</b>	$c \cdot 0 = 0$		$48 \cdot 0 = 0$
<b>Distributive Property</b>	$a(b + c) = a \times b + a \times c$	$a \times b + a \times c = a(b + c)$	$7(10 + 3) = 7 \cdot 10 + 7 \cdot 3$

Identify the property or properties that can aid in simplifying the following examples, then simplify.

**Example:**  $18 + 17 + 2$  Use the Commutative Property of +  $18 + 2 + 17 = 20 + 17 = 37$

**Example:**  $(4 \cdot 12) + (4 \cdot 8)$  Use the Distributive Property  $4(12 + 8) = 4(20) = 80$

**Example:**  $28 \cdot 15$  Use the Distributive Property  $28(10 + 5) = (28 \cdot 10) + (28 \cdot 5) = 280 + 140 = 420$

- $4 \cdot 9 \cdot 5$
- $16 + 29 + 34$
- $28 \cdot 13 \cdot 25$
- $(87 \cdot 9) - (27 \cdot 9)$
- $24 + 1 + 16$
- $90 \cdot 37$
- $19 \cdot 10 \cdot 0$
- $20 \cdot 12 \cdot 5 \cdot 10$
- $74 \cdot 39$
- $(8 \cdot 73) + (8 \cdot 27)$