1.6 Commutative & Associative Properties

Commutative Property

of Addition	$a + b = b + a$
of Multiplication	$a \cdot b = b \cdot a$

Associative Property

of Addition	$a + (b + c) = (a + b) + c$
of Multiplication	$a(bc) = (ab)c$

Example: Add the following numbers mentally.

$$800 + (1200 + 1050)$$

$$(800 + 1200) + 1050$$

$$2000 + 1050$$

$$3050$$

Example: Evaluate $6(\frac{1}{2})(2\frac{1}{2})$.

$6(\frac{1}{2})(\frac{5}{2})$

$3 \cdot \frac{5}{2}$

$\frac{15}{2}$

Example: Find the volume of a rectangular prism 4 inches long, $3\frac{1}{2}$ inches wide, and $\frac{1}{2}$ inch high.

$V = lwh$

$V = 4 \cdot 3\frac{1}{2} \cdot \frac{1}{2}$

$V = 4 \cdot \frac{7}{2} \cdot \frac{1}{2}$

$V = 4 \cdot \frac{1}{2} \cdot \frac{7}{2}$

$V = \frac{2}{1} \cdot \frac{7}{2}$

$V = 7 \text{ in}^3$

Example: Simplify $5k + (4 + 2k)$, indicating all the properties used.

$5k + (4 + 2k)$

$5k + (2k + 4)$ comm. prop.

$(5k + 2k) + 4$ assoc. prop.

$7k + 4$ subst. prop. / combine like terms

Example: Simplify $4a + 7(2 + 3a)$, indicating all the properties used.

$4a + 7(2 + 3a)$

$4a + 14 + 21a$ dist. prop.

$4a + 21a + 14$ comm. prop.

$25a + 14$ subst. prop. or combine like terms

Example: Simplify $2n + 3(5n^2 + 7n) + n^2$, indicating all the properties used.

$2n + 3(5n^2 + 7n) + n^2$

$2n + 15n^2 + 21n + n^2$ dist. prop.

$2n + 21n + 15n^2 + n^2$ comm. prop.

$23n + 16n^2$ subst. prop. or combine like terms

Example: Simplify $4m^2 + 3(6k + k^2) + 2k$, indicating all the properties used.

$4m^2 + 3(6k + k^2) + 2k$

$4m^2 + 18k + 3k^2 + 2k$ dist. prop

$4m^2 + 3k^2 + 18k + 2k$ comm. prop.

$4m^2 + 3k^2 + 20k$ subst. prop. or combine like terms