5.5 Multiplying & Dividing a Polynomial by a Constant

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* Use the **Distributive Property** to multiply a polynomial by a constant

**Ex #1**

(a) \(-5(4e^2 - 5e + 3)\)

\[= -20e^2 + 25e - 15\]

* Use a **Model** (Rectangle)

**Ex #2**

Write the multiplication sentence modelled by each rectangle

(a) \(4 \times (m + 4)\)

\[= 4(m + 4)\]

(b) \(5 \times (w + 6)\)

\[= 5(w + 6)\]

\[= 5w + 30\]

\[= 4m + 16\]
Example 3
To multiply $2(4x)$ with algebra tiles, we have $8x$.

Model 2 rows of 4:

Solve:

\[
\begin{array}{cccc}
& x & x & x & x \\
\hline
2 & & & & \\
\end{array}
\]

\[
4x
\]

\[
\Rightarrow 2(4x)
\]

Example 5: Write the multiplication sentence represented by these tiles.

\[
\begin{array}{c}
\frac{1x}{2} + 3
\end{array}
\]

\[
\begin{array}{cccc}
& & & & \\
\hline
2 & & & & \\
\hline
\end{array}
\]

\[
2(x + 3)
\]

\[
2x + 6
\]

Division

Example 6: Find the quotient.

\[
\div 2 (x + 3)
\]
(a) \(-\frac{9v^2 + 6}{3}\)  
(b) \(\frac{6s - 9}{3}\)

\[= \ -\frac{9v^2}{3} + \frac{6}{3}\  = \ \frac{6s}{3} - \frac{9}{3}\]

\[= \ -3v^2 + 2\  = \ 2s - 3\]

Ex#7 Write the division sentence modelled by the tiles and solve

\[
\begin{array}{ccccc}
& & & & \downarrow 2x + 5 \\
& & & 2x & \\
\hline
4x^2 + 10x & \downarrow 2x & \downarrow 2x & \downarrow 2x & \downarrow 2x \end{array}
\]

Multiply: \(2x \cdot (2x + 5)\)

\[= 4x^2 + 10x\]

Division \(\frac{4x^2 + 10x}{2x}\)

\[= \frac{4x^2}{2x} + \frac{10x}{2x}\]

\[= 2x + 5\]

Ex #7

Find the quotient \((6s - 9) - 3\)

Arrange 6 and 9 into 3 equal rows...
\[ 3(2x-3) \checkmark \]
\[ = 6x - 9 \checkmark \]

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