

**Learning Goals:** I will learn to

- use different strategies to multiply a polynomial by a monomial
- solve problems involving multiplication of a polynomial by a monomial

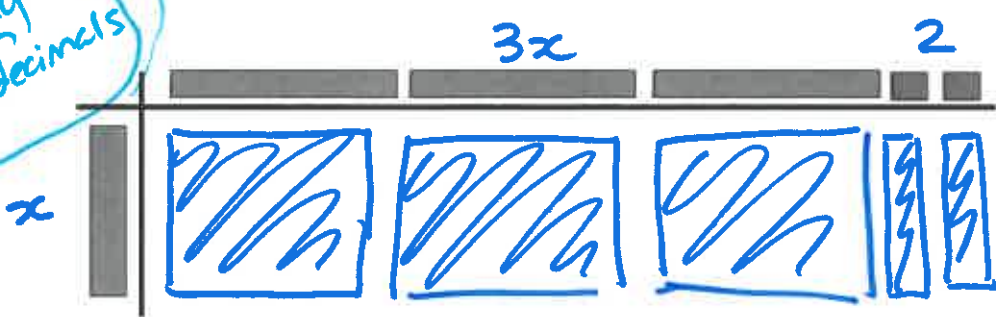
**Develop Understanding**

**Example 1: Multiply a Polynomial by a Monomial Using a Model**

Use a model to determine the product  $x(3x + 2)$

Method 1: Use Algebra Tiles

\* don't really work with fractions/decimals



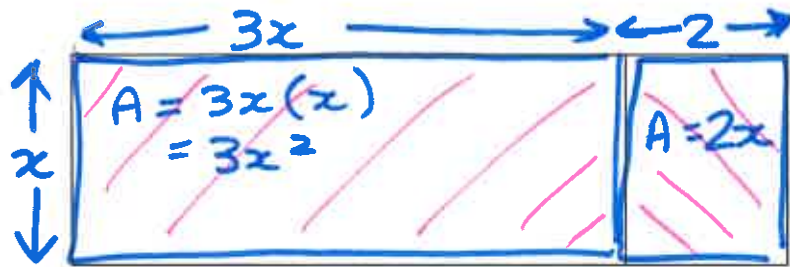
$x(3x+2) = 3x^2 + 2x$

$A = lw$

Method 2: Use an Area Model

$x(3x + 2)$

\* doesn't really work with negatives (negative lengths don't really make sense)



total area  $3x^2 + 2x$

### Example 2: Multiply a Polynomial by a Monomial

Calculate each product using the **distributive property**.

$$\begin{aligned} \text{a) } & 4(3x - 5) \\ &= 4(3x) + 4(-5) \\ &= 12x + (-20) \\ &= 12x - 20 \end{aligned}$$

$$\begin{aligned} \text{b) } & -7y(2x - 4y) \\ &= -14xy + 28y^2 \end{aligned}$$

$$\begin{aligned} \text{c) } & 2x(6x^2 + 3x - 1) \\ &= 12x^3 + 6x^2 - 2x \end{aligned}$$

$$\begin{aligned} \text{d) } & 4(4m + 2) \\ &= 16m + 8 \end{aligned}$$

$$\begin{aligned} \text{e) } & -3x(5x^2 + 4x - 5) \\ &= -15x^3 - 12x^2 + 15x \end{aligned}$$

$$\begin{aligned} \text{f) } & 8x(2y - 3x) \\ &= 16xy - 24x^2 \end{aligned}$$

Multiply/Distribute

collect like terms

### Example 3: Expand and Simplify Expressions

Use the distributive property, then simplify.

$$\begin{aligned} \text{a) } & 3(6x^2 - 2x - 1) - 4(2x^2 - 3x + 5) \\ &= 18x^2 - 6x - 3 - 8x^2 + 12x - 20 \\ &= 10x^2 + 6x - 23 \end{aligned}$$

BEDMAS  
(multiply before add)

$$\begin{aligned} \text{c) } & \frac{1}{3}(6w + 9) - \frac{3}{4}(8w - 12) \\ &= \frac{6w}{3} + \frac{9}{3} - \frac{24w}{4} + \frac{36}{4} \\ &= 2w + 3 - 6w + 9 \\ &= -4w + 12 \end{aligned}$$

$$\begin{aligned} \text{b) } & 5k(k + 7) - 1(k^2 + 4) \\ &= 5k^2 + 35k - k^2 - 4 \\ &= 4k^2 + 35k - 4 \end{aligned}$$

$$\begin{aligned} \text{d) } & -3x(2x + 3y - 5) \\ &= -6x^2 - 9xy + 15x \end{aligned}$$

distributing a  $-1$  has the same effect as "adding the opposite"