

Lesson 13-4

Example 1 Products of a Monomial and a Polynomial

Find each product.

a. $2(3x + 4)$

$$\begin{aligned} 2(3x + 4) &= 2(3x) + 2(4) && \text{Distributive Property} \\ &= 6x + 8 && \text{Simplify.} \end{aligned}$$

b. $(-3x + 7)(-6x)$

$$\begin{aligned} (-3x + 7)(-6x) &= (-3x)(-6x) + (7)(-6x) && \text{Distributive Property} \\ &= 18x^2 - 42x && \text{Simplify.} \end{aligned}$$

Example 2 Product of a Monomial and a Polynomial

$$4m(3m^2 - 2mn + 4n^2)$$

$$\begin{aligned} 4m(3m^2 - 2mn + 4n^2) &= 4m(3m^2) + 4m(-2mn) + 4m(4n^2) && \text{Distributive Property} \\ &= 12m^3 - 8m^2n + 16mn^2 && \text{Simplify.} \end{aligned}$$

Example 3 Use a Polynomial to Solve a Problem

GARDENING A rectangular garden has length equal to 6 less than 4 times its width. If the perimeter of the garden is 58 feet, what are the dimensions of the garden?

Explore You know the perimeter of the garden. You want to find the dimensions of the garden.

Plan Let w represent the width of the garden. Then $4w - 6$ represents the length. Write an equation.

$$\underbrace{\text{Perimeter}}_P \underbrace{\text{equals}}_{} \underbrace{\text{twice}}_2 \underbrace{\text{the sum of the length and width.}}_{(l + w)}$$

Solve

$$\begin{aligned} P &= 2(\ell + w) && \text{Write the equation.} \\ 58 &= 2(4w - 6 + w) && \text{Replace } P \text{ with } 58 \text{ and } l \text{ with } 4w - 6. \\ 58 &= 2(5w - 6) && \text{Combine like terms.} \\ 58 &= 10w - 12 && \text{Distributive Property} \\ 70 &= 10w && \text{Add 12 to each side.} \\ 7 &= w && \text{Divide each side by 10.} \end{aligned}$$

The width is 7 feet, and the length is $4w - 6$ or 22 feet.

Examine

Check the reasonableness of the results by estimating.

$$\begin{aligned} P &= 2(\ell + w) && \text{Formula for perimeter of a rectangle} \\ P &\approx 2(20 + 10) && \text{Round 22 to 20 and 7 to 10.} \\ P &\approx 2(30) \text{ or about } 60 \end{aligned}$$

Since 60 is close to 58, the answer is reasonable.