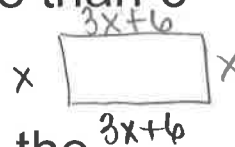


Key

## 7.7B Factoring Application

The length of a rectangle is 6 more than 3 times the width.



a) Write a polynomial to represent the perimeter of the rectangle.

$$l = 3x + 6 \quad x + \underline{3x+6} + \underline{x} + \underline{3x+6}$$

$$w = x \quad \boxed{P = 8x + 12 \text{ units}}$$

b) Write a polynomial to represent the area of the rectangle.

$$x(3x + 6)$$

$$\boxed{3x^2 + 6x \text{ units}^2}$$

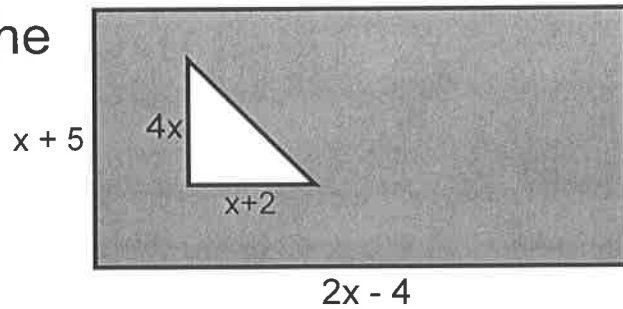
a) Find the area of the rectangle.

$$(x+5)(2x-4)$$

$$x(2x-4) + 5(2x-4)$$

$$2x^2 - 4x + 10x - 20$$

$$A = 2x^2 + 6x - 20$$



b) Find the area of the triangle.

$$A = \frac{1}{2}bh$$

$$= \frac{1}{2}(4x)(x+2)$$

$$= 2x(x+2)$$

$$A = 2x^2 + 4x \text{ units}^2$$

c) Find the area of the shaded region.

$$(2x^2 + 6x - 20) - (2x^2 + 4x) = \cancel{2x^2} + \underline{6x} - 20 - \cancel{2x^2} - \underline{4x} = 2x - 20 \text{ Units}$$

The length of a rectangular game reserve is 1 mile longer than twice the width. The area of the reserve is 55 square miles.

a) What is the width of the reserve?

$$l = 2x + 1 \quad x(2x+1) = 55$$

$$w = x \quad 2x^2 + x = 55$$

$$A = 55$$

$$2x^2 + x - 55 = 0$$

$$\begin{array}{r} 2x^2 + x - 55 = 0 \\ \underline{-10x - 11} \\ -11x - 55 \\ \underline{-11x - 11} \\ -44 \\ \underline{-44} \\ 0 \end{array}$$

$$(2x+11)(x-5) = 0$$

$$\begin{array}{r} 2x+11=0 \\ \underline{-11 -11} \\ 2x = -11 \\ \underline{2} \\ x = -5.5 \end{array}$$

$$\begin{array}{r} x-5=0 \\ \underline{+9 +9} \\ x = 5 \end{array}$$

$$\begin{array}{r} x - 5 \\ 2x \quad \underline{2x^2 - 10x} \\ 11 \quad \underline{11x - 55} \\ 0 \end{array}$$

$$2x(x-5) + 11(x-5) = 0$$

b) What if the area of the reserve is 136 square miles. How wide is the reserve?

$$2x^2 + x = 136$$

$$2x^2 + x - 136 = 0$$

$$\begin{array}{r} 2x^2 + x - 136 = 0 \\ \underline{-16x - 17} \\ -15x - 136 \\ \underline{-17x - 136} \\ 2x - 17 \\ \underline{2} \\ x = -8.5 \end{array}$$

$$(x-8)(2x+17) = 0$$

$$\begin{array}{r} x-8=0 \\ \underline{+8 +8} \\ x = 8 \end{array}$$

$$\begin{array}{r} 2x+17=0 \\ \underline{-17 -17} \\ 2x = -17 \\ \underline{2} \\ x = -8.5 \end{array}$$

$$2x^2 - 16x + 17x - 136 = 0 \quad W = 8 \text{ mi}$$

Notes 7.7B Factoring Application

The area of a rectangle is represented by the polynomial  $3y^3 + 15y^2 - 27y$  square units. If the width of the rectangle is  $3y$ , find the length.

$$A = lW$$

$$\frac{3y^3}{3y} + \frac{15y^2}{3y} - \frac{27y}{3y} = \frac{3y \cdot l}{3y}$$

$$y^2 + 5y - 9 = l$$

Your new hot tub is the shape of a square. The area of your hot tub is represented by the polynomial  $x^2 - 6x + 9$  square units.

a) Write the polynomial that represents the side lengths of your hot tub.

$$x^2 - 6x + 9 = (x-3)(x-3)$$

$$(x^2 - 3x) - 3(x-3)$$

$$x(x-3) - 3(x-3)$$

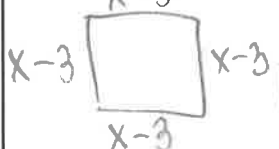
$$\begin{array}{r|l} 9 & x^2 - 6x + 9 \\ \hline 3 & 3x - 9 \end{array}$$

$$\begin{array}{r|l} x & x^2 - 6x + 9 \\ \hline -3 & -3x + 9 \end{array}$$

b) Write the polynomial that represents the perimeter of your hot tub.

$$x-3 + x-3 + x-3 + x-3$$

$$P = 4x - 12 \text{ units}$$



c) If the perimeter of your hot tub is 20 feet, find  $x$ .

$$4x - 12 = 20$$

$$+12 \quad +12$$

$$\frac{4x}{4} = \frac{32}{4} \quad \boxed{x = 8}$$