

To multiply polynomials with more than two terms, distribute each term in the 1st polynomial to each term in the 2nd polynomial

$$\begin{array}{r}
 (x+3)(x^2+3x+5) \\
 \xrightarrow{\quad} \xrightarrow{\quad} \xrightarrow{\quad} \\
 x^3+3x^2+5x \\
 + \quad 3x^2+9x+15 \\
 \hline
 \boxed{x^3+6x^2+14x+15}
 \end{array}$$

Example 1: Multiply a binomial by a trinomial

$$\begin{array}{r}
 \text{a. } (x-5)(x^2+4x+6) \\
 \xrightarrow{\quad} \xrightarrow{\quad} \xrightarrow{\quad} \\
 x^3+4x^2+6x \\
 + \quad -5x^2-20x-30 \\
 \hline
 \boxed{x^3-x^2-14x-30}
 \end{array}$$

$$\begin{array}{r}
 \text{b. } (x+2)(x^2-2x-5) \\
 \xrightarrow{\quad} \xrightarrow{\quad} \xrightarrow{\quad} \\
 x^3-2x^2-5x \\
 + \quad +2x^2-4x-10 \\
 \hline
 \boxed{x^3-9x-10}
 \end{array}$$

$$\begin{array}{r}
 \text{c. } (2x+3)(x^2-4x+6) \\
 \xrightarrow{\quad} \xrightarrow{\quad} \xrightarrow{\quad} \\
 2x^3-8x^2+12x \\
 3x^2-12x+18 \\
 \hline
 \boxed{2x^3-5x^2+18}
 \end{array}$$

$$\begin{array}{r}
 \text{d. } (x^2+4x-7)(3x-1) \\
 \xrightarrow{\quad} \xrightarrow{\quad} \xrightarrow{\quad} \\
 3x^3-x^2+12x^2-4x-21x+7 \\
 \hline
 \boxed{3x^3+11x^2-25x+7}
 \end{array}$$

Try it!

1. $(4x-5)(x^2-10x-3)$

$$4x^3 - 40x^2 - 12x - 5x^2 + 50x + 15$$

$$\boxed{4x^3 - 45x^2 + 38x + 15}$$

2. $(3x^2 - x + 4)(x - 2)$

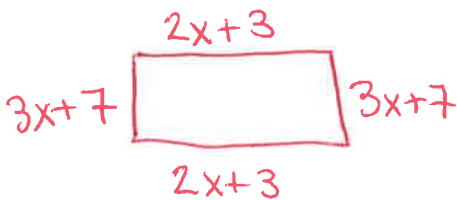
$$(x-2)(3x^2 - x + 4)$$

$$3x^3 - x^2 + 4x + (-6x^2 + 2x - 8)$$

$$\boxed{3x^3 - 7x^2 + 6x - 8}$$

Word Problems!

1. The length of a rectangle is represented by $2x + 3$ and its width is represented by $3x + 7$. The perimeter of the rectangle is 35 units. Find the value of x .



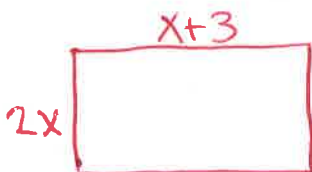
$$2x+3+3x+7+2x+3+3x+7 = 35$$

$$\begin{array}{r} 10x + 20 = 35 \\ -20 \quad -20 \\ \hline \end{array}$$

$$\frac{10x}{10} = \frac{15}{10}$$

$$\boxed{x = 1.5}$$

2. The length of a rectangle is $x + 3$ and the width is $2x$. Write the algebraic expression that represents the area of the rectangle.



$$A = l \cdot w$$

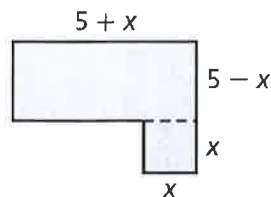
$$A = 2x(x+3)$$

$$\boxed{A = 2x^2 + 6x}$$

3. Write an expression that represents the area of the swimming pool.

$$\begin{aligned}
 A_{\text{Big Rectangle}} &= (5+x)(5-x) \\
 &= 25 - \cancel{5x} + \cancel{5x} - x^2 \\
 &= 25 - x^2
 \end{aligned}$$

$$\begin{aligned}
 A_{\text{square}} &= x \cdot x \\
 &= x^2
 \end{aligned}$$

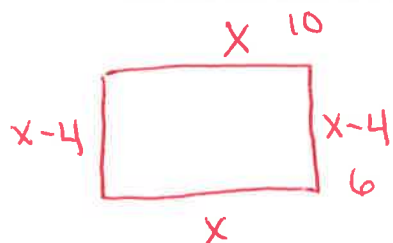


$$\begin{aligned}
 &A_{\text{Big } \square} + A_{\text{square}} \\
 &25 - x^2 + x^2 = \boxed{25 \text{ units}^2}
 \end{aligned}$$

4. The width of a rectangle is 4 meters shorter than its length.

a. Write a polynomial that represents the area of the rectangle.

b. Find the area of a rectangle when the width is 6 meters.



$x = \text{length}$
 $x - 4 = \text{width}$

$$\begin{aligned}
 \text{a) } A &= l \cdot w \\
 A &= x(x-4)
 \end{aligned}$$

$$\boxed{A = x^2 - 4x \text{ meters}^2}$$

$$\begin{aligned}
 \text{b) } x - 4 &= 6 \\
 +4 \quad +4 & \\
 \hline
 &
 \end{aligned}$$

$$x = 10$$

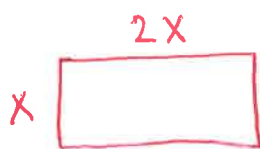
$$A = 10 \cdot 6$$

$$\boxed{A = 60 \text{ m}^2}$$

5. The length of a tennis court is twice the width.

a. Write a polynomial expression that represents the area of the tennis court.

b. Find the area when the width of the tennis court is 20 meters.



$x = \text{width}$
 $2x = \text{length}$

$$\begin{aligned}
 \text{a) } A &= l \cdot w \\
 A &= 2x \cdot x
 \end{aligned}$$

$$\boxed{A = 2x^2 \text{ meters}^2}$$

$$\text{b) } A = 2(20)^2$$

$$A = 2(400)$$

$$\boxed{A = 800 \text{ m}^2}$$

