

Recall: A binomial has two terms.

Ex:  $x + 3$ ,  $2r - 7$

When multiplying two binomials, we multiply each term in the first binomial by each term in the second binomial.

Ex:  $(x + 4)(x + 5)$

$$= x^2 + 5x + 4x + 20$$
$$= x^2 + 9x + 20$$

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Ex. 1 Practice:

FOIL

$$\begin{aligned} 1) (x - 6)(x + 1) \\ = x^2 + x - 6x - 6 \\ = x^2 - 5x - 6 \end{aligned}$$

$$\begin{aligned} 2) (9 - p)(4 + p) \\ = 36 + 9p - 4p - p^2 \\ = 36 + 5p - p^2 \end{aligned}$$

$$\begin{aligned} 3) (2k + 3)(4k + 1) \\ = 8k^2 + 2k + 12k + 3 \\ = 8k^2 + 14k + 3 \end{aligned}$$

$$\begin{aligned} 4) (6r - 2)(3r - 5) \\ = 18r^2 - 30r - 6r + 10 \\ = 18r^2 - 36r + 10 \end{aligned}$$

### Special Products - Square of a Binomial

Expand:  $(x + 4)^2$

$$\begin{aligned} = (x + 4)(x + 4) \\ = x^2 + 4x + 4x + 16 \\ = x^2 + 8x + 16 \end{aligned}$$

Squaring a number means multiplying it by itself.

Ex 2: Expand  $(p - 9)^2$

$$\begin{aligned} = (p - 9)(p - 9) \\ = p^2 - 9p - 9p + 81 \\ = p^2 - 18p + 81 \end{aligned}$$

Ex 3: Expand  $(2p - 3)^2$

$$\begin{aligned} = (2p - 3)(2p - 3) \\ = 4p^2 - 6p - 6p + 9 \\ = 4p^2 - 12p + 9 \end{aligned}$$

Ex: 4

A backyard has length  $4x + 3$ , and width  $3x - 12$ , as seen below.

a) Write a general expression for the area of the backyard.

$$A = l \times w$$

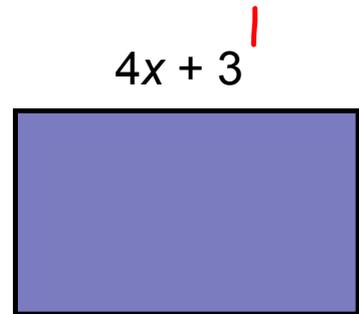
$$A = (4x + 3)(3x - 12)$$

$$A = 12x^2 - 48x + 9x - 36$$

$$A = 12x^2 - 39x - 36$$

$$3x - 12$$

*w*



b) If you know that  $x = 5$  metres, what is the area of the backyard?

$$A = 12(5)^2 - 39(5) - 36$$

$$A = 12(25) - 39(5) - 36$$

$$A = 300 - 195 - 36$$

$$A = 69 \text{ m}^2$$

Sometimes we have to expand brackets to simplify polynomials.

Ex: 1.  $(x+5)^2 + (3x-2)(x+7)$

$$= (x+5)(x+5) + (3x-2)(x+7)$$
$$= \cancel{x^2} + \cancel{5x} + \cancel{5x} + \cancel{25} + \cancel{3x^2} + \cancel{21x} - \cancel{2x} - \cancel{14}$$
$$= x^2 + 3x^2 + 5x + 5x + 21x - 2x + 25 - 14$$
$$= 4x^2 + 29x + 11$$

Ex: 2.  $(6-w)(6+w) + 2(14-w)$

$$= \cancel{36} + \cancel{6w} - \cancel{6w} - \cancel{w^2} + \cancel{28} - \cancel{2w}$$
$$= 36 + 28 + 6w - 6w - 2w - w^2$$
$$= 64 - 2w - w^2$$