# MULTIPLYING BINOMIALS - FOIL $(x+3)(x-2)$

**First some terminology...**

A **POLYNOMIAL** is an algebraic expression made up of one or more terms separated by addition or subtraction

Examples: $3x^2 + 2x - 1$
$4x - 6$

A **MONOMIAL** is a polynomial with one term Ex - $3x^2$

A **BINOMIAL** is a Polynomial with two terms Ex - $3x^2 + 2x$

A **TRINOMIAL** is a polynomial with three terms Ex - $3x^2 + 2x - 1$

**EXERCISE:** Identify each polynomial expression as a monomial, binomial, or trinomial.

| Polynomial Expression | Monomial, Binomial, or Trinomial??? |
|---|---|
| $x^2 + 5x$ | Binomial |
| $7$ | Monomial |
| $45p^2q - 15q^3$ | Binomial |
| $2x^2 + 8x - 4$ | Trinomial |
| $ab^3c$ | Monomial |
| $-2x - 4x^2$ | Binomial |

**How to Multiply Binomials – the FOIL Method**

**F:** Multiply the First terms in each bracket together
**O:** Multiply the Outside terms in each bracket together
**I:** Multiply the Inside terms in each bracket together
**L:** Multiply the Last terms in each bracket together

**This is very similar to the Distributive Property (Rainbow Method)** applied twice

**Example 1**

**Step 1: Use FOIL**

a) $(x + 2)(x + 3)$

$= (x)(x) + (x)(3) + (2)(x) + (2)(3)$ } FOIL
$= x^2 + 3x + 2x + 6$
$= x^2 + 5x + 6$ ← collect like terms

b) $(2x - 4)(x + 6)$

$= (2x)(x) + (2x)(6) + (-4)(x) + (-4)(6)$
$= 2x^2 + 12x - 4x - 24$
$= 2x^2 + 8x - 24$

**Step 2: Collect Like Terms and Simplify**

**Example 2** $(3x - 2)(2x + 5)$

$= (3x)(2x) + (3x)(5) + (-2)(2x) + (-2)(5)$

$= 6x^2 + 15x - 4x - 10$

$= 6x^2 + 11x - 10$

**MULTIPLYING BINOMIALS**

**Step 1:** Use **FOIL** (First, Outside, Inside, Last)

**Step 2:** Collect Like Terms and Simplify

**Example 3** $(m - 5)(m + 5)$

$= (m)(m) + (m)(5) + (-5)(m) + (-5)(5)$

$= m^2 + 5m - 5m - 25$

$= m^2 + 0m - 25$

$= m^2 - 25$

**Example 4** $(a - 3)^2$ ← multiply same bracket twice

$= (a-3)(a-3)$

$= (a)(a) + (a)(-3) + (-3)(a) + (-3)(-3)$

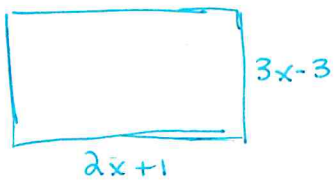
$= a^2 - 3a - 3a + 9$

$= a^2 - 6a + 9$

**Application Example**

A swimming pool has dimensions L = (2x + 1) and W = (3x – 3)

a) Determine an expression for the area in terms of x.




$A = lw$

$A = (2x+1)(3x-3)$

$A = (2x)(3x) + (2x)(-3) + (1)(3x) + (1)(-3)$

$A = 6x^2 - 6x + 3x - 3$

$A = 6x^2 - 3x - 3$

b) Find the area when x = 10 metres.

$A = 6x^2 - 3x - 3$

$= 6(10)^2 - 3(10) - 3$

$= 6(100) - 30 - 3$

$= 600 - 30 - 3$

$= 567\ m^2$