

8.2

Multiplying Polynomials



To multiply polynomials:

- Distribute everything in the first polynomial to everything in the second.
- **REMEMBER:** When you multiply like bases, add the exponents.

EX: Find the product.

• $x(2x^3 - 7x^2 + 4)$

$$2x^4 - 7x^3 + 4x$$

• $(x - 2)(x^2 + 2x + 1)$

$$x^3 + \underline{2x^2} + \underline{x} - \underline{2x^2} - \underline{4x} - \underline{2}$$

$$x^3 - 3x - 2$$

*Distribute x
and
*Distribute -2

- $(3y^2 - y + 5)(2y - 3)$

$$(2y - 3)(3y^2 - y + 5)$$

$$6y^3 - \underline{2y^2} + \underline{10y} - \underline{9y^2} + \underline{3y} - 15$$

$$\boxed{6y^3 - 11y^2 + 13y - 15}$$

* Rewrite smaller polynomial first, if you want

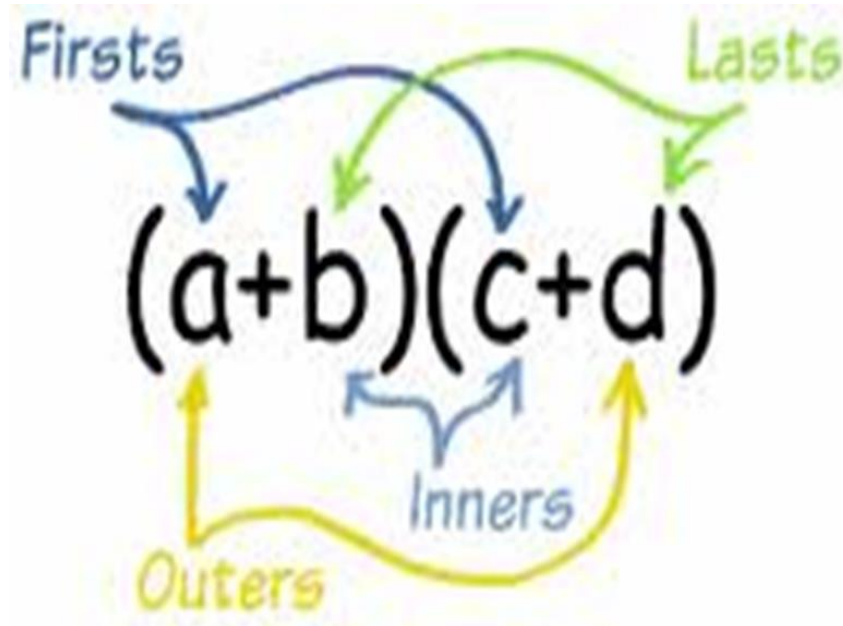
* Distribute $2y$
and

* Distribute -3

FOIL Method

- When multiplying two binomials, you can use the FOIL Method.
- The FOIL Method is the distributive property but in a special order.
- Multiply:
 - Firsts
 - Outers
 - Inners
 - Lasts

FOIL Method



EX: Find the product.

• $(4b - 5)(b - 2)$

$$4b^2 - \underline{8b} - \underline{5b} + 10$$

$$\boxed{4b^2 - 13b + 10}$$

• $(6n - 1)(n + 5)$

$$6n^2 + \underline{30n} - \underline{1n} - 5$$

$$\boxed{6n^2 + 29n - 5}$$

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

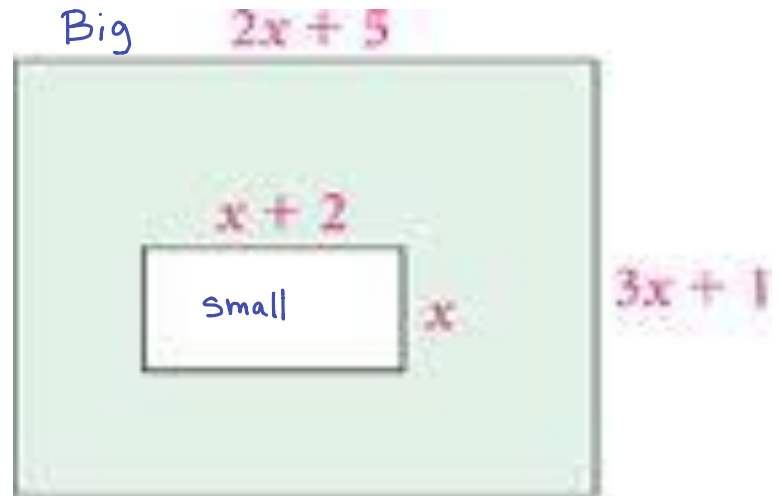
A diagram illustrating the expansion of $(2x + 3y)^2$. It shows two identical binomials, $(2x + 3y)$, written side-by-side. Four blue arrows indicate the multiplication process: one arrow from the first $2x$ to the first $2x$, one from the first $2x$ to the second $3y$, one from the second $3y$ to the first $2x$, and one from the second $3y$ to the second $3y$.

$$4x^2 + \underline{6xy} + \underline{6xy} + 9y^2$$

$$\boxed{4x^2 + 12xy + 9y^2}$$

EX:

- Write a polynomial that represents the area of the shaded region.



$$\text{Shaded Area} = \text{Big Area} - \text{Small Area}$$

$$= (2x+5)(3x+1) - x(x+2)$$

$$= \underline{6x^2} + \underline{2x} + \underline{15x} + \underline{5} - \underline{x^2} - \underline{2x}$$

$$\text{Shaded Area} = 5x^2 + 15x + 5$$