Multiplying Polynomials

Objective: To multiply two polynomials and square a binomial.

Review
- Distributive Property – multiply everything inside ( ) by what’s outside the ( )
- For example, $3(x + 4) = 3x + 12$
- Try this one: $-2(m - 5)$
- Solution: $-2m + 10$

EXAMPLES – DISTRIBUTE!
- Ex) $5n(7n - 2)$
  - $= 5n(7n) - 5n(2)$
  - $= 35n^2 - 10n$
- Ex) $(6h - 7)(2h + 3)$
  - $= 6h(2h) + 6h(3) - 7(2h) - 7(3)$
  - $= 12h^2 + 18h - 14h - 21$
  - $= 12h^2 + 4h - 21$

Example
- a) $4p^2(-5p^4)$
- b) $5y(6y - 1)$
- c) $-3a^4(4 - a)$
- d) $5r^3(2r^2 - 3r - 4)$

Try these on your own...
- e) $-3y^2(6y^2 - 8y + 12)$
- f) $\frac{3}{4}a(8a^2 + 12a + 24)$

FOIL
- To multiply two binomials, find the sum of the products of
  - F the First terms
  - O the Outer terms
  - I the Inner terms
  - L the Last terms.
- Note: FOIL is nothing more than using the distributive property twice.
Examples – Just watch…

- Ex) (x-4)(x+9)
  - First = x(x)
  - Outer = x(9)
  - Inner = -4(x)
  - Last = -4(9)
  - Find the sum:
    - = x² - 4x + 9x - 36
    - Simplify: x² + 5x - 36

- Ex) (m-3)(m+4)
  - First = m(m)
  - Outer = m(4)
  - Inner = -3(m)
  - Last = -3(4)
  - Find the sum:
    - = m² - 3m + 4m - 12
    - = m² + m - 12

Example

- g) (5m - 3)(2m + 6)
- h) (5w + 2)(2w + 5)

Multiplying Conjugates

- (a + b)(a – b) = a² - b²

Note: The outside & inside terms will always cancel out b/c they are opposites. The resulting binomial will ALWAYS have a minus sign.

Example

- i) (b + 7)(b - 7)
- j) (3d - 4f)(3d + 4f)
- k) 3x³(x + 4)(x - 4)

SQUARE of a BINOMIAL

- (a + b)² =
  - (a + b)(a + b)
  - = a² + 2ab + b²

- (a - b)²
  - = (a – b)(a – b)
  - = a² – 2ab + b²

Do you notice a pattern here?

Write this down!

- EVERY time you square a binomial, the result is a trinomial.
Steps for squaring a binomial

1. Square the first term.
2. Multiply the two terms together and double.
3. Square the last term.

Note: The first and last terms will always be positive. The middle term will have the same sign as the original binomial.

Example

- l) \( (a - 3)^2 \)
- m) \( (5r - 7)^2 \)
- n) \( (-4m - 9n)^2 \)