Factoring

COMMON FACTORING

- Factoring is the reverse of expanding.
- Instead of expanding the following question $2(x + 3) = 2x + 6$, we are trying to work in the reverse order. $2x + 6 = 2(x + 3)$
- In order to find the **greatest common factor** between all terms…
  - Look for the largest term that divides evenly into all terms.
  - Expect that the GCF might include constants AND variables.
  - Factor out negatives (subtraction signs) when possible.
- Examples:
  - $2ab + 4c = 2(ab + 2c)$
  - $-3b^2 - 9b = -3b(b + 3)$
  - $3x^2 + 6x^2 - 9x = 3x(x + 2x - 3)$
  - $3x(x - 2) - 2(x - 2) = (x - 2)(3x - 2)$
  - $x(a + b) + y(a + b) = (a + b)(x + y)$

FACTORING TRINOMIALS 1

- Factoring trinomials is the opposite of expanding binomials (A.K.A. the FOIL method).
- To factor a trinomial, the following question must be asked: "What two numbers (pos. or neg.) multiply to give the last term and add together to give the middle coefficient?"
- Example - Factor the following trinomial: $x^2 + 8x + 12$
  - What two numbers (pos. or neg.) multiply to give 12 and add together to give 8?

1 and 12
2 and 6
3 and 4

$(x + 2)(x + 6)$

check! → $x^2 + 6x + 2x + 12$

$x^2 + 8x + 12$

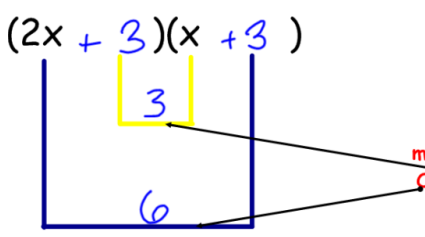
  - The answer can be checked by expanding the binomial. This should result in the original question.
- Example - Sometimes there is a need to factor twice using different methods. Factor $2x^2 + 8x - 24$.
  - $2x^2 + 8x - 24 = 2(x^2 + 4x - 12) = 2(x - 2)(x + 6)$

FACTORING TRINOMIALS 2

- When factoring trinomials that have a coefficient in front of the first term, the method must change because the other approach won't work.
- When there is a term in front of the squared variable other than 1, the **"OI in FOIL"** method of factoring must be used.
- Example: Factor the following trinomial

$2x^2 + 9x + 9$

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



$2x^2 + 6x + 3x + 9$

$2x^2 + 9x + 9$

× 18
+ 9

18
1, 18
2, 9
6, 3

These 2 numbers make up the OI in FOIL

FACTORING USING THE DIFFERENCE OF SQUARES

- When two binomials are the same with the exception of the sign, expanding them always results in a binomial as a final product.
- In order to factor binomials, the square roots of each of the term must be looked at.
- Example: $25a^2 - 16b^2$
  - the square root of 25 is 5
  - the square root of 16 is 4
  - the square root of a^2 is a
  - the square root of b^2 is b
    - The brackets will be the exact same, except they will have opposite signs!! (5a – 4b)(5a +4b).

SUMMARY OF FACTORING