

FACTORIZING POLYNOMIALS

PURPLE: the format of the expression given

GREEN: the factored form of the expression

RED: what you are going to see in the given expression.

- CHECK for GCF first.
- Identify the # of terms

2 terms

$$a^2 - b^2 = (a+b)(a-b)$$

Perfect Square - Perfect Square

$$a^2 + b^2 = (a+bi)(a-bi)$$

Perfect Square + Perfect Square

$$a^3 - b^3 = (a-b)(a^2 + ab + b^2)$$

perfect cube - perfect cube

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

Perfect cube + Perfect cube

3 terms

$$a^2 + 2ab + b^2 = (a+b)^2$$

$$a^2 - 2ab + b^2 = (a-b)^2$$

• the 1st and 3rd terms will be Perfect Squares

• the middle term (2nd term) will be 2 times the square roots of the 1st & 3rd terms.

$$ax^2 + bx + c = (\#x + \#)(\#x + \#)$$

• there are two integers that multiply to ac and add to b .

can use methods like: X, star, box, guess & check, slip/slide/divide, etc

$$ax^{2n} + bx^n + c = (\#x^n + \#)(\#x^n + \#)$$

• the exponent on the variable in the 1st term is DOUBLE the variable in the second term.

• there are two integers that multiply to ac and add to b .

4 terms

$$ax^3 + bx^2 + cx + d = (\#x^2 + \#)(\#x + \#)$$

• the first two terms have to have the same ratio as the last two terms

$$\frac{b}{a} = \frac{d}{c} \text{ (proportionality)}$$

Steps: factor out

$$a^3 + 3a^2b + 3ab^2 + b^3 = (a+b)^3$$

$$a^3 - 3a^2b + 3ab^2 - b^3 = (a-b)^3$$

• 1st and last terms will be perfect cubes

• The middle terms are divisible by 3 and have the structure $3a^2b$ & $3ab^2$

All of the identities can be used FORWARD and BACKWARD (to factor) & (to multiply out)

DOS • SOS • DOC • SOC • PST • BC

DOS
Difference of Squares

SOS
Sum of Squares

DOC
Difference of Cubes

SOC
Sum of Cubes

PST
perfect square trinomial

TRIM
other trinomial methods

GF
quadratic form

GAP
grouping

BC
binomial cubed