

When finished with STEPS 0 and 1, think about the number of terms you have left in the polynomial factors.

If it is a BINOMIAL (2 terms), then refer to STEP 2.

If it is a TRINOMIAL (3 terms), then refer to STEP 3.

If it is a 4 TERM POLYNOMIAL (4 terms), then refer to STEP 4.

STEP 2: FACTORING BINOMIALS!

- There are only three ways to factor binomials.
- They are ALL special patterns.
- Follow the order of the special patterns:
 - (A) First check for DIFFERENCE OF TWO SQUARES.
 - (B) Second check for DIFFERENCE OF TWO CUBES.
 - (C) Third check for SUM OF TWO CUBES.
- If the binomial does not fit into one of these three categories, then it CANNOT be factored.

STEP 2A - Difference of 2 Squares

The difference of two squares factors into the product of conjugates!

$$a^2 - b^2$$

$$(a-b)(a+b)$$

examples:

Factor

$$\textcircled{1} 81j^4 - 16k^2$$

$$(9j^2 - 4k)(9j^2 + 4k)$$

Square root of $81j^4$ → $9j^2$
 Square root of $16k^2$ → $4k$

$$\textcircled{2} -9 + z^6$$

$$-(z^6 - 9)$$

$$-(z^3 - 3)(z^3 + 3)$$

Sq root of z^6 → z^3
 Square root of 9 → 3

STEP 2B: DIFFERENCE OF TWO CUBES

$$\sqrt[3]{a^3} = a$$

$$\sqrt[3]{b^3} = b$$

$$a^3 - b^3$$

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

Cube Roots
 Square of a
 Product of a-b
 Square of b
 Binomial - Trinomial

STEP 2C: SUM OF TWO CUBES

$$a^3 + b^3$$

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

$$1^3 = 1 \quad (x)^3 = x^3$$

$$2^3 = 8 \quad (x^2)^3 = x^6$$

$$3^3 = 27 \quad (x^3)^3 = x^9$$

$$4^3 = 64 \quad (x^4)^3 = x^{12}$$

$$5^3 = 125 \quad (x^5)^3 = x^{15}$$

$$10^3 = 1000$$

Factor: $8m^6 - 27n^9$

$$(2m^2 - 3n^3)(4m^4 + 6mn^3 + 9n^6)$$

order x
 lead term/neg x
 gcf x
 2 terms
 Diff of 2 Squares x
 Diff of 2 Cubes

$$-3z^{12} - 3000a^3$$

$$-3000a^3 - 3z^{12}$$

$$-3(1000a^3 + z^{12})$$

$$(z^4)^3 = z^{12}$$

$$-3(10a + z^4)(100a^2 - 10az^4 + z^8)$$

STEP 3 - Factoring TRINOMIALS

STEP 3A - PERFECT SQUARE TRINOMIAL FACTORS INTO THE SQUARE OF BINOMIAL.

$$a^2 + 2ab + b^2$$

$$(a+b)^2$$

$$a^2 - 2ab + b^2$$

$$(a-b)^2$$

$$x^2 + 12x + 36$$

$$121z^2 - 33z + 9$$