

How to factor a polynomial if they don't tell you what method to use:

Terms	Method:
2	① GCF ② Difference of Squares Sum/Difference of Cubes
3	① GCF ② Factor the trinomial if possible (times the 1 st & last)
4 or more	① GCF ② Factor by Grouping

2 TERM EXAMPLE:

GCF: $x^6 - 16x^2$

$x^2 (x^4 - 16)$ $a=x^2$ look to see if you factor the leftovers
(DIFF. OF 2 SQUARES)

$x^2 (x^2 + 4)(x^2 - 4)$ ← DIFF. OF 2 SQUARES AGAIN
 $a=x$
 $b=2$

$x^2 (x^2 + 4)(x + 2)(x - 2)$

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

$$4x^8 - 32x^2$$

$$4x^2(x^6 - 8) \quad \begin{array}{l} a = x^2 \\ b = 2 \end{array}$$

$$4x^2(x^2 - 2)((x^2)^2 + (x^2)(2) + (2)^2)$$

$$4x^2(x^2 - 2)(x^4 + 2x^2 + 4)$$

3 Term Example:

$$3x^3 + 7x^2 + 4x$$
$$x(3x^2 + 7x + 4)$$

$$3 \cdot 4 = 12$$

3 4

$$(3x^2 + 3x)(+4x + 4)$$
$$3x(x+1) + 4(x+1)$$
$$x(x+1)(3x+4)$$

$$2x^5 - 5x^3 + 3x$$

$$x(2x^4 - 5x^2 + 3) \quad \begin{array}{l} 2 \cdot 3 = 6 \\ \quad \quad \quad \wedge \\ \quad -2 \quad -3 \end{array}$$

$$(2x^4 - 2x^2)(-3x^2 + 3)$$

$$2x^2(x^2 - 1) - 3(x^2 - 1)$$

$$x(2x^2 - 3)(x^2 - 1) \quad \begin{array}{l} a = x \\ b = 1 \end{array}$$

$$x(2x^2 - 3)(x+1)(x-1)$$

4 or more Terms Example:

$$3x^4 + 3x^3 - 12x^2 - 12x$$

$$3x(x^3 + x^2)(-4x - 4)$$

$$x^2(x+1) - 4(x+1)$$

$$3x(x+1)(x^2-4) \begin{matrix} a=x \\ b=2 \end{matrix}$$

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