Sum of cubes – an expression in the form of $a^3 + b^3$. It can be factored as $(a + b)(a^2 - ab + b^2)$

EX. $x^3 + 8$ x^3+2^3

$a=x$

$b=2$

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

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

Difference of cubes – an expression in the form $a^3 - b^3$. It can be factored as $(a - b)(a^2 + ab + b^2)$

EX. $x^3 - 27$ x^3-3^3

$a=x$

$b=3$

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

$(x-3)(x^2+3x+9)$

Escalator

$\sqrt[3]{x}$

$\sqrt[3]{27}$

Solving Polynomial Equation Essentials

To solve a polynomial equation by factoring:

1. Write the equation in the form $P(x) = 0$.
2. Factor $P(x)$.
3. Use the Zero Product Property to find the roots.

TECHNIQUES	EXAMPLES
Factoring Out the GCF Factor out the greatest common factor of all the terms.	$18x^4 - 27x^3 + 45x^2$ $9x^2(2x^2 - 3x + 5)$
Quadratic Trinomials For $ax^2 + bx + c$, find factors with product *ac* and sum *b*.	$6x^2 - 5x - 4$ $a \cdot c$ -24 3×-8 -5 b $2x \quad 1$ $3x \quad 6x^2 \quad 3x$ $-4 \quad -8x \quad -4$ $(2x+1)(3x-4)$
Perfect Square Trinomials $a^2 + 2ab + b^2 = (a+b)^2$ $a^2 - 2ab + b^2 = (a-b)^2$	$x^2 + 16x + 64$ $(x+8)^2$ $\sqrt{64} = 8$ $8+8=16$ $x^2 - 16x + 64$ $(x-8)^2$ $\sqrt{64} = -8$ $-8+-8=-16$

Difference of Squares $a^2 - b^2 = (a+b)(a-b)$ $\sqrt{4x^2} = 2x = a$ $\sqrt{16} = 4 = b$	$4x^2 - 16$ $(2x+4)(2x-4)$
Factor By Grouping	$x^3 - 4x^2 - 9x + 36$
Sum/Difference of Cubes $a^3+b^3=(a+b)(a^2-ab+b^2)$	$64x^3 + 1$ $\quad a=4x \quad b=1$ $(4x+1)((4x)^2-4x+1)$ $64x^3 - 1$ $(4x+1)(16x^2-4x+1)$