Factoring the Sum and Difference of Cubes

Common perfect cubes:

$1^3 = 1$

$2^3 = 8$

$3^3 = 27$

$4^3 = 64$

$5^3 = 125$

$10^3 = 1000$

Knowing these will help!

Steps:

1. Check for GCF
2. Take the cube root of the 1st & 2nd term
   - 1st = a
   - 2nd = b
3. Write down signs
4. Plug into formula

Same **O**pposite **A**lways **P**ositive

Sum of cubes: $a^3 + b^3 = (a+b)(a^2 - ab + b^2)$

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

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

Difference of cubes: $a^3 - b^3 = (a-b)(a^2 + ab + b^2)$

****Remember, always look for a GCF FIRST *****

Ex: Factor.

1. $x^3 + 27$

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

$b = \sqrt[3]{27} = 3$

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

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

2. $8x^3 + 27$

$a = \sqrt[3]{8x^3} = 2x$

$b = \sqrt[3]{27} = 3$

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

$(2x+3)(4x^2 - 6x + 9)$

3. $2x^5 - 16x^2$

$2x^2(x^3 - 8)$

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

$b = \sqrt[3]{8} = 2$

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

4. $4x^3 - 32$

$4(x^3 - 8)$

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