Factoring Special Forms

Summary

1. Always look for a greatest common factor (GCF) to factor out first.

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

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

Factoring Sum of Cubes

A sum of cubes is an expression in the form

$$a^{3} + b^{3}$$

To start, take the cube root of each term:

•
$$\sqrt[3]{a^3} = a$$

•
$$\sqrt[3]{b^3} = b$$



Remember: Always check to see if you are able to factor out a GCF first.

Example 1. Factor each completely.

(a)
$$x^3 + 125$$

(b)
$$27y^3 + 64$$

(c)
$$2x^3 + 54$$

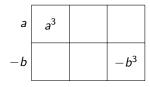
Factoring Difference of Cubes

A difference of cubes is an expression in the form

$$a^{3}-b^{3}$$

To start, take the cube root of each term:

- $\sqrt[3]{a^3} = a$
- $\bullet \sqrt[3]{-b^3} = -b$



Example 2. Factor each completely.

(a)
$$x^3 - 216$$

(b)
$$8 - 125y^3$$

(c)
$$5x^3 - 40$$