

Sum and Difference of Cubes

10th Grade

Two patterns worth memorising, plus the sign rule that keeps them straight.

Both a sum and a difference of cubes factor. The signs follow a fixed pattern.

$$a^3 \pm b^3 = (a \pm b)(a^2 \mp ab + b^2)$$

$$x^3 + 8$$

$$8 = 2^3.$$

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

$$x^3 - 27$$

$$27 = 3^3.$$

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

$$8x^3 + 125$$

$$8x^3 = (2x)^3.$$

$$(2x+5)(4x^2 - 10x + 25)$$

Signs

Same, Opposite, Always Positive

First bracket same as the original, then opposite, then plus.

THE COMMON MISTAKE

✗ $x^3 + 8 = (x+2)(x+2)(x+2)$

✓ $(x+2)(x^2 - 2x + 4)$

Expand the wrong version and the middle terms do not cancel.

Unlike squares, a SUM of cubes does factor. That asymmetry catches people out.