

Difference of Squares

9th Grade

The pattern worth spotting instantly, and the one that looks similar but does not factor.

A difference of two squares always factors into a sum times a difference.

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

$$x^2 - 16$$

$$(x+4)(x-4)$$

Both are perfect squares, subtracted.

$$9x^2 - 25$$

$$(3x+5)(3x-5)$$

$9x^2$ is $(3x)^2$.

$$x^4 - 81$$

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

Then factor again: $(x^2+9)(x+3)(x-3)$.

$$x^2 + 16$$

does not factor

A SUM of squares has no real factorisation.

THE COMMON MISTAKE

✗ $x^2 + 16 = (x+4)(x+4)$

✓ $x^2 + 16$ **does not factor over the reals**

Expand $(x+4)(x+4)$ and you get $x^2 + 8x + 16$. The middle term does not vanish.

Difference of squares factors. Sum of squares does not — not with real numbers.