



Factoring a Difference of Perfect Squares

Video Notes

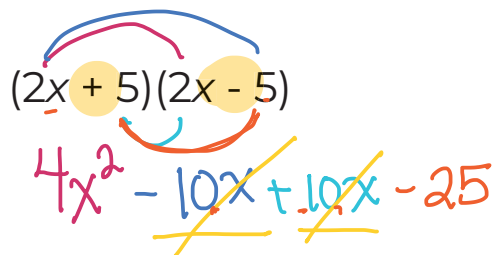
[Video Link](#)

Factoring a Difference of Perfect Squares

What background knowledge will I need?

- How to factor a trinomial

Expand:

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


$$4x^2 - 25 \leftarrow \text{Difference of Perfect Squares.}$$

Three conditions for a difference of perfect squares:

- the expression must be a **binomial** (2 terms)
- it must be a **difference - subtraction**
- both terms must be **perfect squares**

Factor:

$$x^2 - 49$$

\rightarrow No x^1

$$(x + 7)(x - 7)$$

Diagram showing the expansion of $(x + 7)(x - 7)$ with terms $+7x$ and $-7x$ circled and crossed out, and a blue arrow pointing to the final result.

$$(x + 7)(x - 7)$$

3 conditions:

- ✓ binomial
- ✓ difference-subtraction
- ✓ perfect squares

$$\sqrt{x^2} = (x)$$

$$(x \cdot x = x^2)$$

$$\sqrt{49} = (7)$$

$$(7 \cdot 7 = 49)$$

Factor:

$$25x^4 - 36y^6$$

\rightarrow middle term to cancel!

$$(5x^2 + 6y^3)(5x^2 - 6y^3)$$

Diagram showing the expansion of $(5x^2 + 6y^3)(5x^2 - 6y^3)$ with terms $30x^2y^3$ and $-30x^2y^3$ circled and crossed out.

3 conditions:

- ✓ binomial
- ✓ difference-subtraction
- ✓ perfect squares

$$\sqrt{25x^4} = (5x^2)$$

$$(5x^2 \cdot 5x^2 = 25x^4)$$

$$\sqrt{36y^6} = (6y^3)$$

$$(6y^3 \cdot 6y^3 = 36y^6)$$

FINAL ANSWER:
 $(5x^2 + 6y^3)(5x^2 - 6y^3)$

★ Quick Note: To find the square root of a term with an exponent, simply cut the exponent in half.

Factor:
 $x^8 - 16$

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

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

$$\sqrt{x^8} = x^4$$
$$(x^4 \cdot x^4 = x^8)$$

$$\sqrt{16} = 4$$

3 conditions:

- binomial
- difference-subtraction
- perfect squares

Non-Example:

$$x^2 + 9 \rightarrow \text{Not allowed}$$

∴ 3 conditions:

- binomial
- difference-subtraction -NO!
- perfect squares

Not factorable

Video → why can't you factor a sum of perfect squares?

Non-Example:

$$64x^3 - 100$$

3 conditions:

- binomial
- difference-subtraction
- perfect squares

~~$\sqrt{64x^3}$~~ ~~$x^3 \rightarrow x^2 \rightarrow x$~~

~~$(8x^2 + 10)(8x - 10)$~~

~~$80x$~~
 ~~$-80x^2$~~

Not factorable.