

Perfect Squares

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$$\begin{aligned} &\cdot (a+b)^2 \\ &= a^2 + 2ab + b^2 \\ &\cdot (a-b)^2 \\ &= a^2 - 2ab + b^2 \end{aligned}$$

Example of Perfect Squares

| | | |
|----------------|--------------------|----------------------------------|
| $(x+1)^2$ | $(2x-5)^2$ | $(x+2\sqrt{3})^2$ |
| $x^2 + 2x + 1$ | $4x^2 - 20x + 5^2$ | $x^2 + 4\sqrt{6}x + 2\sqrt{3}^2$ |
| | $4m^2 - 20x + 25$ | $x^2 + 4\sqrt{6}x + 12$ |

Difference of Two Squares

Difference of Two Squares

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

note:

$$\begin{aligned} &(a-b)(a+b) \\ &= a^2 + ab - ab - b^2 \\ &= a^2 - b^2 \end{aligned}$$

Examples of Difference of Two Squares

| | |
|-------------------|-------------------------|
| $(x-1)(x+1)$ | $(2m+5)(2m-5)$ |
| $x^2 + x - x - 1$ | $4m^2 - 10m + 10m - 25$ |
| $x^2 - 1$ | $4m^2 - 25$ |

$$(\sqrt{3}x + \sqrt{5})(\sqrt{3}x - \sqrt{5})$$

$$3x^2 - \sqrt{15} + \sqrt{15}$$

$$3x^2 - 5$$

Polynomial signs

| Quadratic equation | Sign of factors |
|--------------------|--|
| $ax^2 + bx + c$ | Positive sign for both factors + + |
| $ax^2 - bx + c$ | Negative sign for both factors - - |
| $ax^2 + bx - c$ | - for small number, + for large number |
| $ax^2 - bx - c$ | + for small number, - for large number |

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Page 1 of 1.

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