

Aim: How do we choose an appropriate method for solving quadratic equations?

Lesson

Method for solving quadratic equations:

First, transform a quadratic equation into standard form, and then decide which method to use.

1. Solve quadratic equations by factoring

Example:

$$x^2 + 5x + 6 = 0$$

$$(x + 3)(x + 2) = 0$$

$$x + 3 = 0$$

$$x = -3$$

$$\text{or } x + 2 = 0$$

$$\text{or } x = -2$$

Factoring

Apply zero product property

Solve two first degree equations

Exercise:

a) $x^2 + 7x + 12 = 0$

c) $x^2 - 16x + 63 = 0$

b) $x^2 + x - 20 = 0$

d) $2x^2 + x - 15 = 0$

2. Solve quadratic equations by factoring special cases

Example:

$$x^2 - 9 = 0$$

$$(x + 3)(x - 3) = 0$$

$$x + 3 = 0$$

$$x = -3$$

$$\text{or } x - 3 = 0$$

$$\text{or } x = 3$$

Factoring, since $A^2 - B^2 = (A + B)(A - B)$

Apply zero product property

Solve two first degree equations

Exercise:

a) $4x^2 - 25 = 0$

b) $x^2 + 8x + 16 = 0$

3. Solve quadratic equations using quadratic formula

If $ax^2 + bx + c = 0$ and $a \neq 0$, then $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Example:

$$x^2 + 5x + 6 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-5 \pm \sqrt{5^2 - (4)(1)(6)}}{2(1)}$$

Use the quadratic equation

Substitute 1 for a, 5 for b, and 6 for c

$$x = (-5 \pm \sqrt{25 - 24}) / 2$$

Simplify

$$x = (-5 \pm 1) / 2$$

Simplify

$$x = (-5 + 1) / 2$$

or $x = (-5 - 1) / 2$

Calculate two solutions

$$x = -2$$

or $x = -3$

Write two solutions

The solutions are -2 and -3

Exercise: Solving the following quadratic equations using quadratic formula.

a) $x^2 + 7x + 12 = 0$

d) $x^2 + 4x + 2 = 0$

b) $x^2 + 8x + 16 = 0$

e) $x^2 + 5x + 3 = 0$

c) $4x^2 - 25 = 0$

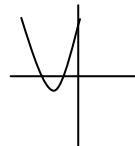
f) $12x^2 + x - 35 = 0$

4. Solve quadratic equations by graphing

Example:

$$x^2 + 5x + 6 = 0$$

The x-intercepts are -2 and -3



5. Exercise: Solve the following equations by appropriate method.

a) $x^2 - 5x + 4 = 0$

e) $x^2 + 3x + 1 = 0$

b) $9x^2 + 24x + 16 = 0$

d) $25x^2 - 36 = 0$

Solve the following equations by any method:

1. $2x^2 + 3x = 6$

2. $8x^2 - 6x + 1 = 0$

3. $2x^2 + 7x - 15 = 0$

4. $2x^2 - 32 = 0$

5. $10x^2 = 8x$

6. $5 = -2x + x^2$

7. $3x^2 - 192 = 0$

8. $3x^2 - 2x = 8$