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:

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

$(x + 3)(x + 2) = 0$			*Factoring*
$x + 3 = 0$	*or*	$x + 2 = 0$	*Apply zero product property*
$x = -2$	*or*	$x = -3$	*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:

$x^2 - 9 = 0$

$(x + 3)(x - 3) = 0$			*Factoring, since* $A^2 - B^2 = (A + B)(A - B)$
$x + 3 = 0$	*or*	$x - 3 = 0$	*Apply zero product property*
$x = -3$	*or*	$x = 3$	*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 $\boldsymbol{ax^2 + bx + c = 0}$ and $\boldsymbol{a \neq 0}$, then $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Example:

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

$x = (-b \pm \sqrt{b^2 - 4ac})/2a$	*Use the quadratic equation*
$x = (-5 \pm \sqrt{5^2 - (4)(1)(6)})/2(1)$	*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) $x^2 + 7x + 12 = 0$

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

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

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

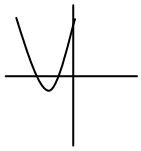
e) $x^2 + 5x + 3 = 0$

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

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

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

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