Choosing the Best Method for Solving Quadratics

Square Root Method: (1)

Use when:

1. you are told to solve by square root method.
   Such as: "Solve by square root method".
2. x^2 is set equal to a numeric value. ($x^2 = c$)
   Such as: $x^2 = 9$ or $x^2 = 12$
3. the middle term, bx, is missing.
   Such as: $3x^2 - 15 = 0$
4. you have the difference of two squares.
   Such as: $x^2 - 81 = 0$

missing "b"

or $(x+3)^2 = 2$

Factoring Method: (2)

Use when:

1. you are told to solve by factoring.
   Such as: "Solve by factoring".
2. the quadratic is easily factorable.
   Such as: $x^2 - 4x - 12 = 0$
3. the quadratic is already factored.
   Such as: $(x + 5)(x - 8) = 0$
4. the constant term, c, is missing. (GCF)
   Such as: $3x^2 - x = 0$

Factorable

Completing the Square Method: (3)

Use when:

1. you are told to solve by completing the square.
   Such as: "Solve by completing the square".
2. when a = 1 and b is an even number
   Such as: $x^2 + 6x = 7$

$a = 1$

b is even

$x^2 + bx = c$

Quadratic Formula Method: (4)

Use when:

1. you are told to use the quadratic formula.
   Such as: "Solve by the quadratic formula".
2. factoring looks difficult, or you are having trouble finding the correct factors.
   Such as: $10x^2 - 3x - 4 = 0$
3. the quadratic is not factorable.
   Such as: $x^2 - 6x + 2 = 0$
4. the question asks for the answers to form $ax^2 + bx + c = 0$ to be rounded.
   Such as: $2x^2 + 18x + 4 = 0$

Works Every time!

Choose the best method for each equation, then solve. Express answers involving radicals in simplest radical form. In each set, one is best solved by completing the square, one by quadratic formula, etc.

a) $x^2 + 10x + 5 = 0$

$x = \frac{-10 \pm \sqrt{(10)^2 - 4(1)(5)}}{2(1)}$

$x = -5 \pm 2\sqrt{5}$

Quadratic Formula

b) $0 = 4x^2 - 20x + 25$

$(2x-5)(2x-5) = 0$

$x = 5/2$

Factor

c) $2y^2 - 120 = 0$

$2y^2 = 120$

$\sqrt{y^2} = \sqrt{60}$

$x = \pm 2\sqrt{15}$

Square Root

d) $x^2 + 8x = -10$

$x^2 + 8x + \underline{16} = -10 + \underline{16}$

$(x+4)^2 = 6$

$x + 4 = \pm\sqrt{6}$

$x = -4 \pm \sqrt{6}$

Complete the Square

a) $x^2 - 12x - 4 = 0$

$x = 6 \pm 2\sqrt{10}$

Complete the □

b) $x^2 - x - 5 = 0$

$x = \frac{1 \pm \sqrt{21}}{2}$

Quad Formula

c) $x^2 = 180 - x^2$

$x = \pm 3\sqrt{10}$

Square Root

d) $2x^2 + 6 = -7x$

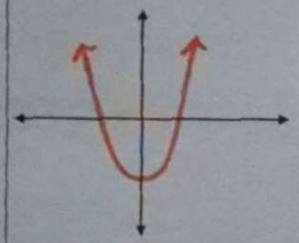
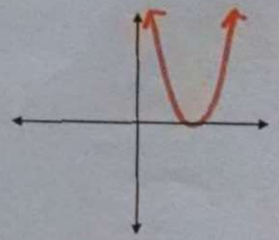
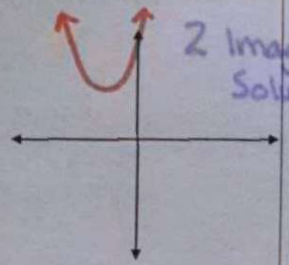
$x = -3/2, -2$

Factor

How many solutions does a Quadratic Equation have??

→ Use the Discriminant

$b^2 - 4ac$

If the discriminant is > 0 → 2 real solutions	If the discriminant is = 0 → 1 real solution	If the discriminant is < 0 → no real solutions
		 2 Imaginary Solutions
Positive	Zero	Negative

Determine the number of solutions for each quadratic function. $ax^2+bx+c=0$

1) $2x^2 - 5x + 8 = 0$	2) $4x^2 - 25 = 0$	3) $x^2 - 6x + 9 = 0$
$a=2$ $b=-5$ $c=8$	$a=4$ $b=0$ $c=-25$	$a=1$ $b=-6$ $c=9$
b^2-4ac	b^2-4ac	b^2-4ac
$(-5)^2-4(2)(8)$	$(0)^2-4(4)(-25)$	$(-6)^2-4(1)(9)$
$=-39$	$=400$	$=0$
→ No Real Solution	→ 2 Real Solutions	→ 1 real Solution

Notes Solving using Quadratic Formula

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a} \quad \text{for} \quad 0 = ax^2 + bx + c$$

Always works as long as function is equal to 0.

1) $x^2 + 2x - 3 = 0$	2) $x^2 - 4 = 0$	3) $4x^2 = 12x - 9$
$a=1$ $b=2$ $c=-3$	$x = \frac{0 \pm \sqrt{16}}{2}$	$x = \frac{12 \pm \sqrt{0}}{8}$
$x = \frac{-2 \pm \sqrt{(2)^2-4(1)(-3)}}{2(1)}$	$x = \{2, -2\}$	$x = 3/2$
$x = \{1, -3\}$		
4) $6x^2 - 3x - 1 = 0$	5) $x^2 - 6x - 1 = 0$	6) $4x^2 - 4x + 3 = 0$
$x = \frac{3 \pm \sqrt{33}}{12}$	$x = 3 \pm \sqrt{10}$	$x = \frac{4 \pm \sqrt{-32}}{8}$
$x = \{.73, -.23\}$	$x = \frac{6 \pm 2\sqrt{10}}{2}$	No Real Solutions
		$x = \frac{4 \pm 4i\sqrt{2}}{8}$
		$x = \frac{1 \pm i\sqrt{2}}{2}$