5 Different Ways to Solve Quadratics in Standard Form

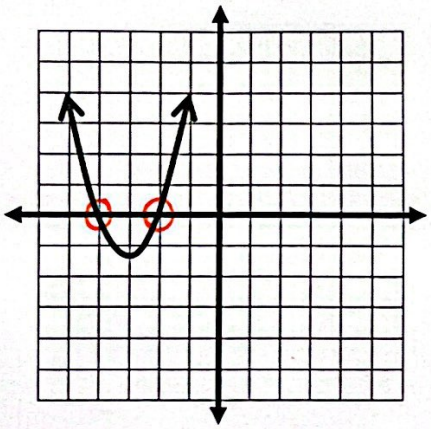
Remember that "to solve" means to find the x-intercepts.

X-intercepts are also called: zeros, roots, solutions

Standard Form	Vertex Form	Factored Form
$f(x) = ax^2 + bx + c$ *a, b, and c are real numbers*	$f(x) = (x - h)^2 + k$ *Vertex = (h, k)*	$f(x) = (x \pm m)(x \pm n)$ *m and n are real numbers*

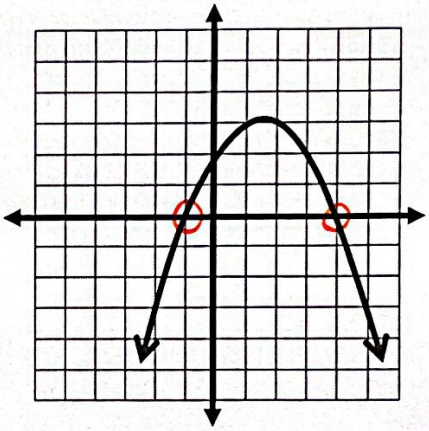
From a graph:

1.



Solutions: $x = -2, -4$

2.



Solutions: $x = -1, 4$

Factoring

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

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

$x+2=0$ or $x+3=0$

$x = -2$ $x = -3$

4. $x^2 - 3x - 10 = 0$

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

$x-5=0$ or $x+2=0$

$x = 5$ or $x = -2$

Take Square Root of Both Sides

5. $(x + 5)^2 = 16$

$\sqrt{(x+5)^2} = \pm\sqrt{16}$

$x + 5 = \pm 4$

$x = -5 \pm 4$

$x = -9$ or $x = -1$

6. $(x - 3)^2 = 81$

$\sqrt{(x-3)^2} = \pm\sqrt{81}$

$x - 3 = \pm 9$

$x = 3 \pm 9$

$x = -6$ or 12

Complete the Square, then Take Square Root of Both Sides

7. $x^2 + 8x - 30 = 0$

$x^2 + 8x = 30$ $\quad b = 8$ $\quad (\frac{8}{2})^2 = 16$

$x^2 + 8x + 16 = 30 + 16$

$(x+4)^2 = 46$

$\sqrt{(x+4)^2} = \pm\sqrt{46}$

$x + 4 = \pm\sqrt{46}$

$x = -4 \pm \sqrt{46}$

8. $x^2 - 6x = 7$ $\quad (\frac{-6}{2})^2 = 9$

$x^2 - 6x + 9 = 7 + 9$

$(x-3)^2 = 16$

$\sqrt{(x-3)^2} = \pm\sqrt{16}$

$x - 3 = \pm 4$

$x = 3 \pm 4$

$x = -1$ or 7

Quadratic Formula

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

STEPS:
1. Identify a, b, and c.
2. Substitute these values into the formula.
3. Put only $(b)^2-4(a)(c)$ into the calculator, not the square root sign.
4. Take the square root of this value if the answer is a whole number. Otherwise, leave it as a square root.
5. Write the solution.

9. $x^2 + 5x + 2 = 0$

$a = 1$ $\quad b = 5$ $\quad c = 2$

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

$$x = \frac{-5 \pm \sqrt{17}}{2}$$

$5^2 - 4(1)(2)$

$25 - 8$

17

10. $x^2 - 5x - 14 = 0$

$a = 1$ $\quad b = -5$ $\quad c = -14$

$$x = \frac{-(-5) \pm \sqrt{(-5)^2 - 4(1)(-14)}}{2(1)}$$

$(-5)^2 - 4(1)(-14)$

$25 + 56$

81

$$x = \frac{5 \pm \sqrt{81}}{2}$$

$$x = \frac{5 \pm 9}{2}$$

$x = \frac{5+9}{2} = 7$ $\quad x = \frac{5-9}{2} = -2$