

Algebra 2 - Solving Quadratic Equations - Answer Key

Common Core A-REI.B.4a, A-REI.B.4b · maths-pdf.fr/en/

Every worksheet problem on solving quadratic equations is solved here, one step at a time. Compare your method as well as your final answer, because the steps show where a lost plus-or-minus sign or a wrong sign in the formula can go wrong. Final answers appear in bold so you can find them quickly when you only need a check.

Algebra 2 · Common Core State Standards: **A-REI.B.4a, A-REI.B.4b**

Exercise 1 - Square roots

Take the square root of both sides, keeping both signs.

$$x = \pm 7$$

Exercise 2 - Isolate the square

$$3x^2 = 75, \text{ so } x^2 = 25.$$

$$x = \pm 5$$

Exercise 3 - Square of a binomial

$$x-4 = \pm 6, \text{ so } x = 4 \pm 6.$$

$$x = 10, -2$$

Exercise 4 - Irrational solutions

$$x+2 = \pm\sqrt{11}, \text{ so } x = -2 \pm\sqrt{11}.$$

$$x = -2 + \sqrt{11}, -2 - \sqrt{11}$$

Exercise 5 - Factor and solve

$(x-5)(x+2)=0$. By the zero product property, $x-5=0$ or $x+2=0$.

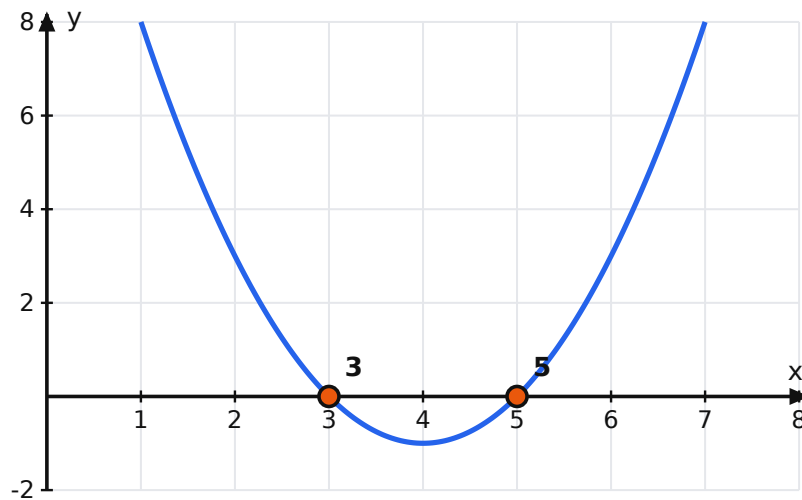
$$x=5, -2$$

Exercise 6 - Factor, a = 2

$(2x-1)(x+4)=0$. Check: $2x^2+8x-x-4$.

$$x=\frac{1}{2}, -4$$

Exercise 7 - Factoring and the graph



The solutions are the x-intercepts.

$$(x-3)(x-5)=0.$$

$x=3, 5$, matching the x-intercepts

Exercise 8 - Complete the square, integer

$x^2+6x=7$. Add 9: $x^2+6x+9=16$.

$$(x+3)^2=16, \text{ so } x+3=\pm 4.$$

$$x=1, -7$$

Exercise 9 - Complete the square, irrational

$$x^2 - 4x = 3. \text{ Add 4: } (x-2)^2 = 7.$$

$$x-2 = \pm\sqrt{7}.$$

$$x = 2 \pm \sqrt{7}$$

Exercise 10 - Complete the square, odd b

$$x^2 + 5x = -3. \text{ Half of 5 is } \frac{5}{2}; \text{ square it: } \frac{25}{4}.$$

$$\left(x + \frac{5}{2}\right)^2 = -3 + \frac{25}{4} = \frac{13}{4}, \text{ so } x + \frac{5}{2} = \pm \frac{\sqrt{13}}{2}.$$

$$x = \frac{-5 \pm \sqrt{13}}{2}$$

Exercise 11 - Quadratic formula, rational

$$\text{Identify } a=3, b=-5, c=-2.$$

$$\text{Discriminant: } b^2 - 4ac = (-5)^2 - 4(3)(-2) = 49.$$

$$\text{Substitute: } x = \frac{-(-5) \pm \sqrt{49}}{2(3)}.$$

$$\sqrt{49} = 7.$$

$$x = -\frac{1}{3} \text{ or } x = 2$$

Exercise 12 - Quadratic formula, radicals

$$\text{Identify } a=2, b=4, c=-3.$$

$$\text{Discriminant: } b^2 - 4ac = (4)^2 - 4(2)(-3) = 40.$$

$$\text{Substitute: } x = \frac{-(4) \pm \sqrt{40}}{2(2)}.$$

$$\sqrt{40} = 2\sqrt{10}.$$

$$x = \frac{-2 - \sqrt{10}}{2} \text{ or } x = \frac{-2 + \sqrt{10}}{2}$$

Exercise 13 - Complex solutions

Identify $a=1, b=2, c=5$.

Discriminant: $b^2 - 4ac = (2)^2 - 4(1)(5) = -16$.

Substitute: $x = \frac{-(2) \pm \sqrt{-16}}{2(1)}$.

$\sqrt{-16} = 4i$: the solutions are complex.

$x = -1 + 2i$ or $x = -1 - 2i$

Exercise 14 - Discriminants

Equation	$D = b^2 - 4ac$	Type
$x^2 - 4x + 4 = 0$	0	one real
$x^2 + x + 1 = 0$	-3	two complex
$2x^2 - 5x - 3 = 0$	49	two real

Completed table.

$16 - 16 = 0$; $1 - 4 = -3$; $25 + 24 = 49$.

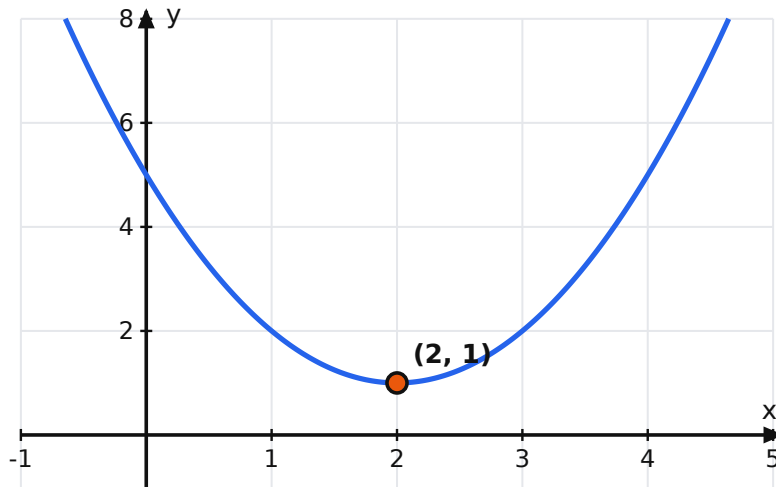
One real; two complex; two real

Exercise 15 - Find k

One real solution means $D = 0$: $k^2 - 4(1)(9) = 0$, so $k^2 = 36$.

$k = 6$ or $k = -6$

Exercise 16 - No real solutions



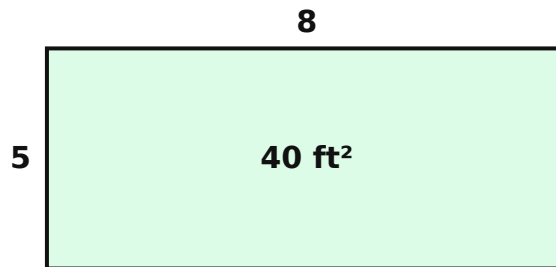
Vertex (2, 1) above the axis.

The vertex (2, 1) is above the x-axis and the parabola opens up, so it never reaches 0.

$$D = 16 - 20 = -4. \quad x = \frac{4 \pm 2i}{2}.$$

$$x = 2 \pm i$$

Exercise 17 - Garden



Width 5 ft, length 8 ft.

$$w(w+3) = 40 \text{ gives } w^2 + 3w - 40 = 0, \text{ so } (w+8)(w-5) = 0.$$

The width cannot be negative, so $w = 5$ and the length is $w+3 = 8$.

5 feet by 8 feet

Exercise 18 - Ball hits the ground

$$-16t^2 + 48t + 4 = 0 \text{ becomes } 4t^2 - 12t - 1 = 0.$$

$$D = 144 + 16 = 160, \sqrt{160} = 4\sqrt{10}, \text{ so } t = \frac{12 \pm 4\sqrt{10}}{8} = \frac{3 \pm \sqrt{10}}{2}.$$

The negative value is rejected. $t = \frac{3 + \sqrt{10}}{2} \approx 3.08$.

About 3.08 seconds

Exercise 19 - Break-even

$$x^2 - 12x + 20 = 0, \text{ so } (x-2)(x-10) = 0.$$

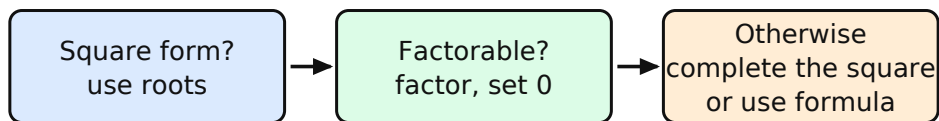
x = 2 and x = 10 (20 and 100 tickets)

Exercise 20 - Find the error

The zero product property only works when the product equals 0. Rewrite: $x^2 - 2x - 8 = 0$, so $(x-4)(x+2) = 0$.

$$x = 4, -2$$

Exercise 21 - Choose a method



Choose a method.

$$(x+7)^2 = 0, \text{ so } x = -7. D = 196 - 196 = 0.$$

One solution, x = -7 (repeated)