

Algebra 1 - Solving Quadratic Equations - Answer Key

Common Core A-REI.B.4a, A-REI.B.4b, A-SSE.B.3a, A-CED.A.1 · maths-pdf.fr/en/

Use this key to check your work on the quadratic equations worksheet. Every solution shows the steps, and the final answer appears in bold. If your answer differs, find the first line where your work and the key disagree, then redo the problem from there without looking.

Algebra 1 · Common Core State Standards: **A-REI.B.4a, A-REI.B.4b, A-SSE.B.3a, A-CED.A.1**

Exercise 1 - Standard form

Add 2 to both sides: $3x^2 - 5x + 2 = 0$.

$$a = 3, b = -5, c = 2$$

Exercise 2 - Square roots

Take the square root of both sides: $x = \pm\sqrt{49}$.

$$x = 7 \text{ or } x = -7$$

Exercise 3 - Isolate the square

Add 5: $x^2 = 25$. Then $x = \pm 5$.

$$x = 5 \text{ or } x = -5$$

Exercise 4 - Perfect square equals a number

Take square roots: $x + 2 = \pm 5$.

$$x = -2 + 5 = 3 \text{ or } x = -2 - 5 = -7.$$

$$x = 3 \text{ or } x = -7$$

Exercise 5 - Coefficient on the square

Divide by 2: $x^2 = 9$.

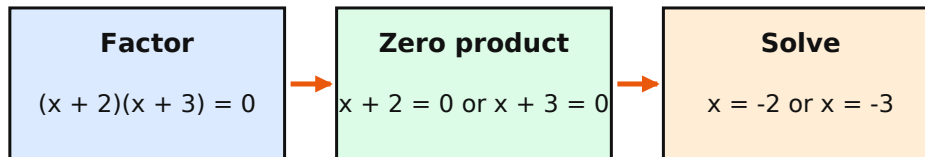
$$x = 3 \text{ or } x = -3$$

Exercise 6 - Irrational solutions

$$x = \pm\sqrt{20} = \pm\sqrt{4 \cdot 5}.$$

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

Exercise 7 - Factoring



Solving by factoring.

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

Set each factor to 0: $x = -2$ or $x = -3$.

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

Exercise 8 - Factoring with negatives

$$(x-3)(x-4)=0.$$

$$x = 3 \text{ or } x = 4$$

Exercise 9 - Do not divide by x

Move everything to one side: $x^2 - 3x = 0$. Factor: $x(x-3) = 0$.

Dividing by x would lose the solution $x = 0$.

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

Exercise 10 - Leading coefficient 2

Factor: $(2x-1)(x+3)=0$.

$2x-1=0$ gives $x=\frac{1}{2}$; $x+3=0$ gives $x=-3$.

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

Exercise 11 - Complete the square

Add $(6\div 2)^2=9$ to both sides: $x^2+6x+9=16$.

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

$x=1$ **or** $x=-7$

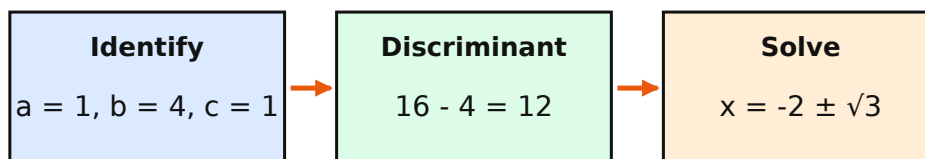
Exercise 12 - Complete the square again

Move the constant: $x^2-4x=5$. Add $(-4\div 2)^2=4$: $x^2-4x+4=9$.

$(x-2)^2=9$, so $x-2=\pm 3$.

$x=5$ **or** $x=-1$

Exercise 13 - Quadratic formula



Quadratic formula steps.

$a=1, b=4, c=1$.

$$x = \frac{-4 \pm \sqrt{16-4}}{2} = \frac{-4 \pm \sqrt{12}}{2} = \frac{-4 \pm 2\sqrt{3}}{2}$$

$$x = -2 \pm \sqrt{3}$$

Exercise 14 - Formula with rational roots

$a=2, b=-3, c=-5$. Discriminant: $9+40=49$.

$x = \frac{3 \pm 7}{4}$, so $x = \frac{10}{4} = \frac{5}{2}$ or $x = \frac{-4}{4} = -1$.

$x = \frac{5}{2}$ or $x = -1$

Exercise 15 - Discriminant

(a) $36-36=0$: one solution. (b) $1-24=-23$: no real solutions. (c) $9+16=25$: two solutions.

(a) 0, one; (b) -23, none; (c) 25, two

Exercise 16 - Rectangle area

$w(w+3)=40$, so $w^2+3w-40=0$.

$(w+8)(w-5)=0$, so $w=-8$ or $w=5$. A width cannot be negative.

Width 5 feet, length 8 feet

Exercise 17 - Ball at a given height

Set $-16t^2+64t=48$ and divide by -16 : $t^2-4t+3=0$.

$(t-1)(t-3)=0$, so $t=1$ or $t=3$.

The ball is at 48 feet on the way up and on the way down.

1 second and 3 seconds

Exercise 18 - Consecutive integers

n	n + 1	Product
8	9	72
-9	-8	72

Both pairs multiply to 72; only the positive pair is allowed.

$$n(n+1)=72, \text{ so } n^2+n-72=0.$$

$$(n+9)(n-8)=0, \text{ so } n=8 \text{ (positive).}$$

8 and 9

Exercise 19 - Square pool

$$(x+4)^2=100, \text{ so } x+4=\pm 10.$$

$$x=6 \text{ or } x=-14. \text{ A side cannot be negative.}$$

6 feet

Exercise 20 - Profit

$$\text{Set } -2x^2+50x-100=200, \text{ so } -2x^2+50x-300=0.$$

$$\text{Divide by } -2: x^2-25x+150=0, \text{ so } (x-10)(x-15)=0.$$

10 items or 15 items

Exercise 21 - Ladder

$$b^2+(b+7)^2=13^2, \text{ so } 2b^2+14b+49=169.$$

$$2b^2+14b-120=0, \text{ so } b^2+7b-60=0, \text{ which factors as } (b+12)(b-5)=0.$$

$$\text{The base is } b=5 \text{ feet and the height is } 5+7=12 \text{ feet.}$$

Base 5 feet, height 12 feet