

Quadratic Method Match

Choose a method that fits the equation and interpret every root.

HIGH SCHOOL • HSA-REI.B.4b

CCSS.Math.Content.HSA-REI.B.4b "Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation..."

NAME _____

DATE _____

USE THE INITIAL FORM

For an isolated square, take both square roots. For a product equal to zero, set each factor to zero. Completing the square creates a squared expression. The quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ solves $ax^2 + bx + c = 0$. A negative discriminant gives complex roots; $i^2 = -1$. Algebraic roots must also satisfy any context constraints.

WORKED EXAMPLE

Solve $(x + 1)^2 = 20$. Explain why the square-root method fits.

1. The square is already isolated. Take both roots: $x + 1 = \pm\sqrt{20} = \pm 2\sqrt{5}$.
2. Subtract 1: $x = -1 \pm 2\sqrt{5}$. Either root makes $(x + 1)^2 = 20$.

Answer: $x = -1 + 2\sqrt{5}$ or $x = -1 - 2\sqrt{5}$.

PRACTICE 6 problems

- 1** Solve $x^2 = 81$ by inspection. Give every real root and check each.

ANSWER _____

2 Solve $(x - 2)^2 = 9$ using square roots. Show both cases.

ANSWER

3 Choose an efficient method and solve $2x^2 + 7x + 3 = 0$. State why your method fits.

ANSWER

4 Solve $x^2 + 6x - 7 = 0$ by completing the square. Show the equal amount added to both sides.

ANSWER

- 5** Use the quadratic formula to solve $x^2 + 4x + 13 = 0$. Compute the discriminant and write the roots in $a \pm bi$ form.

ANSWER _____

- 6** Without solving, choose a suitable first step for EACH: (a) $x^2 = 49$; (b) $(x - 4)(x + 5) = 0$; (c) $3x^2 - 12x + 17 = 0$. Explain your choices.

ANSWER _____

APPLY IT Show your work

- 1** A square has side length $(x - 2)$ cm and area 9 cm^2 . Solve the area equation, then decide which root is physically valid. Explain why the other root is rejected.

ANSWER _____

2

A ball's height is $h(t) = -t^2 + 6t + 7$ meters for $t \geq 0$ seconds, until it hits the ground. Solve $h(t) = 0$ and state when the ball lands. Interpret both algebraic roots.

ANSWER _____

CHALLENGE One step up

Solve $3x^2 - 12x + 17 = 0$ using the quadratic formula or completing the square. Give exact complex roots and explain why there are no real roots.

PRACTICE 1

$x = 9$ or -9 ; $9^2 = 81$ and $(-9)^2 = 81$.

PRACTICE 2

$x - 2 = \pm 3$; $x = 5$ or -1 .

PRACTICE 3

Factoring fits: $(2x + 1)(x + 3) = 0$, so $x = -1/2$ or -3 . Other correct methods accepted.

PRACTICE 4

$x^2 + 6x = 7$; add 9: $(x + 3)^2 = 16$. Then $x + 3 = \pm 4$, so $x = 1$ or -7 .

PRACTICE 5

$D = 16 - 52 = -36$. $x = (-4 \pm 6i)/2 = -2 \pm 3i$.

PRACTICE 6

(a) Isolated square: take $\pm\sqrt{49}$. (b) Zero product: set each factor to zero. (c) No simple factoring: use the quadratic formula.

APPLY IT 1

Only $x = 5$; the side length is 3 cm.

$x = 5$ or -1 . Only 5 satisfies $x - 2 > 0$; the other root gives side length -3 cm.

APPLY IT 2

The ball lands at $t = 7$ seconds. The root $t = -1$ is outside this model's time domain.

$(t - 7)(t + 1) = 0$ gives 7 or -1; only 7 satisfies $t \geq 0$.

CHALLENGE

$D = -60$. $x = (12 \pm i\sqrt{60})/6 = 2 \pm (\sqrt{15}/3)i$. Equivalently, $(x - 2)^2 = -5/3$. A real square cannot be negative.