

Algebra 2 · Quadratic Equations with Complex Solutions · Test Answer Key

Common Core N-CN.C.7, A-REI.B.4b · mathovore.fr

Worked solutions and a scoring guide for the 20-point test. Award the points listed in each scoring note, and give partial credit when a student shows correct steps but makes one arithmetic slip. Figures are shown where they help check the reading of a graph.

Algebra 2 Common Core: N-CN.C.7 · A-REI.B.4b

Question 1: Discriminant and solutions (2 points)

a) $D = 16 - 28 = -12$: two complex solutions. b) $D = 25 + 24 = 49$: two real solutions.

a) -12 , two complex solutions b) 49 , two real solutions

Scoring: 1 point for each part (correct discriminant and correct description).

Question 2: Read a graph (2 points)

a) The graph never meets the x-axis: **0 real solutions.**

b) $D = 16 - 24 = -8$, so there are two complex solutions $x = \frac{4 \pm 2i\sqrt{2}}{2} = 2 \pm i\sqrt{2}$.

a) 0 b) $D = -8$, two complex solutions

Scoring: 1 point for part a; 1 point for the discriminant and the description in part b.

Question 3: Square root method (2 points)

a) $4x^2 = -100$, $x^2 = -25$, $x = \pm 5i$. b) $x + 3 = \pm 4i$, $x = -3 \pm 4i$.

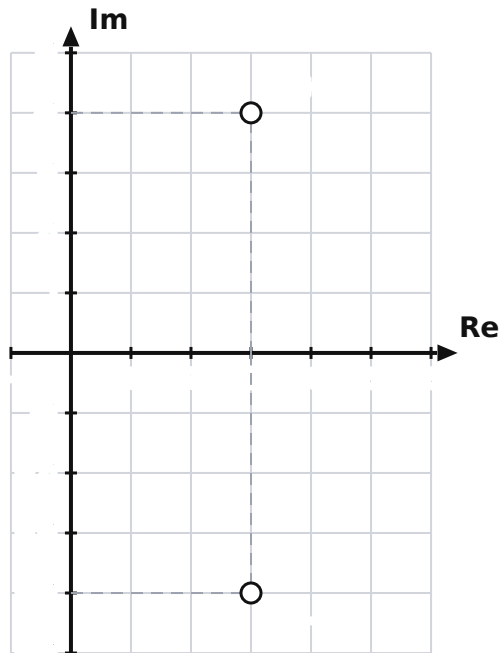
a) $x = \pm 5i$ b) $x = -3 \pm 4i$

Scoring: 1 point for each part.

Question 4: Quadratic formula (3 points)

$D = 36 - 100 = -64$. $x = \frac{6 \pm 8i}{2} = 3 \pm 4i$.

$x = 3 \pm 4i$



The solutions $3 + 4i$ and $3 - 4i$ in the complex plane.

Scoring: 1 point for the discriminant; 1 point for substituting correctly into the formula; 1 point for the simplified solutions.

Question 5: Complete the square (3 points)

$x^2 + 10x = -34$. Add 25: $(x+5)^2 = -9$. Then $x+5 = \pm 3i$.

$$x = -5 \pm 3i$$

Scoring: 1 point for moving the constant and adding 25 to both sides; 1 point for $(x+5)^2 = -9$; 1 point for the solutions.

Question 6: A quadratic with fractions (2 points)

$$D = 1 - 4 = -3. \quad x = \frac{-1 \pm i\sqrt{3}}{2}.$$

$$x = \frac{-1 \pm i\sqrt{3}}{2}$$

Scoring: 1 point for the discriminant; 1 point for the solutions.

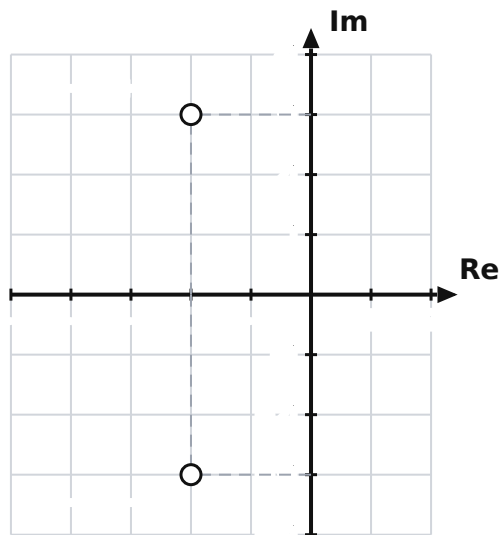
Question 7: Solutions in the plane (3 points)

a) $p = -2 + 3i$ and $q = -2 - 3i$.

b) The sum is -4 , and the sum equals $-b$, so $b = 4$.

c) The product is $4 - 9i^2 = 13$, so $c = 13$.

a) $-2 \pm 3i$ b) $b = 4$ c) $c = 13$



The solutions $-2 + 3i$ and $-2 - 3i$.

Scoring: 1 point for each part.

Question 8: Will the balloon reach 20 feet? (3 points)

Set $-16t^2 + 32t = 20$, so $16t^2 - 32t + 20 = 0$ and $4t^2 - 8t + 5 = 0$.

$D = 64 - 80 = -16$, so $t = \frac{8 \pm 4i}{8} = 1 \pm 0.5i$.

The solutions are not real, so the balloon never reaches 20 ft. Its maximum height is 16 ft at $t = 1$.

Scoring: 1 point for writing the equation correctly; 1 point for the discriminant or solutions; 1 point for the conclusion.

Total
20 points