

Algebra 2 - Zeros and Graphs of Polynomial Functions - Test Answer Key

Common Core A-APR.B.3, F-IF.C.7c · maths-pdf.fr/en/

Use this answer key and scoring guide to grade the test on zeros and graphs of polynomial functions (A-APR.B.3). Each solution shows the full reasoning, and the scoring note explains how many points to award for correct setup, correct work, and a correct final answer. Partial credit rewards a sound method even when a small arithmetic slip changes the result.

Algebra 2 · Common Core State Standards: **A-APR.B.3, F-IF.C.7c**

Question 1 - Zeros from factors [2 pts]

$x=0$ (multiplicity 1), $x=-\frac{3}{2}$ (multiplicity 1), $x=7$ (multiplicity 2).

$0, -\frac{3}{2}, 7$

Scoring: 1 point for the three zeros, 1 point for the multiplicities.

Question 2 - Factor and solve [3 pts]

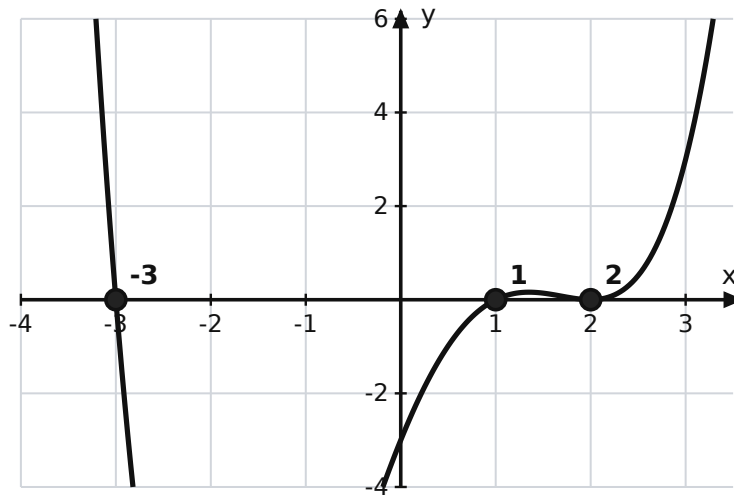
$$x^2(x-4)-9(x-4)=(x-4)(x^2-9)=(x-4)(x-3)(x+3).$$

$$x=4, 3, -3$$

Scoring: 1 point for grouping, 1 point for the factored form, 1 point for the zeros.

Question 3 - Multiplicity on a graph [2 pts]

Crossing means odd multiplicity (1 each) and touching means even multiplicity (2 at $x=2$).
Total degree 4.



Zeros -3, 1, 2.

$$f(x) = \frac{1}{4}(x+3)(x-1)(x-2)^2$$

Scoring: 1 point for the multiplicities, 1 point for the factored form.

Question 4 - End behavior [2 pts]

- a. Odd degree, positive leading coefficient: falls to the left, rises to the right.
- b. Even degree, negative leading coefficient: falls on both ends.

(a) down left, up right; (b) down on both ends

Scoring: 1 point for each part.

Question 5 - Rational Root Theorem [3 pts]

Candidates: $\pm 1, \pm 2, \pm 4, \pm 8$. $p(1) = 1 + 1 - 10 + 8 = 0$.

Divide by $x-1$: $x^2 + 2x - 8 = (x+4)(x-2)$.

$$x = 1, 2, -4$$

Scoring: 1 point for the candidates, 1 point for finding a zero and dividing, 1 point for all three zeros.

Question 6 - Polynomial from a graph point [2 pts]

$f(x) = a(x+2)(x-1)(x-3)$. At $x=0$: $a(2)(-1)(-3) = 6a = -12$, so $a = -2$.

$$f(x) = -2(x+2)(x-1)(x-3)$$

Scoring: 1 point for the setup with a , 1 point for $a = -2$ and the equation.

Question 7 - Sign chart [2 pts]

x	-2	0	3	5
$f(x)$	-24	8	-4	18
Graph	below	above	below	above

Completed table.

$$f(-2) = (-1)(-4)(-6) = -24; f(0) = 8; f(3) = -4; f(5) = 18.$$

-24, 8, -4, 18

Scoring: 1 point for the four values, 1 point for the positions.

Question 8 - Box volume [2 pts]

Zeros: $x=0, 8, 5$. The cut must be less than half the shorter side, 5 inches.

Zeros 0, 5, 8; domain $0 < x < 5$

Scoring: 1 point for the zeros, 1 point for the domain.

Question 9 - Complex zero [2 pts]

The conjugate $1-2i$ is also a zero.

$$(x-4)(x-(1+2i))(x-(1-2i)). \text{ The quadratic part is } x^2-2x+5.$$

$$1-2i; f(x) = (x-4)(x^2-2x+5)$$

Scoring: 1 point for the conjugate, 1 point for the polynomial.

Total
20 points