

Algebra 2 · Polynomial Functions and Their Graphs · Test Answer Key

Common Core F-IF.C.7c, A-APR.B.3, F-IF.B.4 · mathovore.fr

This key gives a complete solution and a scoring guide for every question. Award partial credit as described, and give full credit for any valid method that reaches a correct result, including equivalent forms of an equation.

Algebra 2 Common Core: F-IF.C.7c · A-APR.B.3 · F-IF.B.4

Question 1: Degree and end behavior (2 points)

- a. Degree 5, leading coefficient -3 .
- b. Odd degree, negative leading coefficient: **rises on the left and falls on the right**.

Scoring: 1 point for each part. Part a needs both values.

Question 2: Zeros and multiplicity (2 points)

- a. $x=0$ (multiplicity 1), $x=2$ (multiplicity 2), $x=-5$ (multiplicity 3).
- b. Degree $1+2+3=6$. It crosses at 0, touches and turns at 2, and flattens and crosses at -5 .

Scoring: 1 point for each part. In part b, the degree and at least two correct behaviors are needed.

Question 3: Factor by grouping (2 points)

- a. $x^2(x-4)-9(x-4)=(x-4)(x^2-9)=(x-4)(x-3)(x+3)$.
- b. $x=4, 3, -3$. Check: $g(3)=27-36-27+36=0$.

Scoring: 1 point for each part.

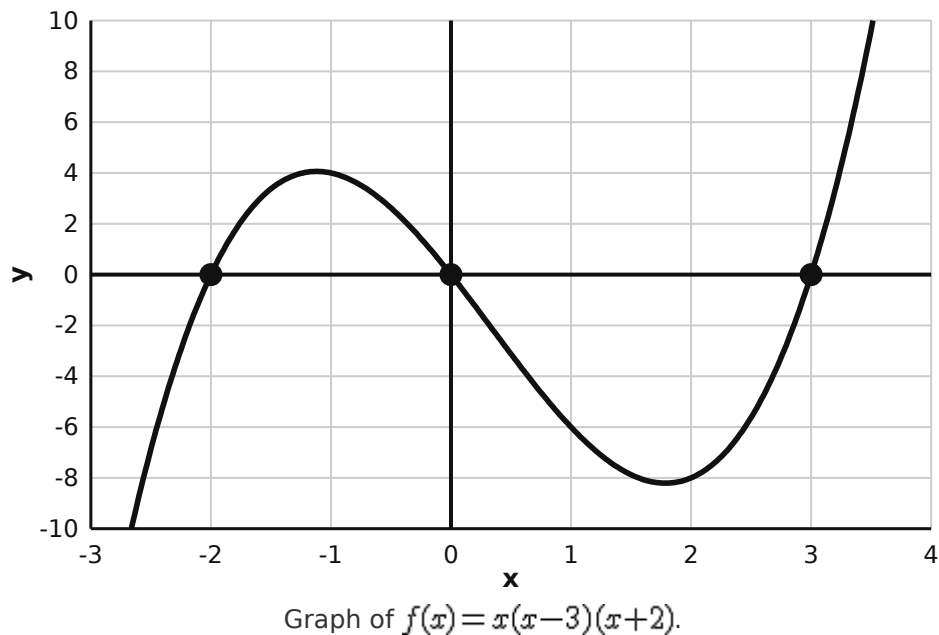
Question 4: Equation from a graph (3 points)

- a. $x=-1$ (multiplicity 1, crosses) and $x=2$ (multiplicity 2, touches).
- b. $f(x)=a(x+1)(x-2)^2$ and $f(0)=a(1)(4)=-8$, so $a=-2$.
- c. $f(x)=-2(x+1)(x-2)^2$. Check: $f(1)=-2(2)(1)=-4$.

Scoring: 1 point for each part. Allow follow-through from part a when computing the leading coefficient.

Question 5: Sketch a graph (3 points)

Zeros: -2 , 0 and 3 , each crossing. Degree 3 with positive leading coefficient: falls on the left, rises on the right. Test values: $f(-1)=4$, $f(1)=-6$, $f(2)=-8$.



Scoring: 1 point for the three zeros labeled; 1 point for correct end behavior; 1 point for a smooth curve with the right signs between the zeros.

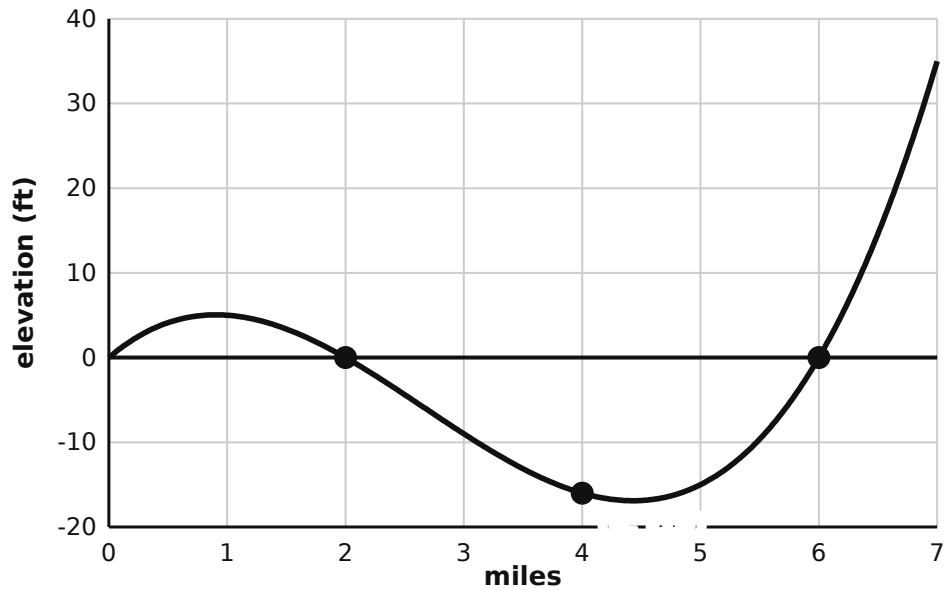
Question 6: Turning points (2 points)

- $6-1=5$.
- The graph has 3 turning points, so the degree is at least 4. Both ends rise, so the degree is even and the leading coefficient is **positive**. Least degree 4.

Scoring: 1 point for each part. Part b needs both the degree and the sign.

Question 7: Trail elevation (3 points)

- $e(x)=0$ at 0, 2 **and** 6 miles.
- The table values are negative from $x=3$ to $x=5$, and e is zero at 2 and 6: **between 2 and 6 miles**.
- 16 feet at mile 4.**

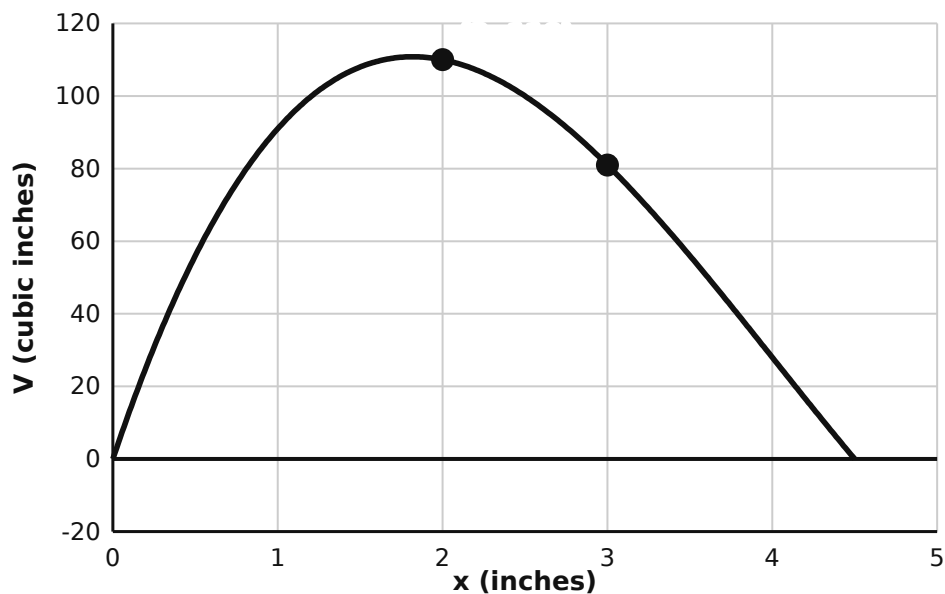


Graph of $e(x) = x(x-2)(x-6)$.

Scoring: 1 point for each part.

Question 8: Open box (3 points)

- Length $15-2x$, width $9-2x$, height x : $V(x) = x(9-2x)(15-2x)$.
- The width $9-2x$ must be positive: $0 < x < 4.5$.
- $V(2) = 2(5)(11) = 110$ and $V(3) = 3(3)(9) = 81$. $x = 2$ gives the greater volume.



Graph of $V(x)$ on its domain.

Scoring: 1 point for each part.

Total

20 points