

Algebra 2 · Polynomial Functions and Their Graphs · Quiz

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

Name: _____ Date: ____/____/____ Score: _____

Try these ten multiple-choice questions on degree, end behavior, zeros, multiplicity, turning points and graphs of polynomial functions. Each question has exactly one correct answer, and the explanation points out the mistake that the wrong choices come from.

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

Questions

Question 1

What is the degree of $f(x) = (x-1)(x+2)(3x+1)$?

- A. 1
- B. 5
- C. 3
- D. 6

Question 2

What is the end behavior of $f(x) = -2x^4 + x^3$?

- A. rises on the left, rises on the right
- B. falls on the left, rises on the right
- C. rises on the left, falls on the right
- D. falls on the left, falls on the right

Question 3

The function $f(x) = (x-4)^3(x+1)^2$ has a zero at $x = 4$. How does the graph behave there?

- A. It touches the axis and turns around.
- B. It crosses the axis like a straight line.
- C. It flattens and crosses the x-axis.
- D. It never reaches the x-axis.

Question 4

What are the zeros of $f(x) = x^3 - x^2 - 6x$?

- A. 0, -3, 2
- B. 3, -2
- C. 0, 6, -1
- D. 0, 3, -2

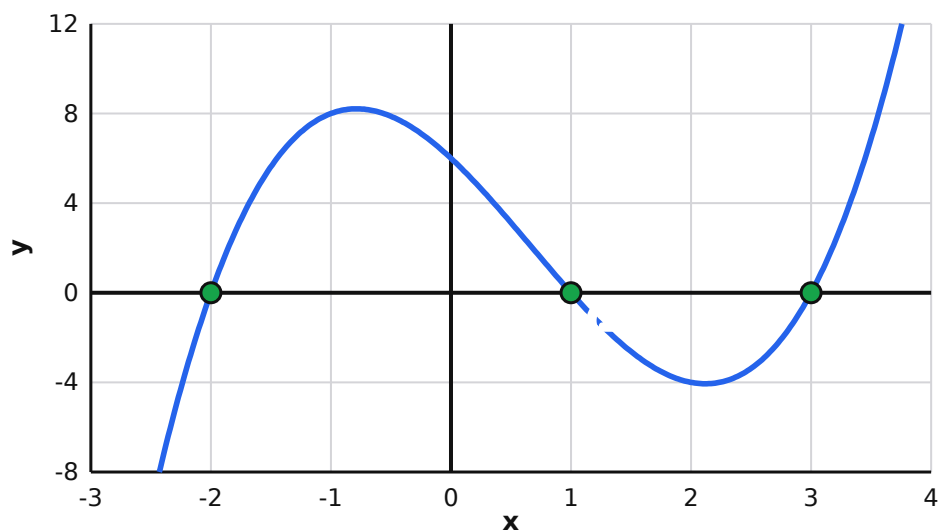
Question 5

What is the greatest number of turning points a polynomial of degree 7 can have?

- A. 7
- B. 6
- C. 8
- D. 5

Question 6

Which function could have the graph shown?

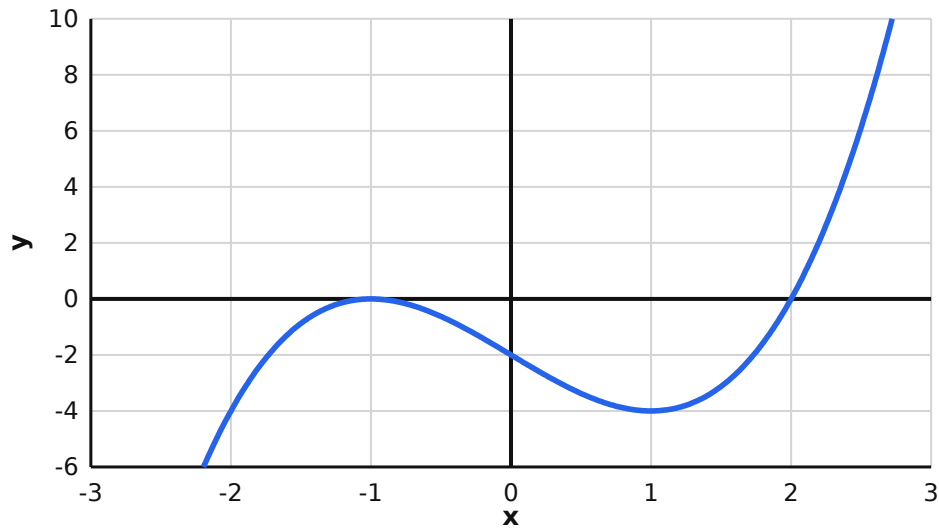


A cubic with three zeros.

- A. $f(x) = (x-2)(x+1)(x+3)$
- B. $f(x) = (x+2)(x-1)(x-3)$
- C. $f(x) = -(x+2)(x-1)(x-3)$
- D. $f(x) = (x+2)(x-1)^2(x-3)$

Question 7

At which zero does the graph touch the x-axis without crossing?

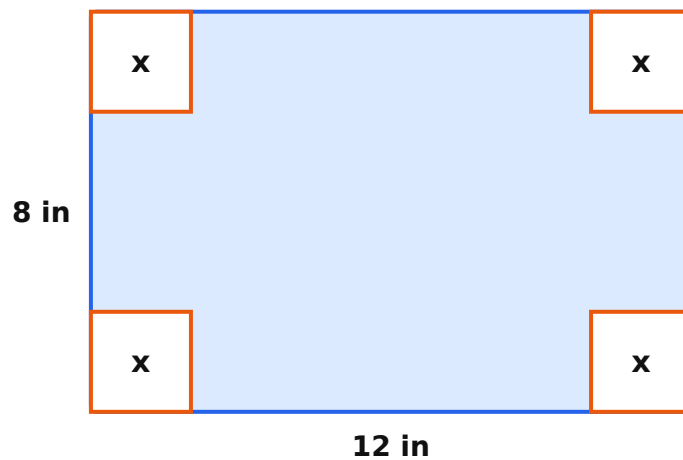


A cubic with a double zero.

- A. $x = -1$
- B. $x = 2$
- C. $x = 0$
- D. $x = 1$

Question 8

A square of side x is cut from each corner of the 8-inch by 12-inch sheet to make an open box. Which domain makes sense for the volume function?



Not drawn to scale.

- A. $0 < x < 4$
- B. $0 < x < 6$
- C. $0 < x < 8$
- D. $x > 0$

Question 9

Which function has zeros 2 and -3 , and a zero at -1 with multiplicity 2, with least degree?

- A. $f(x) = (x+2)(x-3)(x-1)^2$
- B. $f(x) = (x-2)(x+3)(x+1)^2$
- C. $f(x) = (x-2)(x+3)(x+1)$
- D. $f(x) = (x-2)(x+3)(x-1)^2$

Question 10

For $f(x) = x^3 - 3x + 5$, what is $f(-2)$?

- A. -9
- B. 7
- C. 3
- D. 19

Answer key

1. **C** - Each of the three linear factors has degree 1, and the degrees add: $1+1+1=3$. Adding the constants or the coefficients gives wrong values.
2. **D** - The degree 4 is even, so the ends match, and the leading coefficient -2 is negative, so both ends fall.
3. **C** - The multiplicity 3 is odd, so the graph crosses, and a multiplicity above 1 flattens it at the zero. An even multiplicity would make it touch and turn.
4. **D** - $x^3-x^2-6x=x(x-3)(x+2)$. Reading the signs wrong gives -3 and 2 , and dropping the common factor x loses the zero 0 .
5. **B** - A degree- n polynomial has at most $n-1$ turning points, so $7-1=6$.
6. **B** - The zeros are -2 , 1 and 3 , each crossing, and the graph rises on the right, so the leading coefficient is positive. Wrong signs in the factors reverse the zeros.
7. **A** - The graph bounces off the axis at $x=-1$, which is a zero of even multiplicity. It crosses the axis at $x=2$; $x=0$ is only where the graph crosses the y-axis.
8. **A** - The shorter side $8-2x$ must stay positive, so $x<4$. Using the longer side gives 6 , which would make the width negative.
9. **B** - A zero at r comes from the factor $(x-r)$, and the multiplicity is the exponent. So -1 gives $(x+1)^2$.
10. **C** - $(-2)^3-3(-2)+5=-8+6+5=3$. Sign errors on $(-2)^3$ or on $-3(-2)$ give the other choices.

Remember:

- Standards F-IF.C.7c, A-APR.B.3 and F-IF.B.4: graph polynomials using zeros and end behavior, and interpret key features.
- Even degree: both ends point the same way. Odd degree: the ends point opposite ways. The sign of a_n picks up or down.
- A zero of odd multiplicity is a crossing; a zero of even multiplicity is a touch point.
- A polynomial of degree n has at most n real zeros and at most $n-1$ turning points.
- The y-intercept of f is $f(0)$; in factored form, multiply the constant parts.