

Precalculus · Polynomial and Rational Functions in Depth · Quiz

Common Core A-APR.B.2, A-APR.B.3, F-IF.C.7c, F-IF.C.7d, N-CN.C.9 · mathovore.fr

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

This precalculus polynomial rational quiz asks 10 multiple-choice questions on polynomial and rational functions in depth, and each answer comes with a short explanation.

Answer these 10 questions on rational roots, complex zeros, end behavior, asymptotes and inequalities. Each question has exactly one correct answer, and the explanation names the most common mistake. Aim for at least 8 correct.

Precalculus Common Core: A-APR.B.2 · A-APR.B.3 · F-IF.C.7c · F-IF.C.7d · N-CN.C.9

Questions

Question 1

How many possible rational zeros does the Rational Root Theorem give for $2x^3 - 5x^2 + x + 6$?

- A. 8
- B. 12
- C. 6
- D. 24

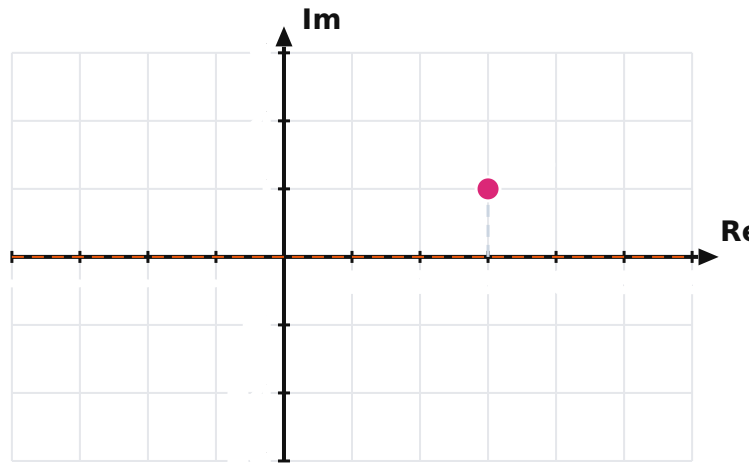
Question 2

Which number can NOT be a rational zero of $3x^3 + x^2 - 4x - 4$?

- A. $\frac{3}{4}$
- B. $\frac{1}{4}$
- C. $\frac{1}{2}$
- D. -1

Question 3

The graph shows one zero, $3+i$, of $x^2 - 6x + 10$. What is the other zero?



One zero is plotted.

- A. $3-i$
- B. $-3+i$
- C. $-3-i$
- D. $1+3i$

Question 4

A polynomial with real coefficients has degree 7. What is the least number of real zeros it can have?

- A. 1
- B. 0
- C. 2
- D. 7

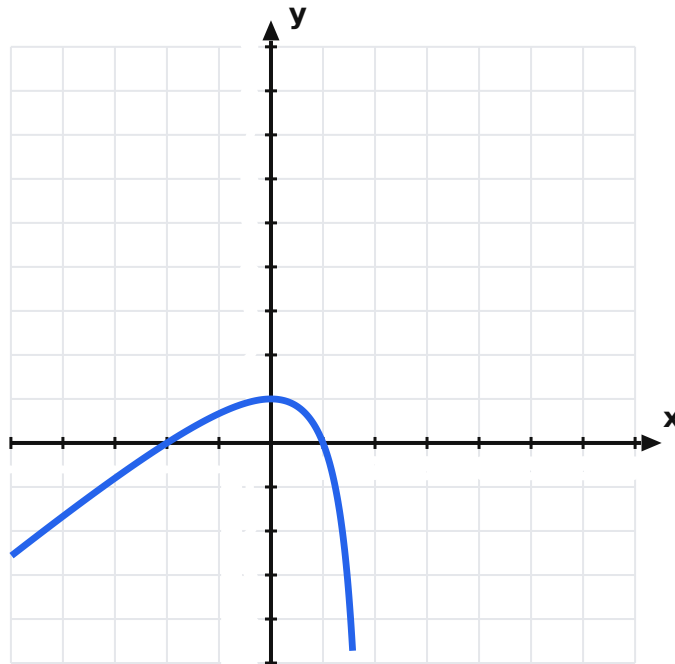
Question 5

What is the end behavior of $f(x) = -3x^4 + 2x - 1$?

- A. Rises to the left and falls to the right
- B. Falls to the left and falls to the right
- C. Falls to the left and rises to the right
- D. Rises to the left and rises to the right

Question 6

The graph shows $f(x) = \frac{x^2+x-2}{x-2}$. What is the equation of its slant asymptote?



Graph of f .

- A. $y = x + 3$
- B. $y = x - 2$
- C. $y = x + 4$
- D. $y = x$

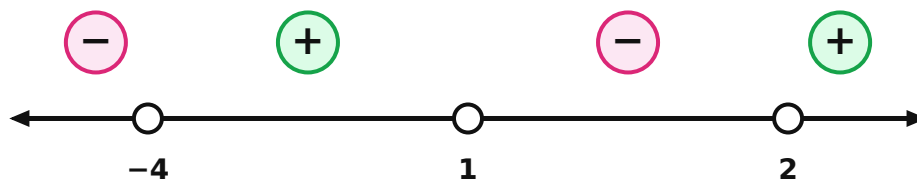
Question 7

Which function has a slant asymptote?

- A. $f(x) = \frac{x^2+1}{x^2-4}$
- B. $f(x) = \frac{x^2+1}{x^3-4}$
- C. $f(x) = \frac{x^3+1}{x^2-4}$
- D. $f(x) = \frac{x^4+1}{x^2-4}$

Question 8

The sign chart is for $(x+4)(x-1)(x-2)$. Which set solves $(x+4)(x-1)(x-2) < 0$?



Signs of the product on each interval.

- A. $(-4, 1) \cup (2, \infty)$

- B. $(-\infty, -4] \cup [1, 2]$
- C. $(1, 2)$
- D. $(-\infty, -4) \cup (1, 2)$

Question 9

Solve $\frac{x-3}{x+2} \geq 0$.

- A. $(-\infty, -2] \cup [3, \infty)$
- B. $[-2, 3]$
- C. $(-\infty, -2) \cup [3, \infty)$
- D. $(-2, 3]$

Question 10

Solve $x^2(x-3) \geq 0$.

- A. $x \geq 3$
- B. $x \geq 0$
- C. $x \leq 3$
- D. $x = 0$ or $x \geq 3$

Answer key

1. **B** - The constant term 6 has 4 divisors and the leading coefficient 2 has divisors 1 and 2, giving $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}$. Counting only integers gives 8.
2. **B** - The numerator p must divide -4 , and 3 does not. The other values have p in 1, 2, 4 and q in 1, 3.
3. **A** - Complex zeros of a real polynomial are conjugates, so the other zero is $3-i$. Negating the real part gives $-3+i$, which is not the conjugate.
4. **A** - Nonreal zeros come in pairs, and 7 is odd, so at least one zero is real. A count of 0 would require an even number of nonreal zeros.
5. **B** - The leading term $-3x^4$ has even degree and a negative coefficient, so both ends fall. Mixed directions need an odd degree.
6. **A** - Dividing gives $x+3+\frac{4}{x-2}$, so the slant asymptote is $y=x+3$. The remainder 4 is not part of the line.
7. **C** - A slant asymptote needs the numerator's degree to be exactly one more than the denominator's. The second has a horizontal asymptote, the third $y=0$, and the last has degree difference 2.
8. **D** - Choose the intervals marked negative, with open endpoints because the inequality is strict. The positive intervals solve the opposite inequality.
9. **C** - The zero $x=3$ is included, but $x=-2$ makes the denominator zero and is excluded. Including -2 is the common mistake.
10. **D** - The factor x^2 is never negative, so $x=0$ gives exactly 0 and works, and for $x \geq 3$ the product is nonnegative. Answering only $x \geq 3$ misses the isolated zero.

How does this quiz work?

Read each question, choose one answer among A, B, C and D, then check it: a short explanation appears after every answer. Your score out of 10 is shown at the end, and you can restart the quiz as often as you like.

What should you review before the quiz?

Reread the key facts of the lesson and the worked example. If a question is hard, go back to the matching part of the lesson, then try the quiz again. Write your work on scrap paper: most mistakes come from skipping a step, not from the idea itself.

Remember:

- Standards A-APR.B.2, A-APR.B.3, F-IF.C.7c, F-IF.C.7d and N-CN.C.9 covered in depth at the Precalculus level.
- Rational zeros have the form $\frac{p}{q}$ with p dividing the constant term and q dividing the leading coefficient.

- A degree n polynomial has exactly n complex zeros counting multiplicity; real polynomials have conjugate pairs $a \pm bi$.
- End behavior follows the leading term; a slant asymptote exists when the numerator's degree is one more than the denominator's.
- Solve inequalities by finding critical numbers, testing intervals on a sign chart, and checking endpoints.

How to use this precalculus polynomial rational quiz

Retake this precalculus polynomial rational quiz until every answer is right, then move on to the worksheet and the test.

