

College Prep Algebra
Chapter 3 Practice Test

Answer the following.

1. Use long division to divide the first polynomial by the second.

$$x^4 - 2x^3 - 9x^2 + 15x - 11 \div x + 3.$$

- A. $x^3 + x^2 - 6x + 33 - \frac{110}{x+3}$
- B. $x^3 - 5x^2 - 6x - 40 - \frac{188}{x+3}$
- C. $x^3 - x^2 + 6x - 23 - \frac{27}{x+3}$
- D. $x^3 - 5x^2 + 6x - 3 + \frac{-2}{x+3}$

2. Use synthetic division to determine which of the following values is a zero of

$$4x^4 + 29x^3 + 28x^2 - 19x - 42.$$

- A. 3
- B. 5
- C. -6
- D. -7

3. Use Synthetic Division and the Factor Theorem to determine whether or not $x + 1$ is a factor of

$$f(x) = x^3 + 3x^2 - 7x - 8.$$

- A. Yes
- B. No

4. Use Synthetic Division to determine whether or not -6 is a zero of

$$h(x) = x^3 + 4x^2 - 17x - 30.$$

- A. Yes
- B. No

5. Use synthetic division to divide the first polynomial by the second.

$$2x^3 - x^2 - 3x + 8 \div x - 2.$$

- A. $2x^2 - 5x + 7 - \frac{6}{x-2}$
- B. $2x^2 - 4x - 24$
- C. $2x^2 + 3x + 3 + \frac{14}{x-2}$
- D. $2x^2 + 3x + 9$

6. Examine the leading term and determine the far-left and far-right behavior of the graph of the polynomial function $f(x) = -3x^5 - 8x^4 - 10x^3 + 4$.

- A. up to the far left, up to the far right
- B. up to the far left, down to the far right
- C. down to the far left, up to the far right
- D. down to the far left, down to the far right

7. Examine the leading term and determine the far-left and far-right behavior of the graph of the polynomial function $f(x) = 3x^6 - 12x^2 + 9x + 17$.

- A. up to the far left, up to the far right
- B. up to the far left, down to the far right
- C. down to the far left, up to the far right
- D. down to the far left, down to the far right

8. Find the zeros of the polynomial function $p(x) = (x + 1)^2(x - 4)$ and state the multiplicity of each zero.

- A. -1, -4 (mult of 2)
- B. -1 (mult of 2), 4
- C. -1, 4 (mult of 2)
- D. -1 (mult of 2), -4

9. Find the zeros of the polynomial function $h(x) = x^3 + x^2 - 8x - 12$. If a zero is a multiple zero, state its multiplicity.

- A. -2, 3, -1
- B. -2 (mult 2), 3, -1 (mult 2)
- C. -2, 3 (mult 2), -1
- D. -2 (mult 2), 3

10. Find the zeros of the polynomial function $f(x) = x^4 - 6x^3 + 10x^2 - 6x + 9$. If a zero is a multiple zero, state its multiplicity.

- A. $\pm i, 2$ (mult 2)
- B. $\pm i, -2$ (mult 2)
- C. $\pm i, 3$ (mult 2)
- D. $\pm i, -3$ (mult 2)

11. Use the Rational Root Theorem to list all possible rational zeros of the polynomial function $p(x) = 3x^3 + 5x^2 + 7x - 6$

- A. $\pm 1, \pm 2, \pm 3, \pm 6$
- B. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{4}{3}, \pm \frac{5}{3}$
- C. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}$
- D. $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{3}, \pm \frac{2}{3}, \pm \frac{3}{3}, \pm \frac{6}{3}$

12. Use the Rational Root Theorem to list all possible rational zeros of the polynomial function $p(x) = x^3 - 3x^2 - 10x + 24$.

- A. $\pm 1, \pm 3, \pm 6, \pm 8, \pm 24$
- B. $\pm 1, \pm 3, \pm 8, \pm 24$
- C. $\pm 1, \pm 2, \pm 4, \pm 6, \pm 24$
- D. $\pm 1, \pm 2, \pm 3, \pm 4, \pm 6, \pm 12, \pm 24$

13. Use Descartes' Rule of Signs to state the number of possible positive, negative, and imaginary zeros of the polynomial function $g(x) = 3x^6 - 5x^5 + 9x^4 + 5x^3 + 7x^2 - 2x - 13$.

- A. 3 or 1(+), 3 or 1(-), 0, 2, or 4(i)
- B. 3 or 1(+), 2 or 0(-), 1 or 3(i)
- C. 2 or 0(+), 2 or 0(-), 2, 4 or 6(i)
- D. 4, 2, or 0(+), 2 or 0(-), 3 or 1(i)

14. Use Descartes' Rule of Signs to state the number of possible positive, negative, and imaginary zeros of the polynomial function $g(x) = x^5 - 14x - 16$.

- A. 3 or 1(+), 2 or 0(-), 3 or 1(i)
- B. 2 or 0(+), 1(-), 3 or 1(i)
- C. 1(+), 2 or 0(-), 3 or 1(i)
- D. 1(+), 2 or 0(-), 2 or 4(i)

15. Find all the zeros of the polynomial function $g(x) = x^3 - 7x^2 + 32x - 60$ and write the polynomial as a product of its linear factors.

- A. $-1, 3 \pm 2i; g(x) = (x + 1)(x - (3 + 2i))(x - (3 - 2i))$
- B. $3, 2 \pm 4i; g(x) = (x - 3)(x - (2 + 4i))(x - (2 - 4i))$
- C. $-3, 2 \pm 2i; g(x) = (x + 3)(x - (2 + 4i))(x - (2 - 4i))$
- D. $-2, -2 \pm 3i; g(x) = (x + 2)(x - (-2 + 3i))(x - (-2 - 3i))$

16. Graph the polynomial $p(x) = x^3 - 7x^2 + 11x - 1$. Estimate, to the nearest tenth, the coordinates of the points where $p(x)$ has a relative maximum or a relative minimum. For each point, indicate whether the y value is a relative maximum or a relative minimum.

- A. $p(x)$ has a relative maximum of 1 at 4 and a relative minimum of 3.7 at -5.5.
- B. $p(x)$ has a relative maximum of 4 at 1 and a relative minimum of -5.5 at 3.7.
- C. $p(x)$ has a relative maximum of 1.06 at 3.96 and a relative minimum of 3.54 at -5.33.
- D. $p(x)$ has a relative maximum of 3.96 at 1.06 and a relative minimum of -5.33 at 3.54.

17. Find the horizontal asymptote of the rational function $f(x) = \frac{4x^3 + 3x^2 + 10x + 15}{8x^4 + 7x + 13}$.

- A. $y = 4$
- B. $y = \frac{1}{2}$
- C. $y = 2$
- D. $y = 0$

18. Determine the vertical and horizontal asymptotes of the rational function $h(x) = \frac{x-3}{x+5}$.

- A. $x = -5, y = 0$
- B. $x = -5, y = 1$
- C. $x = 3, y = 0$
- D. $x = 3, y = 1$

19. Determine the slant asymptote of the rational function $f(x) = \frac{x^3 + 5x^2 + 105x - 150}{x^2 - x - 35}$.

- A. $y = x + 6$
- B. $y = x - 3$
- C. $y = x - 4$
- D. $y = x + 5$

20. Find all the vertical asymptotes of the rational function $f(x) = \frac{3x^2 + 6}{x^2 - 2x - 24}$.

- A. $x = -3, x = 1$
- B. $x = -2, x = 2$
- C. $x = -4, x = 6$
- D. $x = 4, x = -6$

21. Determine the vertical and slant asymptotes of the rational function $f(x) = \frac{x^3 + 3x^2 + 2x - 1}{x^2 - 4}$.

- A. $x = -1, x = 1, y = x + 2$
- B. $x = -4, x = 4, y = x + 3$
- C. $x = -2, x = 2, y = x + 3$
- D. $x = -8, x = 8, y = x + 2$

22. Find a polynomial function p of degree 3 with integer coefficients that has zeros $7 - 2i$ and -3 .

- A. $p(x) = x^3 - 14x^2 + 9x + 178$
- B. $p(x) = x^3 + 13x^2 + 24x - 216$
- C. $p(x) = x^3 - 12x^2 - 27x + 176$
- D. $p(x) = x^3 - 11x^2 + 11x + 159$

23. Find a polynomial function of lowest degree with integer coefficients that has zeros 2, -3 , and -4 .

- A. $f(x) = x^3 + 5x^2 - 2x - 24$
- B. $f(x) = x^3 + 3x^2 - 9x + 32$
- C. $f(x) = x^3 - 2x^2 + 6x - 3$
- D. $f(x) = x^3 + 4x^2 - 3x + 1$