1. Find the domain of f.

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

- ○ **A.** $\{x \mid x \neq \pm 2\}$
- ○ **B.** $\{x \mid x \neq -3\}$
- ○ **C.** $\{x \mid x \neq 3\}$
- ○ **D.** $\{x \mid x \neq -2\}$

2. Find the domain of f.

$$f(x) = \frac{x - 3}{(x - 8)(x + 1)}$$

- ○ **A.** $\{x \mid x \neq -3\}$
- ○ **B.** $\{x \mid x \neq 8, x \neq -1\}$
- ○ **C.** $\{x \mid x \neq 3\}$
- ○ **D.** $\{x \mid x \neq -8, x \neq 1\}$

3. Identify any vertical asymptotes in the graph.
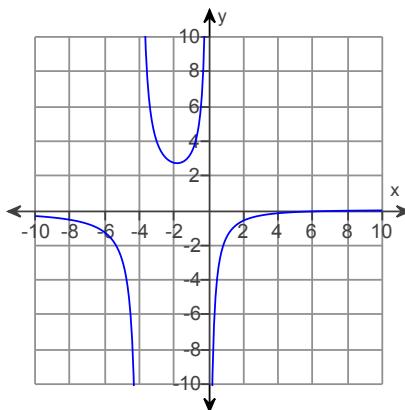
- ○ **A.** $x = 4$
- ○ **B.** $x = 0, x = -4$
- ○ **C.** $x = -4$
- ○ **D.** $x = 9$

4. Identify any horizontal asymptotes in the graph.
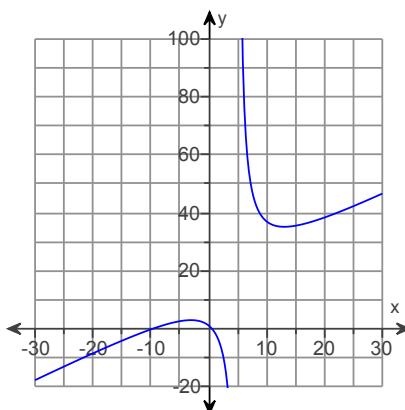
- ○ **A.** None
- ○ **B.** $y = 5$
- ○ **C.** $y = 1$
- ○ **D.** $y = -9$

5. Find any vertical asymptotes.

$$h(x) = \frac{(x-4)(x+9)}{x^2 - 4}$$

- A. $x = 4$, $x = -9$
- B. None
- C. $x = -4$, $x = 9$
- D. $x = 2$, $x = -2$

6. Find any vertical asymptotes.

$$f(x) = \frac{6x^3 + 6x - 3}{x^2 + 8x - 9}$$

- A. $y = 1$, $y = -9$
- B. $y = 6$
- C. $x = 1$, $x = -9$
- D. $x = -1$, $x = 9$

7. Find the horizontal asymptote of the given function.

$$g(x) = \frac{x+7}{x^2 - 3}$$

- A. $y = -7$
- B. $y = 3$
- C. $y = 0$
- D. None

8. Match f(x) with its graph without using a calculator.

$$f(x) = \frac{1}{(x-2)(x-5)}$$
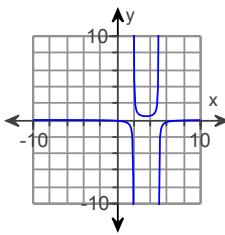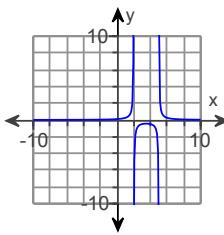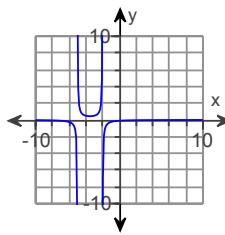
- A.
- B.
- C.
- D.
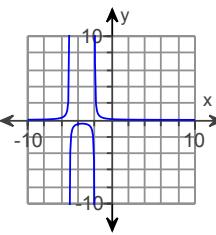
9. Sketch the graph of the rational function.

$$f(x) = \frac{4x^2 - 3}{x + 5}$$

A.
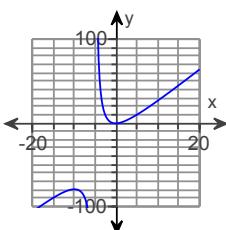
B.
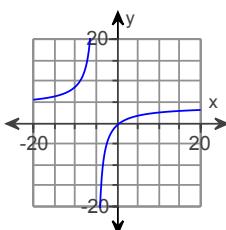
C.
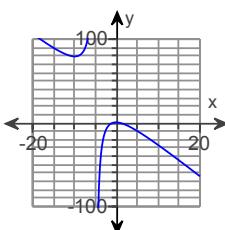
D.
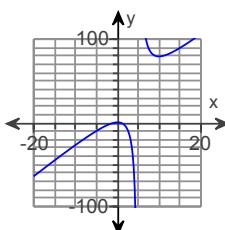
10. Sketch the graph of the rational function.

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

A.
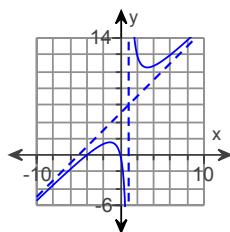
B.
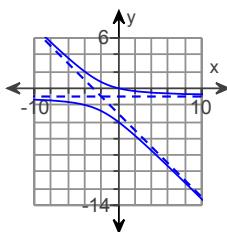
C.
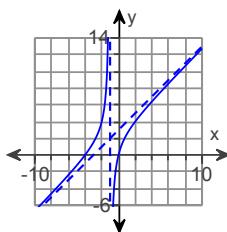
D.
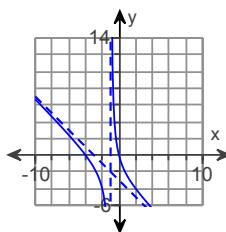
11. Solve the equation.

$$\frac{-7}{x + 8} = -\frac{3}{8}$$

A. $-\dfrac{43}{8}$

B. $\dfrac{80}{3}$

C. $\dfrac{32}{3}$

D. $\dfrac{43}{3}$

12. Solve the rational equation.

$$\frac{x + 1}{2} = \frac{x + 2}{3}$$

A. -1

B. -3

C. 3

D. 1

13. Solve the rational equation.

$$\frac{1}{x+6} + \frac{2}{x+3} = -\frac{3}{x^2 + 9x + 18}$$

- A. 3
- B. 0
- C. −6
- D. no real solutions

14. Solve the polynomial inequality.

$$(x+3)(x-3)^2 > 0$$

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

15. Solve the polynomial inequality.

$$x^3 + 10x^2 + 29x \le -20$$

- A. $(-\infty, -5] \cup [-4, -1]$
- B. $(-\infty, 1] \cup [4, 5]$
- C. $[-5, -4] \cup [-1, \infty)$
- D. $(-\infty, -5) \cup (-4, -1)$

16. Solve the rational inequality.

$$\frac{5}{(x+5)^2} < 0$$

- A. $(-\infty, \infty)$
- B. No solution
- C. $(-\infty, -3)$
- D. $(0, \infty)$

17. Solve the rational inequality.

$$3 + \frac{23}{x} - \frac{8}{x^2} \leq 0$$

A. $\left[-8, \frac{1}{3} \right]$

B. $\left[\frac{1}{3}, 8 \right]$

C. $(-\infty, -8] \cup \left[\frac{1}{3}, \infty \right)$

D. $[-8, 0) \cup \left(0, \frac{1}{3} \right]$

---

18. Evaluate the expression by hand.

$$64^{-3/2}$$

A. $-\frac{1}{512}$

B. $\frac{1}{512}$

C. -512

D. 512

---

19. Evaluate the expression by hand.

$$8^{-4/3}$$

A. $\frac{1}{16}$

B. $\frac{1}{64}$

C. 32

D. 128

---

20. Use positive rational exponents to rewrite the expression.

$$\frac{\sqrt{y+1}}{\sqrt[3]{y+1}}$$

A. $(y+1)^{5/6}$

B. $\frac{1}{(y+1)^{1/6}}$

C. $(y+1)^{3/2}$

D. $(y+1)^{1/6}$

---

21. Use radical notation to rewrite.

$a^{-1/2} b^{3/4}$

○ **A.** $\dfrac{\sqrt{a}}{\sqrt[3]{b^4}}$

○ **B.** $\dfrac{\sqrt[3]{b^4}}{\sqrt{a}}$

○ **C.** $\dfrac{\sqrt{a}}{\sqrt[4]{b^3}}$

○ **D.** $\dfrac{\sqrt[4]{b^3}}{\sqrt{a}}$

---

22. Solve the equation.

$\sqrt{3x+1} = 3 + \sqrt{x-4}$

○ **A.** -1

○ **B.** $5, 8$

○ **C.** $-5, -8$

○ **D.** No solution

---

23. Solve the equation.

$\sqrt{x+6} + \sqrt{2-x} = 4$

○ **A.** $-2, \sqrt{31}$

○ **B.** $2, -2$

○ **C.** 0

○ **D.** -2

24.
Use $f(x) = x^3$ and $g(x) = x + 3$ to evaluate $\left(\dfrac{f}{g}\right)(-3)$.

○ **A.** 1

○ **B.** -27

○ **C.** Undefined

○ **D.** 0

25. Find $(g - f)(x)$.

$f(x) = 5x + 6;\ g(x) = 2x^2$

○ **A.** $2x^2 - 5x - 6$

○ **B.** $2x^2 - 5x + 6$

○ **C.** $3x^3 + 4x^2$

○ **D.** $5x + 6 - 2x^2$

26. Find $\left(\dfrac{f}{g}\right)(x)$.

$f(x) = 9x^2 - 4x;\ g(x) = x^2 - 2x - 8$

○ **A.** $\dfrac{9 - x}{8}$

○ **B.** $\dfrac{9x}{x + 1}$

○ **C.** $\dfrac{9x - 4}{-2}$

○ **D.** $\dfrac{9x^2 - 4x}{x^2 - 2x - 8}$

27. Evaluate $(fg)(-2)$.
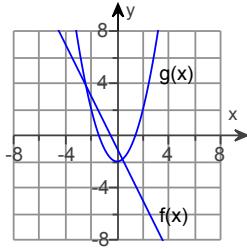
○ **A.** 6

○ **B.** 0

○ **C.** -6

○ **D.** 4

28.
Find g(7) when $g(x) = \dfrac{x + 4}{x + 9}$.

○ **A.** $\dfrac{3}{16}$

○ **B.** $-\dfrac{11}{2}$

○ **C.** $\dfrac{11}{16}$

○ **D.** $-\dfrac{11}{16}$

29.
Find $(f \circ g)(2)$ when $f(x) = 3x + 9$ and $g(x) = \dfrac{2}{x}$.

○ **A.** 15

○ **B.** 12

○ **C.** $\dfrac{2}{15}$

○ **D.** 16

30. Find $(f \circ g)(4)$ when $f(x) = 2x + 5$ and $g(x) = 5x + 7$.

○ **A.** 351

○ **B.** 40

○ **C.** 59

○ **D.** 72

31.
Given $f(x) = \dfrac{x - 8}{9}$ and $g(x) = 9x + 8$, find $(g \circ f)(x)$.

○ **A.** $x - \dfrac{8}{9}$

○ **B.** $x + 16$

○ **C.** $9x + 64$

○ **D.** x

32. Use the graph to evaluate the expression.

    $(f \circ g)(2)$
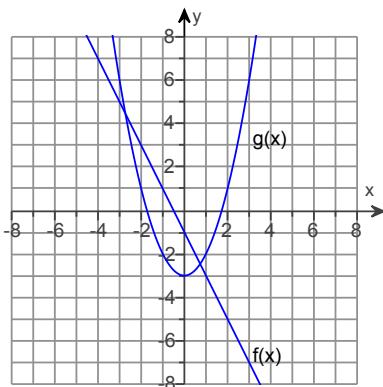
A. -5

B. -4

C. 0

D. -3

33. Find the functions f and g so that $F(x) = (f \circ g)(x)$.

    $$F(x) = \frac{1}{x^2 - 9}$$

A. $f(x) = \frac{1}{x}$; $g(x) = x^2 - 9$

B. $f(x) = \frac{1}{9}$; $g(x) = x^2 - 9$

C. $f(x) = \frac{1}{x^2}$; $g(x) = -\frac{1}{9}$

D. $f(x) = \frac{1}{x^2}$; $g(x) = x - 9$

34. Find the functions f and g so that $F(x) = (f \circ g)(x)$.

    $F(x) = (-7x + 13)^4$

A. $f(x) = -7x^4$; $g(x) = x + 13$

B. $f(x) = x^4$; $g(x) = -7x + 13$

C. $f(x) = -7x + 13$; $g(x) = x^4$

D. $f(x) = (-7x)^4$; $g(x) = 13$

1. A. {x | x ≠ ± 2}

___

2. B. {x | x ≠ 8, x ≠ − 1}

___

3. B. x = 0, x = − 4

___

4. A. None

___

5. D. x = 2, x = − 2

___

6. C. x = 1, x = − 9

___

7. C. y = 0

___

8.
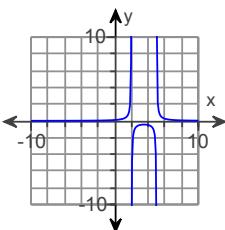
B.

___

9.
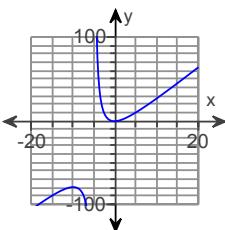
A.

___

10.
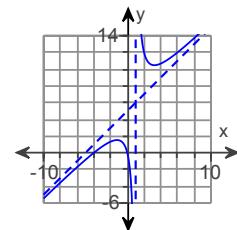
A.

___

11. C. $\dfrac{32}{3}$

___

12. D. 1

___

13. D. no real solutions

___

14. C. $(-3, 3) \cup (3, \infty)$

---

15. A. $(-\infty, -5] \cup [-4, -1]$

---

16. B. No solution

---

17. D. $[-8, 0) \cup \left[0, \dfrac{1}{3}\right]$

---

18. B. $\dfrac{1}{512}$

---

19. A. $\dfrac{1}{16}$

---

20. D. $(y+1)^{1/6}$

---

21. D. $\dfrac{\sqrt[4]{b^3}}{\sqrt{a}}$

---

22. B. 5, 8

---

23. D. -2

---

24. C. Undefined

---

25. A. $2x^2 - 5x - 6$

---

26. D. $\dfrac{9x^2 - 4x}{x^2 - 2x - 8}$

---

27. A. 6

---

28. C. $\dfrac{11}{16}$

---

29. B. 12

---

30. C. 59

---

31. D. x

___

32. D. -3

___

33.
A. $f(x) = \dfrac{1}{x}$; $g(x) = x^2 - 9$

___

34. B. $f(x) = x^4$; $g(x) = -7x + 13$

___