

Sec III

Name _____

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Test 4 Graphing and Solving Rationals PRACTICE Test

Period _____

Simplify each expression.

1) $\frac{n^2 + 17n + 70}{n^2 + 5n - 14}$
 $\frac{(n+10)(n+7)}{(n-2)(n+7)}$
 Cancellation: $\frac{10}{7}$, $\frac{-14}{5}$

2) $\frac{(2p+16)}{p+10} \cdot \frac{1}{(p^2+10p+16)}$
 $\frac{2(p+8)}{p+10} \cdot \frac{1}{(p+8)(p+2)}$
 Cancellation: $\frac{8}{10}$, $\frac{16}{2}$
 $\frac{2}{(p+10)(p+2)}$

3) $\frac{3x^2 + 13x + 4}{(3x+1)(x+4)} \cdot \frac{1}{x+1}$
 $\frac{(3x+1)(x+4)}{(3x+1)(x+1)}$
 Cancellation: $\frac{12}{13}$, $\frac{3x}{4}$, $\frac{1}{4}$
 $\frac{x+4}{x+1}$

4) $\frac{9n}{n^2 + 17n + 70} \div \frac{1}{n+10}$
 $\frac{9n}{(n+10)(n+7)} \cdot \frac{n+10}{1}$
 Cancellation: $\frac{70}{17}$, $\frac{10}{17}$
 $\frac{9n}{n+7}$

5) $\frac{3x}{5x} + \frac{4}{3x}$
 $\frac{2(15xy + 20x)}{15x^2}$
 $\frac{2x(9y + 10)}{15x^2} = \frac{2(9y + 10)}{15x}$
 Cancellation: $\frac{16y + 20}{2(9y + 10)}$

6) $\frac{3v}{v+6} + \frac{2v}{v-4}$
 $\frac{3v^2 - 12v + 2v^2 + 12v}{(v+6)(v-4)} = \frac{5v^2}{(v+6)(v-4)}$
 Cancellation: $\frac{(v-4)}{3v}$, $\frac{2v}{(v+6)}$

Identify the x-intercepts of each.

$$7) f(x) = \frac{x^2 + 2x - 8}{-3x + 3} \rightarrow \begin{array}{c} -8 \\ 2 \end{array} \begin{array}{c} -4 \\ 2 \end{array} (x+4)(x-2)$$

- A) X-intercepts: 2, -2
 B) X-intercepts: 1
 C) X-intercepts: 2, -4
 D) X-intercepts: None

Identify the vertical asymptote(s).

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

- A) Vertical Asym.: $x = 3, x = 1$
 B) Vertical Asym.: $x = 2, x = -1$
 C) Vertical Asym.: $x = 1, x = -3$
 D) Vertical Asym.: $x = -3$

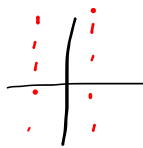
Determine where the function is undefined.

$$9) \frac{b+6}{b^2 + 8b + 12} \rightarrow \begin{array}{c} 12 \\ 2 \end{array} \begin{array}{c} 6 \\ 8 \end{array} (x+2)(x+6) = 0$$

- A) {10, -6}
 B) {-6, -2}
 C) {-6}
 D) $\{-\frac{8}{7}\}$

Identify the Domain.

10) $f(x) = \frac{3x^2 - 6x}{x^2 - 4} \Rightarrow (x+2)(x-2)$



- A) Domain: All reals except 1, 2
- B) Domain: All reals except 0, 2
- C) Domain: All reals except -2, 2**
- D) Domain: All reals except -2, 1

$\neq \mathbb{R}, x \neq 2, -2$

11) Describe the transformation of $\frac{1}{x}$ to

$\frac{1}{(x-2)} + 3$

- A) Left 3, Down 2
- B) Left 2, Up 3
- C) Right 3, Down 2
- D) Right 2, Up 3**

Identify the horizontal asymptote of each.

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

- A) Horz. Asym.: None, it's slanted.
- B) Horz. Asym.: $y = -\frac{1}{4}$
- C) Horz. Asym.: $y = -4$
- D) Horz. Asym.: $y = 0$**

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

- A) Horz. Asym.: None, it's slanted.
- B) Horz. Asym.: $y = 0$
- C) Horz. Asym.: $y = -\frac{1}{2}$
- D) Horz. Asym.: $y = -2$**

14) $f(x) = \frac{x^2 - x - 12}{3x^6}$

- A) Horz. Asym.: None, it's slanted.**
- B) Horz. Asym.: $y = -1$
- C) Horz. Asym.: $y = -\frac{1}{3}$
- D) Horz. Asym.: $y = 0$

15) Which of the following functions has a horizontal asymptote at $y = 0$?

A) $f(x) = \frac{x^4 - 16}{x^4 - 1}$

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

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

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

16) Which of the following functions has a slant asymptote when graphed?

A) $\frac{7}{x+1}$ B) $\frac{x+5}{x^2-9}$

C) $\frac{x^3+3}{3x-1}$ D) $\frac{2x+1}{x+3}$

Match the Horizontal Asymptotes/End behavior to the given equations.

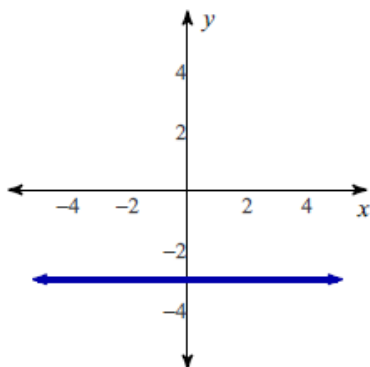
17) C $\frac{2x}{x}$

18) D $\frac{1}{x}$

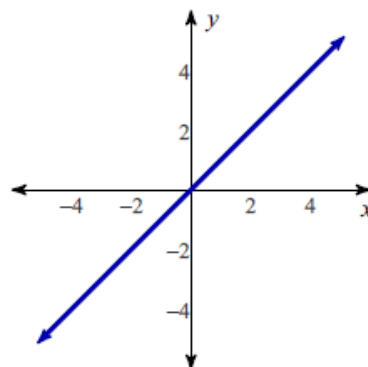
19) b $\frac{x^2}{x}$

20) A $-\frac{3x}{x}$

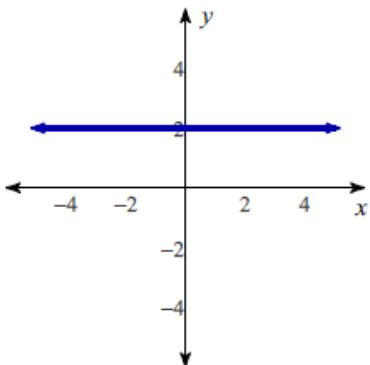
A)



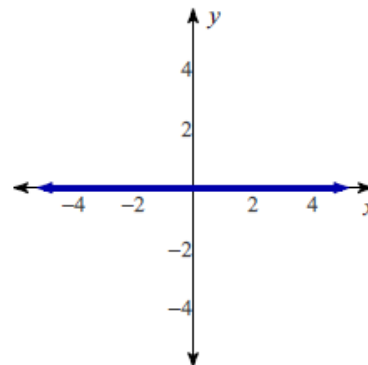
B)



C)



D)



Match the following functions with the corresponding graph.

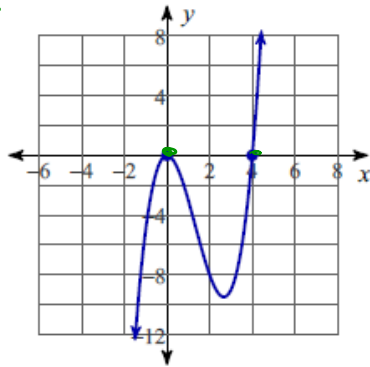
18) 21. P $x(x+2)(x-4)$

22. C $(x+2)^2(x-4)$

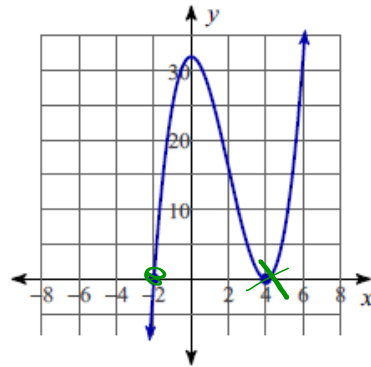
23. b $(x+2)(x-4)^2$

24. A $x^2(x-4)$

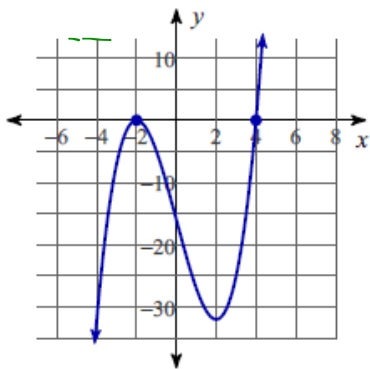
~~A)~~



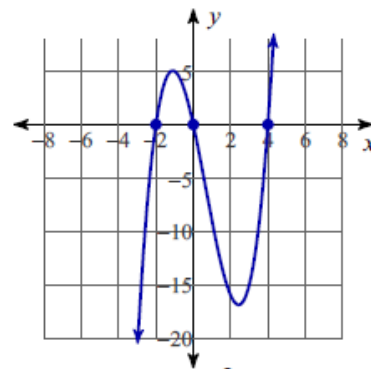
B)



C)



D)



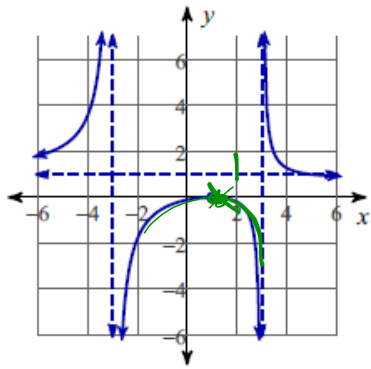
19) 25. b. $\frac{1}{(x-3)(x+3)}$ \rightarrow none

26. d. $\frac{2x+2}{(x-3)(x+3)} = -2$

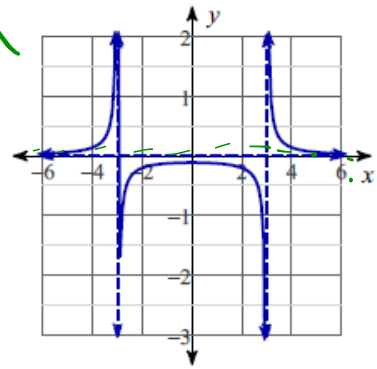
27. C. $\frac{3x^2}{(x-3)(x+3)}$ \rightarrow bounce

28. a. $\frac{(x-1)^2}{(x-3)(x+3)}$ \rightarrow bounce

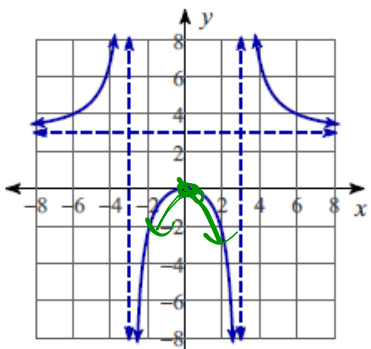
~~A)~~



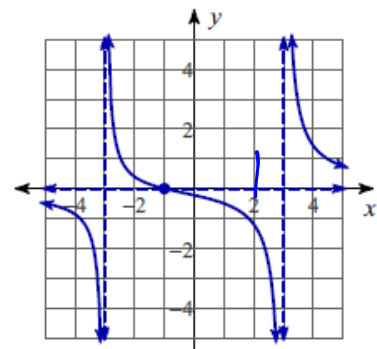
~~B)~~



~~C)~~



~~D)~~

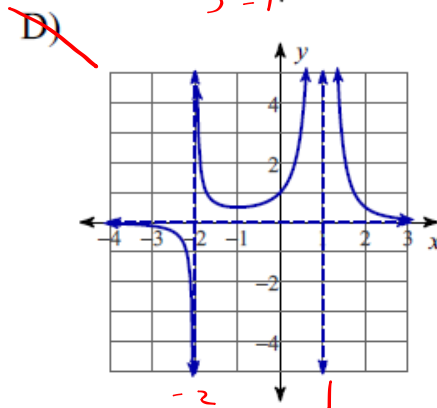
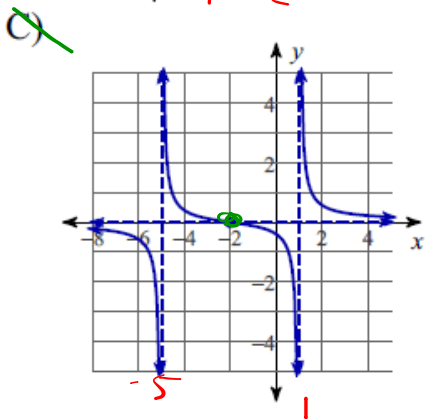
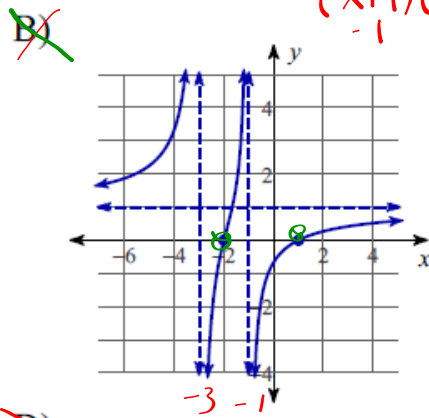
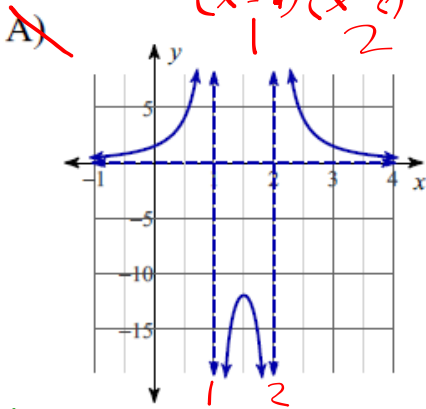


20) 29. $\frac{D}{(x-1)^2(x+2)}$
 1 -2

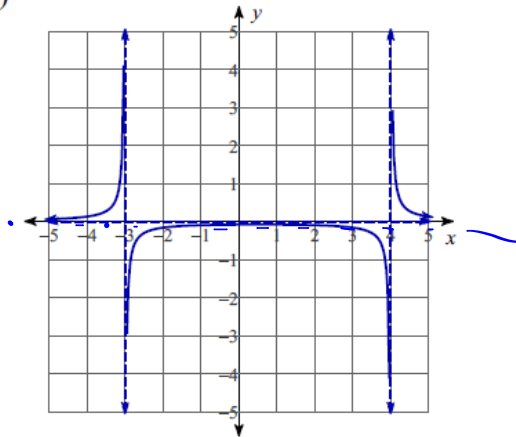
30. $\frac{C}{x^2+4x-5} \rightarrow 2$

31. $\frac{A}{(x^2-3x+2)}$
 $(x-1)(x-2)$
 1 2

32. $\frac{B}{(x-1)(x+2)}$
 $(x+1)(x+3)$
 -1 -3



21)



Determine the features: $\frac{1}{(x-4)(x+3)}$ ← none ↓

X-intercept(s): none

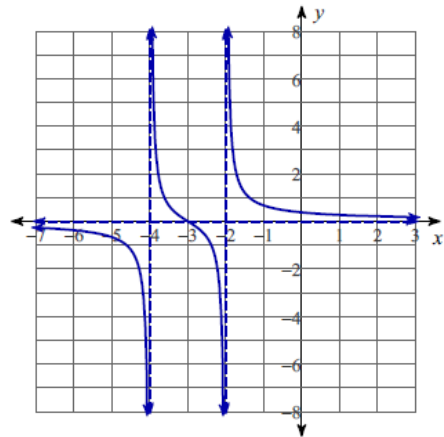
Vertical Asymp.: 4, -3

End Behavior/Horiz. Asymp.: 0

Domain $\mathbb{R}, x \neq 4, -3$

Range $\mathbb{R}, y \neq 0$

22)



Determine the features: $\frac{x+3}{x^2+6x+8}$

X-intercept(s): -3

Vertical Asymp.: -4, -2

End Behavior/Horiz. Asymp.: 0

Domain $\mathbb{R}, \neq -4, -2$

Range \mathbb{R}

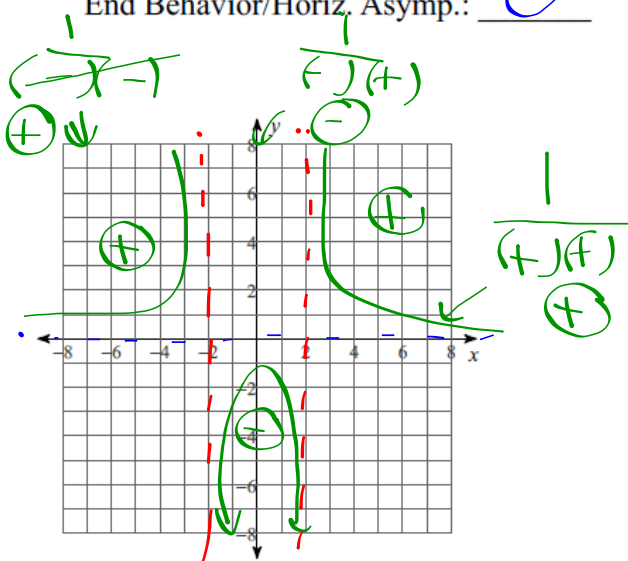
23) Determine the features and graph:

$$\frac{1 \neq \text{none}}{(x-2)(x+2)} \quad \frac{1}{x^2} \quad \frac{1}{x^2}$$

X-intercept(s): none

Vertical Asymp.: 2, -2

End Behavior/Horiz. Asymp.: 0



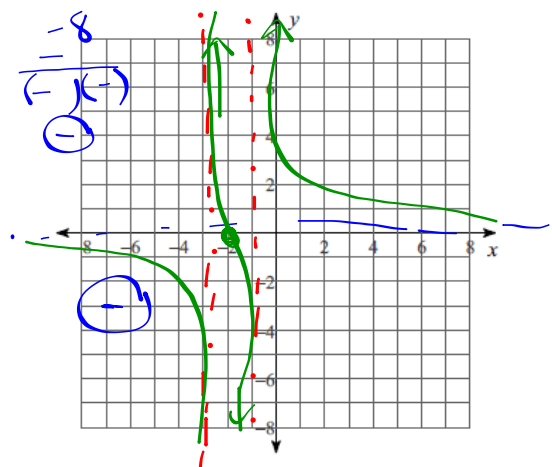
24) Determine the features and graph:

$$\frac{x+2}{x^2+4x+3} \quad (x+1)(x+3)$$

X-intercept(s): -2

Vertical Asymp.: -1, -3 ^{opp}

End Behavior/Horiz. Asymp.: 0



BONUS: Use long division to find the slant asymptote of the given equation:

$$\frac{x^3 + 5x^2 - 3x - 2}{x^2 + x}$$

25)

$$x^2 + x \sqrt{x^3 + 5x^2 - 3x - 2}$$

A) $y = x - 6$

B) $y = x + 6$

C) $y = x - 4$

D) $y = x + 4$