



2023-2024

## Unit 3 Test Review

SCORE:

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Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

Write the expression in reduced form. Show work.

1. 
$$\frac{12x^2 - 6x + 3}{8x^3 + 1}$$

2. 
$$\frac{8y^2 - 18y}{28y - 63}$$

Simplify each expression by multiplying or dividing. Show work.

3. 
$$\frac{10}{x+3} \cdot \frac{x^2 - 9}{40x - 30}$$

4. 
$$\frac{6x^3y^2}{-5x^2 + 5} \div \frac{10xy^3}{(x-1)^2}$$

5. 
$$\frac{64x^2 - 1}{5y^2 - 40y} \div \frac{8x^2 - 23x - 3}{2y^2 - 128}$$

6. 
$$\frac{x+y}{6} \cdot \frac{3}{x^2 - y^2}$$

7. 
$$\frac{y^4 - 81}{xy + 4y + 3x + 12} \div (y^2 + 9)$$

Perform the indicated operation, if possible simplify. Show work.

$$8. \frac{2x-3}{x+6} + 8$$

$$9. \frac{2p-3}{p^2-5p+6} - \frac{5}{p^2-9}$$

$$10. \frac{x^2-2x+8}{x^2-x-12} - \frac{3x-2}{x+3}$$

$$11. \frac{5x}{4x-3} - \frac{8}{x+1}$$

$$12. \frac{2-5m}{m-9} + \frac{4m-5}{9-m}$$

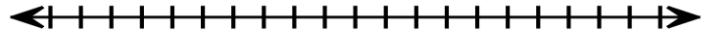
Find the horizontal and vertical asymptotes of the function. Show work!

$$13. f(x) = \frac{2x+1}{x-5}$$

$$14. f(x) = \frac{x}{x^2-4}$$

Find the domain, range, asymptotes and intercepts of each function and then graph the function. Show work!

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



Vertical Asymptotes \_\_\_\_\_

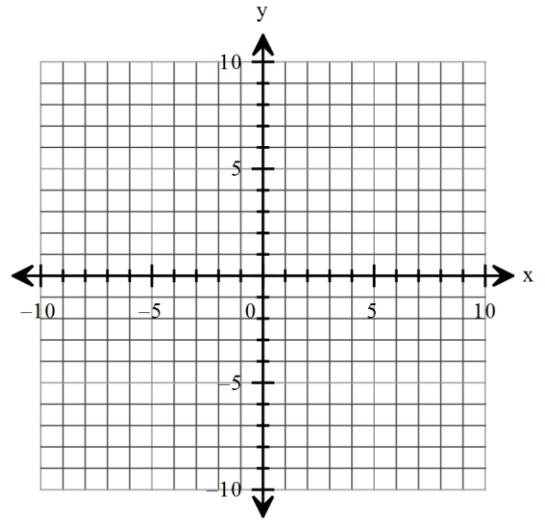
Horizontal/Oblique Asymptotes \_\_\_\_\_

x-intercept(s) \_\_\_\_\_

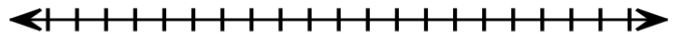
y-intercept(s) \_\_\_\_\_

Domain \_\_\_\_\_

Holes \_\_\_\_\_



16.  $f(x) = \frac{x-1}{x^2 + 4x - 5}$



Vertical Asymptotes \_\_\_\_\_

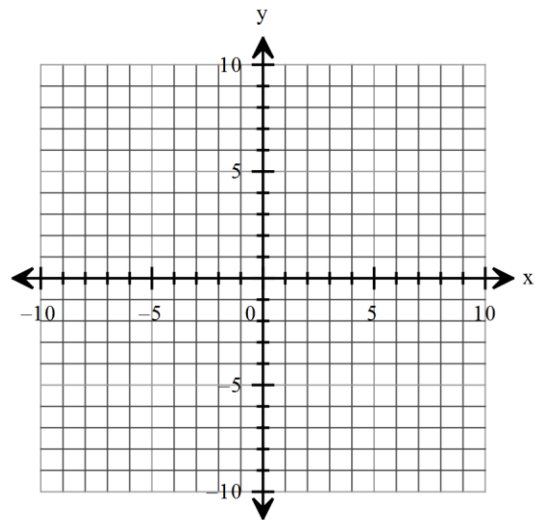
Horizontal/Oblique Asymptotes \_\_\_\_\_

x-intercept(s) \_\_\_\_\_

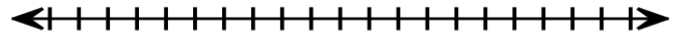
y-intercept(s) \_\_\_\_\_

Domain \_\_\_\_\_

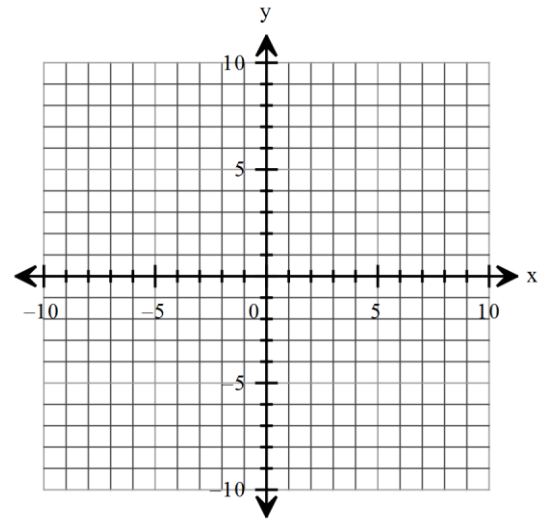
Holes \_\_\_\_\_



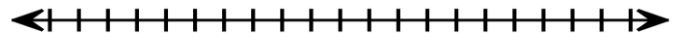
17.  $R(x) = \frac{x^2 + 5x - 6}{x + 2}$



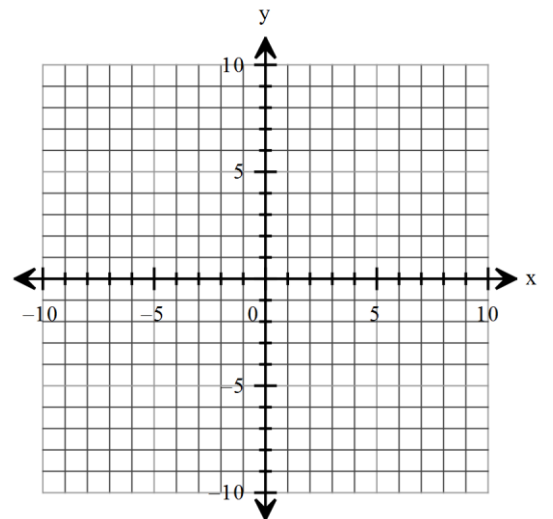
Vertical Asymptotes \_\_\_\_\_  
 Horizontal/Oblique Asymptotes \_\_\_\_\_  
 x-intercept(s) \_\_\_\_\_  
 y-intercept(s) \_\_\_\_\_  
 Domain \_\_\_\_\_  
 Holes \_\_\_\_\_



18.  $R(x) = \frac{x^2 + 3x}{x^2 + 2x - 3}$



Vertical Asymptotes \_\_\_\_\_  
 Horizontal/Oblique Asymptotes \_\_\_\_\_  
 x-intercept(s) \_\_\_\_\_  
 y-intercept(s) \_\_\_\_\_  
 Domain \_\_\_\_\_  
 Holes \_\_\_\_\_



Given the graphs of functions below, determine the key features.

19.

Domain:

Positive:

Range:

Negative:

$x$ -intercept(s):

Maximums / minimums:

$y$ -intercept:

Symmetry:

Increasing:

End Behavior/Limits:

Decreasing:

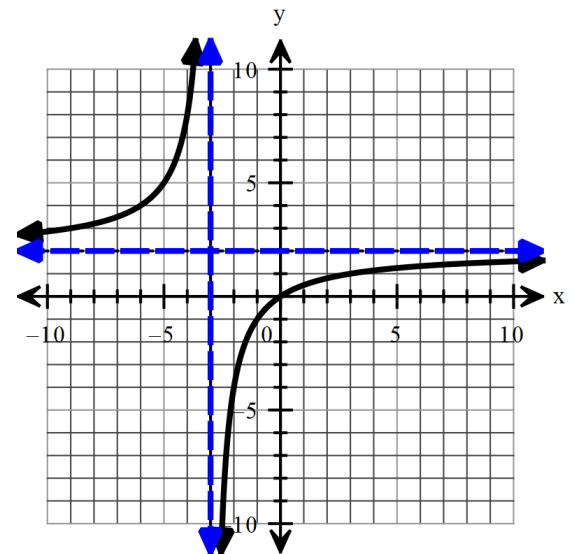
$$\lim_{x \rightarrow -\infty} f(x) = \quad \lim_{x \rightarrow \infty} f(x) =$$

Constant:

$$\lim_{x \rightarrow -3^-} f(x) = \quad \lim_{x \rightarrow -3^+} f(x) =$$

Vertical Asymptote(s):

Horizontal Asymptote:



Write the terms of the partial fraction decomposition of the rational function. Do NOT solve for the constants.

20.  $\frac{2x+3}{3x^2-4x-4}$

Find the partial fraction decomposition.

21.  $\frac{x+2}{x^2-1}$

22.  $\frac{2}{x^2-5x+6}$

Solve the equation algebraically. State the restrictions and identify any extraneous solutions.  
Show work!

$$23. \quad \frac{4x-2}{5} + \frac{x+9}{5} = \frac{2}{5}$$

$$24. \quad x + \frac{4x}{x-3} = \frac{12}{x-3}$$

$$25. \quad x + \frac{35}{x} = 12$$

$$26. \quad \frac{3x}{x+5} + \frac{1}{x-2} = \frac{7}{x^2+3x-10}$$

$$27. \quad \frac{3}{x+2} + \frac{6}{x^2+2x} = \frac{3-x}{x}$$

$$28. \quad \frac{2}{x-1} + x = 5$$

Solve each inequality using sign charts. Write answers in interval notation.

29.  $\frac{2x+6}{x-3} > 0$

30.  $\frac{(x-1)(x+1)}{(x+4)(x+9)} \leq 0$

31.  $\frac{(x-2)^2}{x(x+9)} \leq 0$

32.  $\frac{(x-3)(x+2)}{x-1} \leq 0$

33.  $x^2 + 3x - 40 \geq 0$

Solve each inequality. Express your answer in interval notation.

34.  $3 < x + 4 < 5$

35.  $-2 \leq \frac{1}{2}x < 0$

36.  $-5 < 4 - 3x \leq 2$

37.  $0 < \frac{3x+2}{2} \leq 4$