

## SM3 Unit 3 Review

Name: \_\_\_\_\_

Simplify and state the restrictions on  $x$ .

1) 
$$\frac{48x^2}{36x}$$

2) 
$$\frac{7x^2}{14x^5 - 21x^3}$$

3) 
$$\frac{8x^4 + 37x^3 - 15x^2}{x^3 + 2x^2 - 15x}$$

4) 
$$\frac{3}{x} \cdot \frac{5x}{6x^2 + 9}$$

5) 
$$\frac{2x + 6}{x - 6} \cdot \frac{x^2 - 4x - 12}{30 + 4x - 2x^2}$$

6) 
$$\frac{x^2 - 3x}{x^2 - x - 6} \div \frac{x - 3}{x + 2}$$

7) 
$$\frac{5}{x^2} + \frac{3}{x} + \frac{1}{4x}$$

8) 
$$\frac{5x}{x + 1} + \frac{3x + 1}{x^2 - x - 2}$$

Solve each equation.

9) 
$$\frac{x}{4} = \frac{6}{8}$$

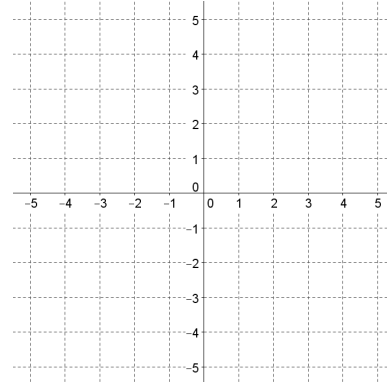
10) 
$$\frac{2}{y} - \frac{1}{y + 2} = \frac{1}{3}$$

$$11) \frac{3}{2x} + 2 = \frac{2x}{x+1}$$

$$12) \frac{2x}{x+1} + \frac{x-5}{x^2-1} = 1$$

13) a) State the multiplicity and roots of  
 $f(x) = 4x^2(x-3)^3(x+1)^2$

b) Sketch the graph.



14) Find the  $a^3$  term of the binomial expression  
 $(2a + 4)^6$

15) The momentum of an object is the product of the object's mass and its velocity. What simplified expression describes the momentum (in  $g \cdot cm/s$ ) of a moving toy car if the rational expression  $\frac{x^2+4x+4}{x^2-9}$  describes the toy car's mass in grams, and the expression  $\frac{x^2+5x+6}{x+2}$  describes the toy car's velocity in centimeters per second (where  $x > 3$ )?

- 16) Suppose one painter can paint the entire house in 12 hours by himself. The second painter could do it in 8 hours. How long would it take the two painters to paint the house together?

Simplify the functions (be sure to include stipulations), state the values of the vertical asymptotes (VA), holes (H), and end behavior (EB).

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

18)  $f(x) = \frac{2x^2 - 5x - 12}{x^3 - 16x}$

VA:

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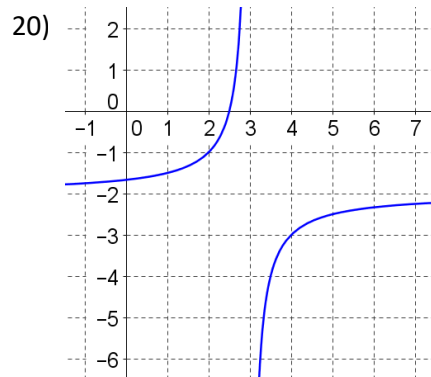
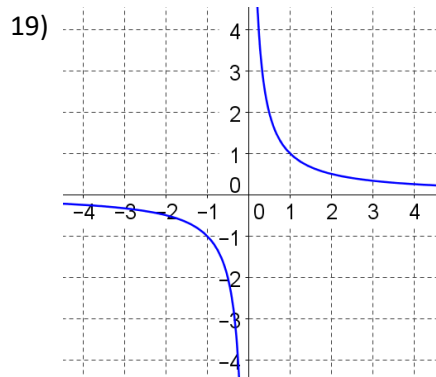
H:

H:

EB:

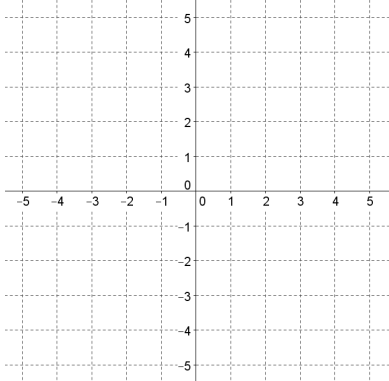
EB:

Describe the vertical asymptotic and end behavior(s) using limit notation. Describe intervals of increase and decrease using interval notation.

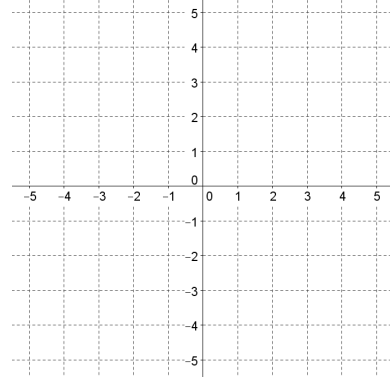


Simplify and sketch the function (use dashed lines for vertical asymptotes and open points for holes); describe the vertical and horizontal asymptotic behavior(s) of the function using limit notation.

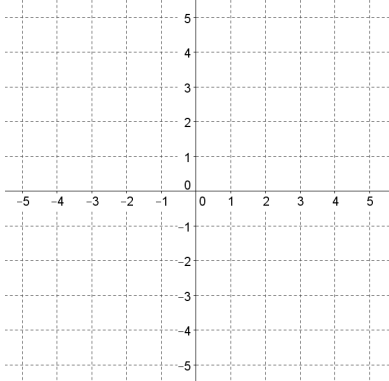
21)  $f(x) = \frac{x^2 - 9}{x + 3}$



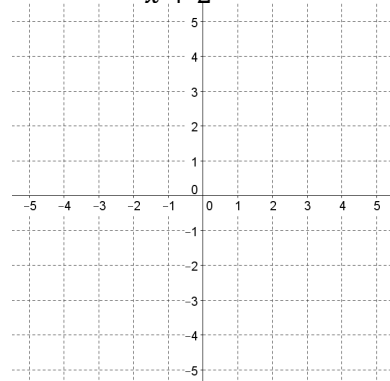
22)  $f(x) = \frac{3x + 2}{x + 1}$



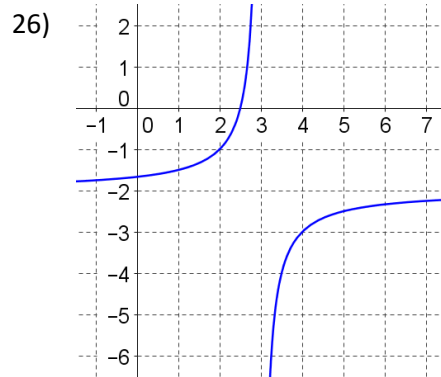
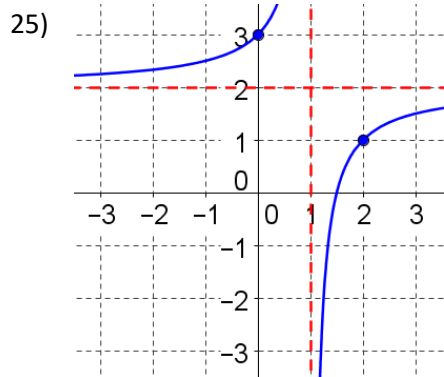
23)  $f(x) = \frac{1}{x^2 - 6x + 8}$



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



Describe how  $\frac{1}{x}$  was transformed to build each function.

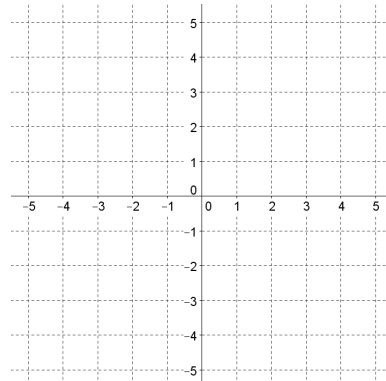


27)  $y = \frac{18}{x-2}$

28)  $y = \frac{-1}{x+5} - 3$

Sketch the function with the given transformation.

29)  $f(x)$  is  $\frac{1}{x}$  shifted to the right by 2, shifted up by 1, and vertically stretched by 2 and vertically flipped



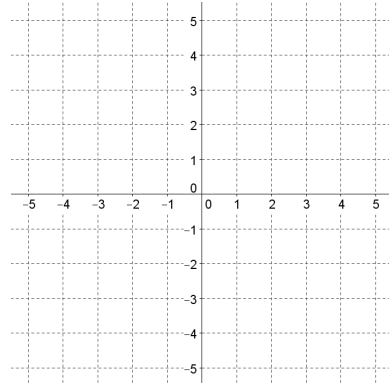
Find the oblique asymptote.

30)  $f(x) = \frac{2x^3 - 5x - 12}{x^2 - 2}$

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

Sketch the function with any vertical, horizontal, or oblique asymptotes (use dashed lines), and plot and label the y-intercept.

32) 
$$f(x) = \frac{x^2 - x - 5}{x + 2}$$



Remember that tests are cumulative! You should pour over your previous unit tests and discern which items will make an appearance on this test.