

Test Review Rationals Name _____

1. Identify any holes, vertical asymptotes, horizontal asymptotes, and slant asymptotes of each graph. If they do not exist write **none** in the space provided. Accurately graph each rational function.

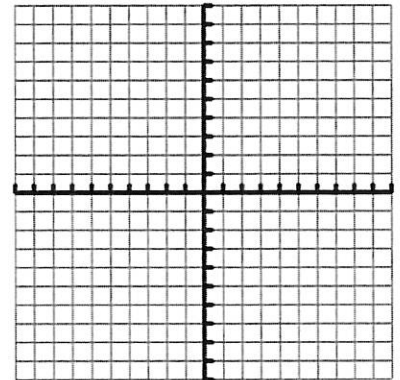
a. $f(x) = \frac{x^2 - 16x + 64}{x - 8}$

Domain _____

Hole(s) _____ Vertical Asymptotes _____

X-intercepts _____ Horizontal Asymptotes _____

Y-intercepts _____ Slant Asymptotes _____



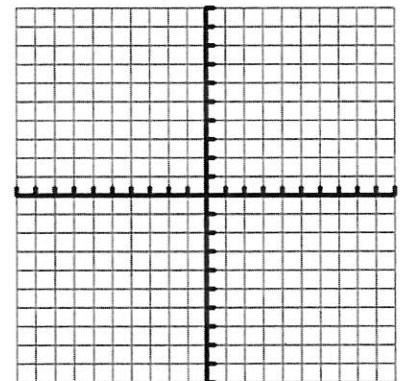
b. $f(x) = \frac{2x^2 - 5x - 12}{x^2 + x - 6}$

Domain _____

Hole(s) _____ Vertical Asymptotes _____

X-intercepts _____ Horizontal Asymptotes _____

Y-intercepts _____ Slant Asymptotes _____



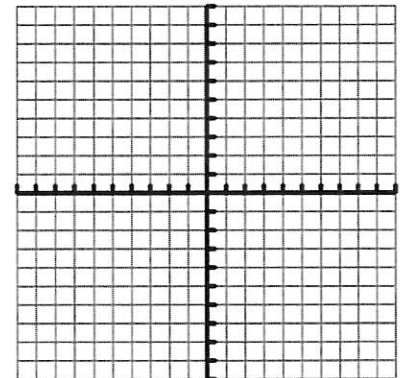
c. $f(x) = \frac{3x^2 - 12x + 15}{3x - 6}$

Domain _____

Hole(s) _____ Vertical Asymptotes _____

X-intercepts _____ Horizontal Asymptotes _____

Y-intercepts _____ Slant Asymptotes _____



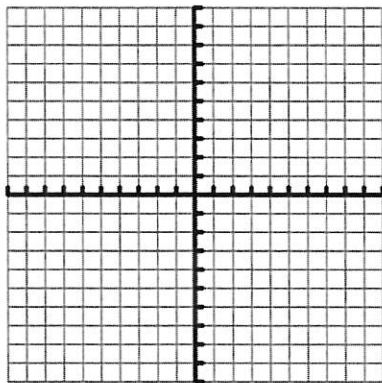
d. $f(x) = \frac{x^2 - x - 6}{x - 2}$

Domain _____

Hole(s) _____ Vertical Asymptotes _____

X-intercepts _____ Horizontal Asymptotes _____

Y-intercepts _____ Slant Asymptotes _____



2. Simplify each of the following. Write the restrictions on the domain.

a. $\frac{x^2 - 5x + 6}{x + 4} \cdot \frac{3x + 12}{x - 2}$

a2. $\frac{36 - x^2}{2x^3 - 2x^2 - 60} \cdot \frac{3x^3 + 15x^2}{6x^3}$

Simplify. Recall, division can be rewritten as multiplication by the _____.

b.
$$\frac{\frac{x^2+10x-11}{x^2+6x+5}}{\frac{x^2+9x-22}{x^2+3x-10}}$$

c.
$$\frac{\frac{2}{x}+1}{\frac{1}{x+2}-\frac{1}{2}}$$

RECALL, TO ADD OR SUBTRACT FRACTIONS YOU MUST HAVE A _____
Simplify:

c.
$$\frac{x+5}{x^2+10x+25} - \frac{2x}{x^2-25}$$

d.
$$\frac{2x-3}{3x^2-13x-10} + \frac{2x+1}{5-x} + \frac{1}{3x+2}$$

D2.
$$\frac{3-x}{x^2-6x+9} - \frac{x+5}{3-x}$$

RECALL, WHEN SOLVING EQUATIONS< OUR GOAL IS TO ELIMINATE THE FRACTIONS!
WE DO THIS by multiplying both sides of the equation (numerators only), by the _____!
This caused the denominators to cancel!

3. Solve each equation.

a. $\frac{1}{9} + \frac{1}{2x} = \frac{1}{x^2}$

b. $\frac{1}{2y+1} + \frac{1}{y+1} = \frac{8}{15}$

c. $\frac{6}{y^2+2y} - \frac{y+1}{y+2} = \frac{2}{y}$

d. $\frac{2}{x-3} - \frac{4}{x+3} = \frac{8}{x^2-9}$

4. Solve each inequality. Recall, you must set the inequality equal to _____ and turn the other side into ONE quotient in order to solve rational inequalities. !

a. $\frac{6}{x} + 3 > \frac{2}{x}$

b. $\frac{2x+1}{3x+1} < \frac{x-1}{3x+1}$

c. $\frac{1}{4x} + \frac{5}{8x} \geq \frac{1}{2}$

d. $\frac{x+3}{x-5} \leq 5$

5. A. You have created a new type of jelly bean that you would like to market to Harry Potter World. They have requested that the packages contain 6.25 cubic centimeters of jelly beans, and that they be packaged in cylindrical containers. You, of course, want to minimize your packaging costs! What dimensions should you use for the container?

Constraint:

Function to be optimized:

Real world domain:

Work:

6.

The function $C(t) = \frac{5t}{0.01t^2 + 3.3}$ describes the concentration of a drug in the blood stream over time. In this case, the medication was taken orally. C is measured in micrograms per milliliter and t is measured in minutes.

- a. Sketch a graph of the function over the first two hours after the dose is given. Label axes.
- b. Determine when the maximum amount of the drug is in the body and the amount at that time.

c. What is the concentration of the drug in the bloodstream after 30 minutes?

7. The fixed cost of production is \$20,000 per month. The cost per unit is \$300 .

- A. Write an equation to represent the average cost of producing n units/
- B. What is the average cost of producing 100 units?
- C. What is the average cost of producing 100,000 units?
- D. What is the horizontal asymptote of the average cost function?
- E. What does the horizontal asymptote represent?

8. You wish to create a rectangular box with an open top by cutting squares out of a piece of cardboard that measures 16 inches by 20 inches.

What should the side length of the square be if you want to MAXIMIZE volume?

9. You have a plot of land that you want to cut using fences of the same width, in order to create 4 rectangular gardens.

If you want the most available space available for planting, and you have 1200 feet of fencing available to use, what should the dimensions of the large rectangular space be?

10. You have 1200 square inches of fabric available to create a cylindrical container with NO TOP.

If you want the container to hold the greatest amount possible, what should the dimensions be?