Name_____ Period_____ Date_____

NON-CALCULATOR SECTION

Vocabulary: Define each word and give an example.

1. Rational Function

2. Vertical Asymptote

3. Domain

Short Answer:

4. Describe how to find the horizontal asymptote of a rational function.

5. Write the factoring pattern for the sum of two cubes.

Review:

6. Simplify the expression: $\left(\frac{27x^6}{8y^{12}}\right)^{2/3}$

7. Solve the equation: $\sqrt{3x} = \sqrt{x+6}$

8. Find the inverse of the function: $f(x) = 3x - 7$

9. Find the discriminant and state the number of real solutions. $3x^2 - 5x = 4$

Problems:
Be sure to show all work used to obtain your answer. **Circle or box in the final answer.**

10. Identify the transformations from the parent graph $f(x)=\frac{1}{x}$, state the domain and range and find the horizontal and vertical asymptote(s) of the function.

a. $f(x)=\frac{3}{x-1}-4$

Trans:_____

_____

Domain: _____

Range: _____

Horizontal:_____

Vertical: _____

b. $f(x)=\frac{2x}{x+5}$

Trans:_____

_____

Domain: _____

Range: _____

Horizontal: _____

Vertical: _____

11. Simplify the expression.

a. $\frac{n^2-9n-22}{n^2-4}$

b. $\frac{4x^2+2x+1}{8x^3-1}$

c. $\frac{y^2+3y-40}{25-y^2}$

12. Perform the indicated operation. Simplify your answers.

a. $\frac{-3x^3}{18}\cdot\frac{2y}{x}$

b. $\frac{x^2-3x}{4x^2-8x}\cdot\left(4x^2-16\right)$

c. $\frac{5p^5q^2}{3p^4}\div\frac{15p}{q^6}$

d. $\frac{x^2-2x-3}{x+1}\div\frac{x^2+x-12}{x^2}$

e. $\frac{7b}{12a}-\frac{1}{18ab^3}$

f. $\frac{4x}{x^2+9x+18}+\frac{5}{x+6}$

g. $\frac{x+5}{x-5}-\frac{3}{x^2-25}$

h. $\frac{8}{y-3}+\frac{2y-5}{y^2-12y+27}$

i. $\frac{x-2}{5x(x-1)}+\frac{1}{x-1}-\frac{3}{x^2+4x-5}$

MULTIPLE CHOICE QUESTIONS

13. In which direction must the graph of $y=\frac{1}{x}$ be shifted to produce the graph of $y=\frac{1}{x+2}$?

A. up B. down C. right D. left

14. Which of the following functions have an asymptote at $y = 1$?

I. $y = \frac{1}{x-1}$

II. $y = \frac{x}{x-1}$

III. $y = \frac{1}{x}$

A. II only B. I and II only C. I and III only D. I, II, and III

15. What is the solution set of $\frac{x+5}{x-2} - \frac{5}{x+2} = \frac{28}{x^2-4}$?

A. $\{-8, 2\}$

B. $\{-8\}$

C. $\{-4, 2\}$

D. $\{-4\}$

16. Which best describes all asymptotes of the function $y = \frac{x^2-1}{x-2}$?

A. $x = 1, x = 2$

B. $x = 2, y = 0$

C. $x = 2, y = 1$

D. $x = 2, y = x$

17. Greg's father can mow the lawn on his riding mower in 45 minutes. It takes Greg 1 hour 45 minutes to mow the lawn with a push mower. Which of the following rational equations can be solved for the number of minutes *t* it would take them to mow the lawn working together?

A. $\frac{t}{45} + \frac{t}{1.45} = 1$ B. $\frac{t}{150} = 1$ C. $\frac{t}{45} + \frac{t}{105} = 1$ D. $\frac{t+45}{t+105} = 1$

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CALCULATOR SECTION

1. Solve the rational equations. You may use your calculators to *check* your solutions only. Show all work.

a. $\frac{9}{x}+\frac{11}{5}=\frac{31}{x}$

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

c. $1+\frac{3}{x-3}=\frac{4}{x^2-9}$

d. $\frac{x}{x-1}=\frac{2x+10}{x+11}$

2. Solve the rational inequalities. You may use your calculators to *check* your solutions only. Show all work.

a. $\frac{4}{3x}+\frac{7}{x}<\frac{5}{9}$

b. $\frac{(x-2)(x+1)}{(x-5)}\le 0$

c. $\frac{x-8}{x}\le 3-x$

3. Find $(f \circ g)(x)$ given $f(x) = \dfrac{2x}{x-3}$ and $g(x) = 4x - 7$

4. Peter can paint a house in 10 hours. Melanie can paint the same house in 9 hours. How long would it take if they worked together?

5. The sum of a number and its reciprocal is $\dfrac{25}{12}$. Find the number and its reciprocal.

6. How many liters of a 25% acid solution must be added to 30 liters of an 80% acid solution to create a 50% acid solution?

A. 18 B. 30 C. 36 D. 66