



Name _____ Period _____ Date _____

NON-CALCULATOR SECTION

Vocabulary: Define each word and give an example.

1. Rational Function
2. Vertical Asymptote
3. Inverse Variation

Short Answer:

4. Describe how to find the horizontal asymptote of a rational function.
5. How can you determine the domain of a rational function?

Review:

6. Solve the quadratic by completing the square (show all work): $x^2 + 6x + 7 = 0$
7. Find the zeros of the polynomial function: $f(x) = 2x^3 - 7x^2 + 3x$
8. Divide using synthetic division: $(a^4 + 5a^3 + 2a^2 - 6a + 4) \div (a + 2)$



Problems:

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

9. Simplify the expression.

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

b. $\frac{2x^2 + 10x}{3x^2 + 16x + 5}$

c. $\frac{y^3 - 5y^2 - 3y + 15}{y^2 - 8y + 15}$

10. Perform the indicated operation. Simplify your answers.

a. $\frac{5x^2y^3}{3xy^4} \cdot \frac{27x^5}{15x^4y}$

b. $\frac{x+2}{x^3-27} \cdot (x^2+3x+9)$

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

d. $\frac{x^2-4x-21}{5x+15} \div \frac{x^2+3x-70}{x^2-100}$

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

f. $\frac{-15x}{x^2-8x+16} + \frac{12}{x-4}$

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

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



11. 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. $f(x) = \frac{4}{x+3} - 2$

Trans: _____

Domain: _____

Range: _____

Horizontal: _____

Vertical: _____

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

Trans: _____

Domain: _____

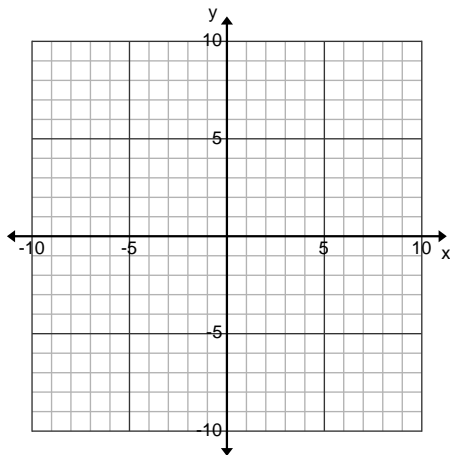
Range: _____

Horizontal: _____

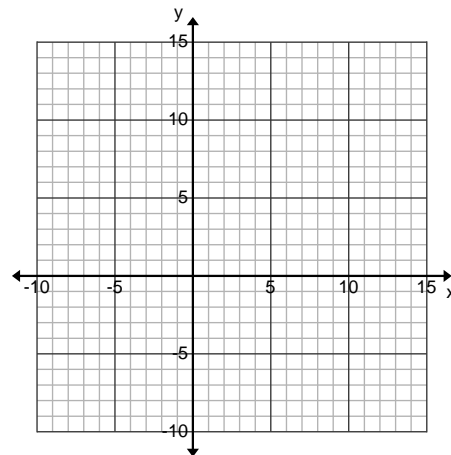
Vertical: _____

12. Graph the functions.

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



b. $y = \frac{x^2 - 1}{x - 2}$



MULTIPLE CHOICE QUESTION

13. What is the solution set of $\frac{2}{x-3} = \frac{1}{x^2 - 2x - 3}$?

A. $\left\{-3, -\frac{1}{2}\right\}$

B. $\left\{-\frac{1}{2}\right\}$

C. $\left\{-\frac{1}{2}, 3\right\}$

D. $\{3\}$



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CALCULATOR SECTION

1. The amount of money raised at a school fundraiser is directly proportional to the number of people who attend. Last year, the amount of money raised for 100 attendees was \$2500. How much money will be raised if 875 people attend this year?
2. For the Choir fundraiser, the number of tickets Allie can buy is inversely proportional to the price of the tickets. She can afford 15 tickets that cost \$4.50 each. How many tickets can Allie buy if each cost \$3.00?
3. The volume of wood in a tree (V) varies directly as the height (h) and inversely as the square of the girth (g). If the volume of a tree is 144 cubic meters when the height is 20 meters and the girth is 1.5 meters, what is the height of a tree with a volume of 1000 and girth of 2 meters?
4. Solve the rational equations. You may use your calculators to *check* your solutions only. Show all work.

a.
$$\frac{x}{3} - \frac{1}{x-2} = \frac{x+1}{4}$$

b.
$$1 - \frac{8}{x-5} = \frac{3}{x}$$

c.
$$\frac{6}{x-3} = \frac{8x^2}{x^2-9} - \frac{4x}{x+3}$$

d.
$$\frac{x-3}{x+5} = \frac{x}{x+2}$$



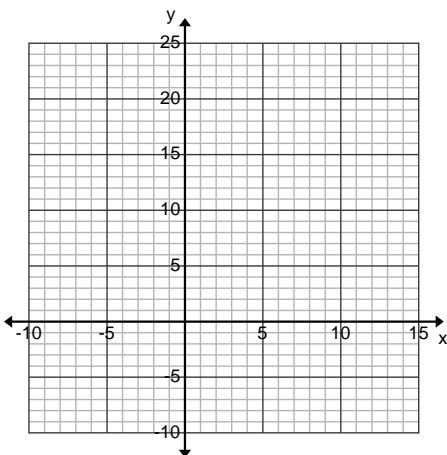
5. Peter can paint a house in 10 hours. Melanie can paint the same house in 9 hours. How long would it take if they worked together?

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

7. Graph the functions below using technology and then state the vertical and horizontal (or slant) asymptotes of the function.

a. $y = \frac{x^2 + 3x - 4}{x - 2}$

Asymptotes:



b. $y = \frac{-2x^2}{x^2 - 1}$

Asymptotes:

