

RATIONAL FUNCTIONS....

NC Objectives:

1.03 Operate with algebraic expressions (polynomial, rational, complex fractions) to solve problems.

1.05 Model and solve problems using direct, inverse, combined and joint variation.

2.05 Use rational equations to solve problems.

a. Solve using tables, graphs, and algebraic properties.

b. Interpret the constants and coefficients in the context of the problem.

c. Identify the asymptotes and intercepts graphically and algebraically.



Day	Date	Lesson	Assignment
1	Wed. May 7	Section 9.1: Direct, Inverse, & Joint Variation <i>Classwork: Packet p. 2</i>	Packet p. 3
2	Thurs. May 8	Section 9.2: Graphing Inverse Variation Section 9.3: Rational Functions & their Graphs Vertical Asymptotes	Packet p. 4 & 5 Watch Video: http://patrickjmt.com/rational-expressions-multiplying-and-dividing-ex-1/
3	Fri. May 9	Horizontal Asymptotes Multiplying & Dividing Rational Expressions	Handout & Packet p. 6 Study for Quiz Watch Video: http://patrickjmt.com/rational-expressions-adding-and-subtracting/
4	Mon. May 12	Quiz on Section 9.1-9.3 Section 9.5: Adding & Subtracting Rational Expressions	Packet p. 7 Part A Watch Video: http://patrickjmt.com/rational-equations-solving/
5	Tues. May 13	Simplifying Complex Fractions Review: Operations with Rational Expressions	Review and Complex Fractions Handout
6	Wed. May 14	Section 9.6: Solving Rational Equations	Packet p. 7 Part B
7	Thurs. May 15	Section 9.6: Applications of Rational Equations Give out rubric for paper slide project	Packet p. 8
8	Fri. May 16	Review of Unit: Paper slide project https://www.youtube.com/watch?v=Qf6L1PTG3p4	Finish Paper slide project
9	Mon. May 19	Review for Unit Test 7	Review: Packet p. 9-11
10	Tues. May 20	Unit Test 7	TBD

Homework Grade:



HONORS ALGEBRA 2 VARIATION WORKSHEET

1. If r varies directly as s , and $r=2$ when $s=10$, find r when $s=30$.
2. If y varies directly as x , and $y=24$ when $x=8$, find y when $x=50$.
3. If p is directly proportional to t and $p=2$ when $t=10$, find p when $t=-1$.
4. If y varies inversely as x and $y=27$ when $x=3$, find y when $x=9$.
5. If y varies inversely as x and $y=15$ when $x=-2$, find y when $x=-5$.
6. If y varies inversely as x and $y=9$ when $x=4$, find y when $x=6$.
7. If y varies jointly as x and z and $y=12$ when $x=4$ and $z=3$, find y when $x=9$ and $z=8$.
8. If y varies jointly as x and z and $y=72$ when $x=3$ and $z=8$, find y when $x=-2$ and $z=-3$.
9. If y varies jointly as x and z and $y=24$ when $x=2$ and $z=3$, find y when $x=4$ and $z=7$.
10. A fish with a mass of $3kg$ causes a fishing pole to bend $9cm$. If the amount of bending varies directly as the mass, how much will the pole bend for a $2kg$ fish?
11. The mass of a copper bar varies directly as its length. If a bar long $40cm$ long has a mass of approximately $420g$, find the mass of a bar $136cm$ long.
12. The interest earned on an investment varies directly with the interest rate. If a 9% rate yields $\$279$, what interest rate yields $\$341$?
13. The illumination i from a light varies inversely as the square of its distance d from an object. $i=8ft$ candles when $d=3ft$, find i when $d=4ft$.
14. The pressure P of a gas at a constant temperature varies inversely as the volume V . If $V=450in^3$ when $P=30lb/in^2$, find P when $V=750in^3$.
15. The frequency of a radio wave is inversely proportional to its wave length. If a radio wave, $30m$ long has a frequency of $1200kilocycles$ per second, what is the length of a wave with a frequency of $900kilocycles$?
16. The area A of a triangle varies jointly as the length of its base b and the length of its corresponding altitude h . If $A=15cm$ when $b=10cm$ and $h=3cm$, find A when $b=25cm$ and $h=6cm$.
17. The distance D traveled at a uniform rate varies jointly as the rate r and the time t . If $D=120$ when $r=60$ and $t=2$, find D when $r=80$ and $t=3$.
18. The area A of a parallelogram varies jointly as the length of a base b and the length of a corresponding altitude h . If $A=16$ when $b=2$ and $h=8$, find A when $b=8$ and $h=16$.

Honors Algebra 2

Section 9.1: Direct, Inverse, & Joint Variation

Homework

- I. Identify the data in each table as a direct variation or an inverse variation. Then write an equation to model the data.

1.)

X	Y
2	4
4	8
10	20
12.5	25

2.)

X	Y
1	8
2	4
4	2
8	1

3.)

X	Y
0.2	12
1	2.4
3	0.8
10	0.24

4.)

X	Y
0.01	9
0.9	0.1
0.1	0.9
3	0.03

- II. Write a function for each statement. Then solve the equation.

5. Find y when $x = 6$, if y varies directly as x and $y = 8$ when $x = 2$.

6. Find x when $y = 5$, if y varies inversely as x and $x = 6$ when $y = -18$

7. Find y when $x = 12$ and $z = 2$, if y varies jointly as x and z and $y = 24$ when $z = 2$ and $x = 1$

8. Find x when $y = 3$, if y varies inversely as x and $x = 4$ when $y = 16$

- III. Each pair of values is from an inverse variation. Find the missing value.

9. $(2, 5), (4, y)$

10. $(4, 6), (x, 3)$

11. $(3, 7), (8, y)$

12. $(x, 12), (4, 1.5)$

13. The number of bags of mulch you need to cover a planting area varies jointly with the area to be mulched a in square feet and the depth of the mulch d in feet. If you need 10 bags to mulch 120 ft^2 to a depth of 3 in., how many bags do you need to mulch 200 ft^2 to a depth of 4 in.?

Graphing Rational Functions” Homework Day 2 – Points of Discontinuity

Find the domain, vertical asymptotes, and holes for the following rational functions.

<p>1. $f(x) = \frac{1}{x-5}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>	<p>2. $f(x) = \frac{5x^3 - 4}{x^2 + 4x - 5}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>
<p>3. $f(x) = \frac{7x}{2x^2 + 9x + 4}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>	<p>4. $f(x) = \frac{2x}{x^2 - 8x}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>
<p>5. $f(x) = \frac{x^2 + x - 6}{3x^2 - 12}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>	<p>6. $f(x) = \frac{x^2 - 1}{x^2 - 2x - 3}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>
<p>7. $f(x) = \frac{12x + 24}{x^2 + 2x}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>	<p>8. $f(x) = \frac{2x^2 + x - 9}{3x^2 - 12}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>

<p>9. $f(x) = \frac{12x^4 + 10x - 3}{3x^4}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>	<p>10. $f(x) = \frac{x + 3}{x^2 - 9}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>
<p>11. $f(x) = \frac{4}{2x^2 - 11x + 5}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>	<p>12. $f(x) = \frac{(x-2)}{(x-2)(x+2)}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p>

Find the domain, points of discontinuity, x-intercept, and y-intercept.

<p>13. $f(x) = \frac{x+3}{x^2 - 4x + 3}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p> <p>x-intercept: _____</p> <p>y-intercept: _____</p>	<p>14. $f(x) = \frac{x+1}{x^2 + 3x + 2}$</p> <p>Domain: _____</p> <p>Vertical Asymptote: _____</p> <p>Hole: _____</p> <p>x-intercept: _____</p> <p>y-intercept: _____</p>
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Multiplying & Dividing Rational Expressions

Perform the indicated operations. Match the problems on the left to their correct answer on the right.

1. $\frac{x^2 - 25}{x^2 - 3x - 10}$	$\frac{x(x-1)}{3(x+1)}$
2. $\frac{x^2 + 5x + 6}{x^2 - x - 20} \cdot \frac{x^2 + 3x - 4}{x^2 + x - 2}$	$\frac{x+5}{x+2}$
3. $\frac{x^2 - 25}{x^2 - 16} \cdot \frac{x^2 - 4x}{2x + 10}$	$\frac{12x}{x+3}$
4. $\frac{3x-6}{x^2 - 5x + 6}$	$\frac{x(x-5)}{2(x+4)}$
5. $\frac{x^2 - 9}{x^2 + x} \div \frac{x-3}{x^2 - 1}$	$\frac{x+3}{x-5}$
6. $\frac{\frac{x^2 - 1}{x^2 + 3x + 2}}{\frac{x^2 - 2x + 1}{x+2}}$	$\frac{3}{x-3}$
7. $\frac{\frac{3x^2 - 9x}{x-2}}{\frac{x^2 - 9}{4x-8}}$	$\frac{1}{x-1}$
8. $\frac{x^2}{x^2 + 2x + 1} \div \frac{3x}{x^2 - 1}$	$\frac{(x+3)(x-1)}{x}$

Honors Algebra 2: Homework Day 4 Adding & Subtracting Rationals

Part A

Simplify each sum or difference.

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

$$2. \frac{d-3}{2d+1} + \frac{d-1}{2d+1}$$

$$3. \frac{xy-y}{x-2} - \frac{y}{x+2}$$

$$4. \frac{5y+2}{xy^2} + \frac{2x-4}{4xy}$$

$$5. \frac{5x}{x^2-9} + \frac{2}{x+4}$$

$$6. \frac{y}{2y+4} - \frac{3}{y+2}$$

$$7. \frac{x+2}{x^2+4x+4} + \frac{2}{x+2}$$

$$8. \frac{5x}{x^2-x-6} + \frac{4}{x^2+4x+4}$$

$$9. \frac{2y}{y^2-4y-12} - \frac{y}{y^2-10y+24}$$

Homework Day 5: Part B Solve each equation. Check each solution.

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

$$2. \frac{10}{x+3} + \frac{10}{3} = 6$$

$$3. \frac{6}{x-1} + \frac{2x}{x-2} = 2$$

$$4. \frac{2x}{5} = \frac{x^2-5x}{5x}$$

$$5. \frac{8(x-1)}{x^2-4} = \frac{4}{x-2}$$

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

$$7. \frac{4}{x-1} = \frac{5}{x-1} + 2$$

$$8. \frac{1}{x-5} = \frac{x}{x^2-25}$$

$$9. \frac{10}{2y+8} - \frac{7y+8}{y^2-16} = \frac{-8}{2y-8}$$

- 1.) The Delaware Demolition Company wants to build a brick wall to hide the area where they store wrecked cars from public view. One bricklayer can build this wall in 5 days. Another bricklayer can do the job in 4 days. If the company hires both of them to work together, how long will it take them to finish the wall?
- 2.) A swimming pool takes 6 hours to fill up when the drain is closed. It takes 10 hours to drain the pool. If the water is poured into the pool with the drain open, how long will it take for the pool to fill up?



- 3.) A round trip flight took 5 hours flying time. The plane traveled the 720 miles to the city at 295 mi/h with no wind. How strong was the wind on the return flight? Was the wind a head wind or tail wind?
- 4.) A cyclist travels 8km in the same time that a walker travels 3 km. The speed of the cyclist is 8km more than the speed of the walker. Find the speed of the cyclist and the speed of the walker.



- 5.) The denominator of a fraction is one less than twice the numerator. If 7 is added to both the numerator and the denominator, the resulting fraction has a value of $\frac{7}{10}$. Find the original fraction.

Honors Algebra 2

Review Sheet Unit 8: Rational Functions

1. Find the vertical asymptote(s) of the graph of $f(x) = \frac{x^2 - 16}{(x - 4)(x + 5)}$
2. Find the horizontal asymptote of the graph of $f(x) = \frac{8}{x - 3}$
3. Simplify: $\frac{5x + 40}{5x - 40}$
4. Simplify: $\frac{\frac{10}{x+1}}{\frac{1}{2} + \frac{3}{x+1}}$
5. What is the difference of $\frac{8x - 3}{x^2 + 2x - 35} - \frac{7}{x^2 - 25}$?
6. Solve $\frac{x^2}{4} - \frac{x}{2} = \frac{3}{4}$
7. Solve $\frac{x+3}{x} - \frac{7}{x+2} = \frac{14}{x^2 + 2x}$
8. Joseph can finish cleaning his parent's house in 1 hour, but his little brother Timmy can destroy it in 3 hours. If little Timmy is left unattended while Joseph is cleaning the house,
how long will it take him to clean it?
9. The variable z varies jointly with x and y . When $x = 6$ and $z = \frac{1}{3}$, $y = 30$. Write an equation that relates x , y , and z .
10. If y varies inversely as x and one point is $(4, 1.4)$, which of the following points satisfies this same equation?

A. $(6, 2.1)$	B. $(3, 1.2)$
C. $(5, 1.5)$	D. $(1.12, 5)$
11. Graph $f(x) = \frac{3x - 2}{x - 1}$.
12. Which of the following statements are true about the graph of $f(x) = \frac{x - 5}{x^2 - 7x + 10}$?

I. There is a vertical asymptote at $x = 5$	III. There is a discontinuity (hole) at $x = 5$
II. There is a vertical asymptote at $x = 2$	IV. There is a discontinuity (hole) at $x = 2$

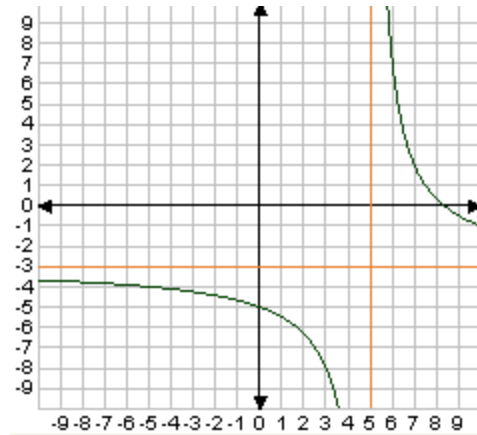
13. Which function is graphed?

A. $y = \frac{10}{x+5} - 3$

B. $y = \frac{10}{x-5} - 3$

C. $y = \frac{10}{x+5} + 3$

D. $y = \frac{10}{x-5} + 3$



14. Where does the "hole" in the graph of $f(x) = \frac{x^2 - 2x - 3}{x^2 + 2x - 15}$ occur?

15a. Simplify: $\frac{x^2 + 2x - 3}{x^2 + 5x + 6} \div \frac{4x^2 - 4x}{x^2 + 3x + 2}$

b. Simplify: $\frac{x^2 - 3x - 4}{x^2 + 6x + 5} - \frac{1}{x+5}$

16. The intensity I , of light received from a source varies inversely as the square of the distance, d , from the source. If the light intensity is 2 footcandles at 17 feet, find the light intensity at 19 feet. Round your answer to the nearest hundredth if necessary.

17. Decide whether the data shows inverse variation. If so, find the missing value.

x	0.5	-0.5	20	-1
y	10	-10	?	-5

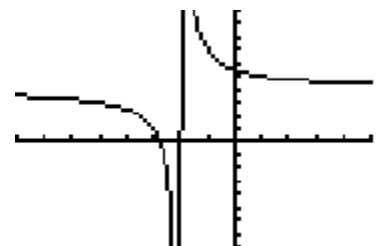
18. A car travels 200 miles in the same time that a freight train travels 120 miles. The speed of the car is 35 mph more than the speed of the train. Find the speed of the car and the speed of the train.

19. Given the following graph and table, state the horizontal and vertical asymptotes, as well as any "holes".

Horizontal asymptote _____

Vertical asymptote _____

"Holes" (if any) _____



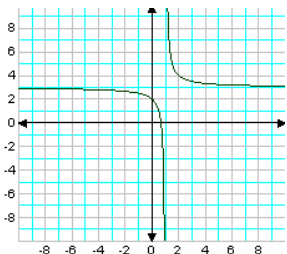
x	y_1
-299	3.9899
-199	3.9848
-99	3.9691
1	ERROR
101	4.0291
201	4.0148
301	4.0099

$x = -299$

Possible Review Questions

20. Find the value of k that makes $(x - 2)$ a factor of $x^3 + 3x^2 - x + k$.
21. Solve $\sqrt{-4x+1} - 8 = -6$
22. Simplify: $\frac{4-\sqrt{3}}{2-\sqrt{3}}$
23. An object is thrown upward into the air with an initial velocity of 128 feet per second. The formula $h(t) = 128t - 16t^2$ gives its height above the ground after t seconds. For how many seconds will the object be in the air?
24. If $f(x) = \frac{4}{3}x - 9$, what is $f^{-1}(-3)$?

ANSWERS!!

1.) $x = -5$	2.) $y = 0$	3.) $\frac{x+8}{x-8}$
4.) $\frac{20}{x+7}$	5.) $\frac{2(4x^2+15x-32)}{(x+5)(x-5)(x+7)}$	6.) 3, -1
7.) 4	8.) 1.5 hours	9.) $z = \frac{1}{540}xy$
10.) D	11.) 	12.) II, III
13.) B	14.) $x = 3$	15.) a.) $\frac{x+1}{4x}$ b.) $\frac{x-5}{x+5}$
16.) $\frac{578}{361} = 1.601$	17.) $\frac{1}{4}$	18.) Car: 87.5 mi/h Train: 52.5 mi/h
19.) Horizontal asymptote $y = 4$ Vertical asymptote $x = -2$ "Holes" (if any) $x = 1$	20.) -18	21.) $\frac{-3}{4}$
22.) $5+2\sqrt{3}$	23.) 8	24.) 4.5