

Algebra 2 Honors
Rational Functions Test 2015 – 2016 REVIEW

Name: KEY
Date: _____

- 1) A SmarTrip card on the Metro costs \$5 for the card and then \$2.10 for every Metro trip (assume for this problem that all trips cost the same amount). Write a function to show the average cost c of the SmarTrip card for t trips.

$$C = 5/t + \$2.10$$

- 2) Identify the asymptotes of your function in problem #1.

$$VA: t = 0$$

$$HA: C = \$2.10$$

- 3) Write the four approach statements for your function in problem #1.

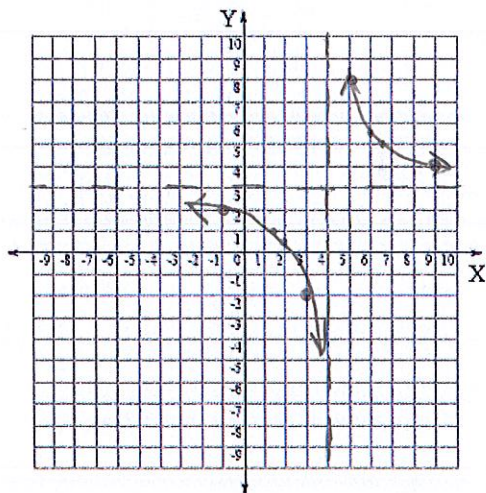
$$x \rightarrow \infty, y \rightarrow \$2.10$$

$$x \rightarrow -\infty, y \rightarrow \$2.10$$

$$x \rightarrow 0 \text{ from the left, } y \rightarrow -\infty$$

$$x \rightarrow 0 \text{ from the right, } y \rightarrow \infty$$

- 4) Graph $y = \frac{5}{x-4} + 3$.



Algebra 2 Honors
Rational Functions Test 2015 – 2016 REVIEW

5) Rewrite $y = \frac{5}{x-4} + 3$ to have asymptotes at $x = -7$ and $y = 6$.

$$y = \frac{5}{x+7} + 6$$

6) Identify the vertical asymptotes, horizontal asymptotes, and holes of the graph of $\frac{2x^2 - 3x - 20}{x^2 - 6x + 8}$

a. Vertical asymptotes: $x = 2$

b. Horizontal asymptotes: $y = 2$

c. Holes: $x = 4$

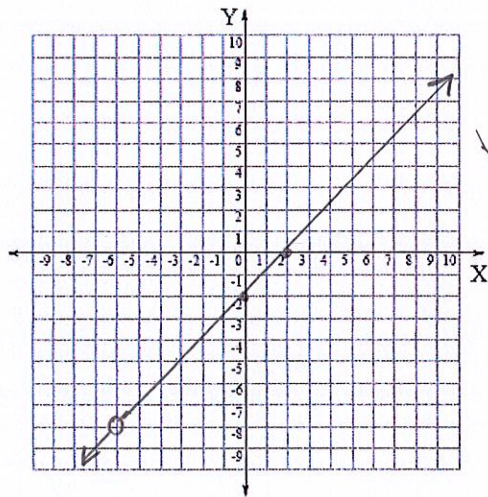
$$\frac{(2x+5)\cancel{(x-4)}}{(x-4)\cancel{(x-2)}} = \frac{2x+5}{x-2}$$

7) Write a function whose graph has a vertical asymptote but no horizontal asymptotes.

Ex: $y = \frac{3x^2 + 4x + 1}{x - 5}$

Algebra 2 Honors
Rational Functions Test 2015 – 2016 REVIEW

- 8) Simplify and graph. Make sure to show all asymptotes and holes. $\frac{x^2 + 4x - 12}{x + 6}$

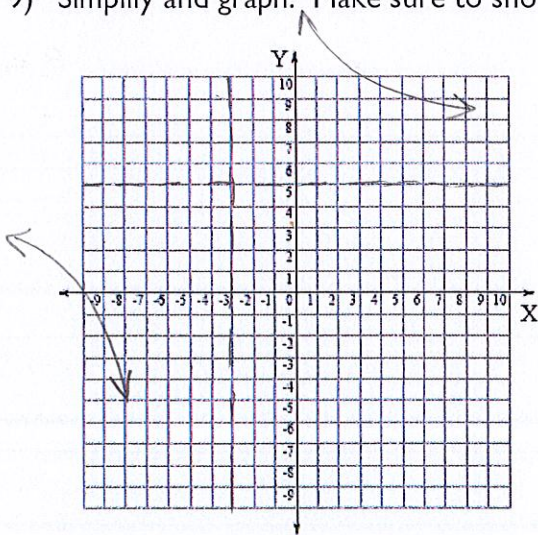


$$y = \frac{(x+6)(x-2)}{(x+6)}$$

$$y = x - 2$$

hole at $x = -6$

- 9) Simplify and graph. Make sure to show all asymptotes and holes. $\frac{5x - 4}{x + 3}$



$$\begin{array}{r} 5 \\ x+3 \overline{) 5x-4} \\ \underline{-(5x+15)} \\ -19 \end{array}$$

$$y = \frac{-19}{x+3} + 5$$

Algebra 2 Honors
Rational Functions Test 2015 – 2016 REVIEW

10) Divide. Simplify your answer.

$$\frac{x^2 - 25}{x^2 - 16} \div \frac{2x + 10}{x^2 - 4x}$$

$$\frac{\cancel{(x+5)}(x-5)}{(x+4)(x-4)} \cdot \frac{x(x-4)}{2(x+5)}$$

$$\boxed{\frac{x^2 - 5x}{2x + 8} \quad x \neq 4, -4, 0, -5}$$

11) Find the LCM of $2x + 4$ and $x^2 + 2x$

$$\begin{array}{l} 2x + 4 \\ / \quad \backslash \\ 2(x + 2) \end{array} \qquad \begin{array}{l} x^2 + 2x \\ / \quad \backslash \\ x(x + 2) \end{array}$$

$$2 \cdot x \cdot (x + 2)$$

$$\boxed{2x^2 + 4x}$$

12) Simplify $\frac{7}{5x+25} - \frac{4}{3x+15}$

$$\frac{7}{5(x+5)} - \frac{4}{3(x+5)}$$

$$\frac{21}{15x+75} - \frac{20}{15x+75}$$

$$\boxed{\frac{1}{15x+75} \quad x \neq -5}$$

13) Simplify $3x - \frac{x^2 + 5x}{x^2 - 2}$

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

$$\boxed{\frac{3x^3 - x^2 - 11x}{x^2 - 2} \quad x \neq \pm\sqrt{2}}$$

Algebra 2 Honors

Rational Functions Test 2015 – 2016 REVIEW

14) Simplify $\frac{\frac{3}{2y}}{\frac{6}{8x}}$.

$$\frac{3}{2y} \cdot \frac{8x}{6}$$

$$\boxed{\frac{2x}{y}}$$

$$x, y \neq 0$$

15) Solve $\frac{1}{4x} - \frac{3}{4} = \frac{7}{x}$

$$\frac{1}{4x} - \frac{3x}{4x} = \frac{28}{4x}$$

$$1 - 3x = 28$$

$$-3x = 27$$

$$\boxed{x = -9}$$

16) Solve $\frac{2}{y} + \frac{1}{2} = \frac{5}{2y}$

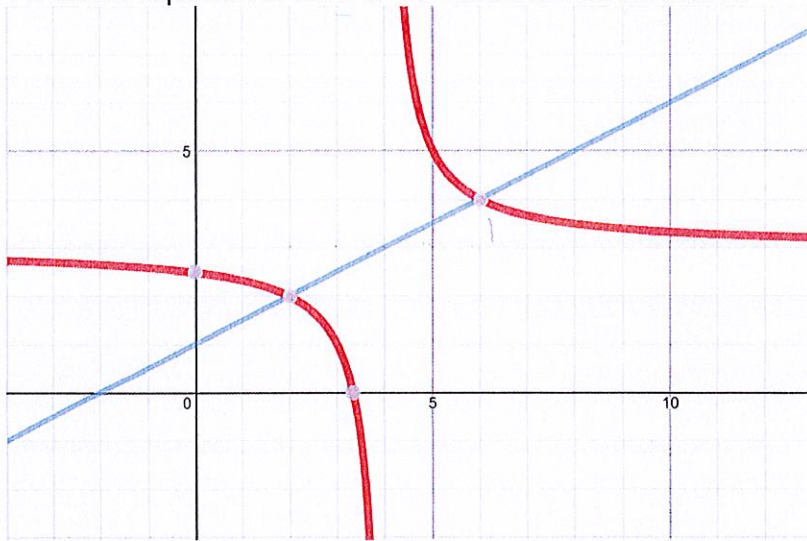
$$\frac{4}{2y} + \frac{y}{2y} = \frac{5}{2y}$$

$$4 + y = 5$$

$$\boxed{y = 1}$$

Algebra 2 Honors
Rational Functions Test 2015 – 2016 REVIEW

17) Write the equation of each of the functions shown below.



Red:

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

Blue:

$$g(x) = \frac{1}{2}x + 1$$

18) Find the points of intersection of the two functions shown above. You must show algebraically how you arrived at your solution in order to earn credit.

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

$$2 \left(\frac{2}{x-4} = \frac{1}{2}x - 2 \right)$$

$$\frac{4}{x-4} = x - 4$$

$$4 = (x-4)(x-4)$$

$$4 = x^2 - 8x + 16$$

$$0 = x^2 - 8x + 12$$

$$0 = (x-2)(x-6)$$

$$x = 2, 6$$

$$x = 2, 6$$

$$y = \frac{1}{2}(2) + 1$$

$$y = 2$$

$$y = \frac{1}{2}(6) + 1$$

$$y = 4$$

Points (2, 2) & (6, 4)