

Unit 7 RATIONAL FUNCTIONS REVIEW SHEET

1. Simplify the following.

a. $\frac{x^2+7x-18}{x^2+12x+27} \cdot \frac{x-2}{x+3}$
 $\frac{(x-2)\cancel{(x+9)}}{(x+3)\cancel{(x+9)}}$

b. $\frac{4p}{4p+8} \cdot \frac{8p+16}{p} \cdot \frac{8}{p}$
 $\frac{\cancel{4p} \cdot 8\cancel{(p+2)}}{\cancel{4(p+2)} \cdot p}$

c. $\frac{7x}{21x^2-14x} \cdot \frac{1}{3x-2}$
 $\frac{7x(3x-2)}{7x(3x-2)}$

d. $\frac{m^2-49}{m^2+3m-28} \cdot \frac{m^2+m-20}{m^2-7m} \cdot \frac{m+5}{m}$
 $\frac{\cancel{(m+7)}\cancel{(m-7)} \cdot \cancel{(m-4)}(m+5)}{\cancel{(m-4)}\cancel{(m+7)} \cdot m\cancel{(m-7)}}$

e. $\frac{8}{n^2+10n+21} + \frac{7}{n+3} \cdot \frac{7n+57}{(n+3)(n+7)}$
 $\frac{8}{(n+7)(n+3)} + \frac{7(n+7)}{(n+3)(n+7)}$
 $\frac{8+7n+49}{(n+3)(n+7)}$

* f. $\frac{2x}{(x+2)^{x+6}} - \frac{7}{x+2} \cdot \frac{(x+2)}{(x+6)}$ *Distribute -*
 $\frac{2x^2+4x-7x-42}{(x+2)(x+6)}$
 $\frac{2x^2-3x-42}{(x+2)(x+6)}$

g. $\frac{x^2}{x^2-25} \cdot \frac{3x+15}{4x^2} \cdot \frac{3x^2}{2(x-5)}$
 $\frac{\cancel{x^2} \cdot 3\cancel{(x+5)}}{\cancel{(x+5)}\cancel{(x-5)} \cdot 4x^2} \cdot \frac{3x^2}{2(x-5)}$

h. $\frac{3x}{x+8} + \frac{x-4}{x} \cdot \frac{(x+8)}{x}$
 $\frac{3x^2+x^2+4x-32}{x(x+8)}$
 $\frac{4x^2+4x-32}{x(x+8)} = \frac{4(x^2+x-8)}{x(x+8)}$

i. $\frac{3}{2x} \cdot \frac{2x}{8xy} - \frac{y}{16x^2} \cdot \frac{y}{y} \cdot \frac{6x-y^2}{16x^2y}$
LCD: 16x²y

j. $\frac{8x+32}{x^2-121} \div \frac{x^2-5x-36}{2x+22}$ *KCF*
 $\frac{\cancel{8(x+4)}}{\cancel{(x+11)}\cancel{(x-11)}} \cdot \frac{2\cancel{(x+11)}}{\cancel{(x+4)}(x-9)} = \frac{16}{(x-11)(x-9)}$ **30**

2. Write an equation of a rational function with asymptotes $x = 4$ and $y = -7$.

$$y = \frac{1}{x-4} - 7$$

3. Solve. List solutions and excluded values.

a. $\frac{8x}{n-7} - \frac{7}{n-7} = \frac{33}{n-7}$

E.V. $x \neq 7$

$$8x - 7 = 33$$

$$8x = 40$$

$$\boxed{x = 5}$$

b. $\left(\frac{-5x}{x+8} + \frac{10}{3x+24} = \frac{-2}{3} \right) \frac{3(x+8)}{1}$

$$-15x + 10 = -2x - 16$$

$$-13x = -26$$

$$\boxed{x = 2}$$

E.V.
 $x \neq -8$

c. $\left(\frac{n^2 + 10n - 97}{n^2 - 4n - 21} = \frac{7}{n+3} + \frac{5}{n-7} \right) \frac{(n-1)(n+3)}{1}$

E.V. $n \neq 7, -3$

$$n^2 + 10n - 97 = 7(n-1) + 5(n+3)$$

$$n^2 + 10n - 97 = 7n - 49 + 5n + 15$$

$$n^2 + 10n - 97 = 12n - 34$$

$$n^2 - 2n - 63 = (n-9)(n+7)$$

$$\boxed{n = 9, -7}$$

4. Steven can look up 20 words in a dictionary in an hour. His teammate, Mary, can look up 30 words per hour.

Working together, how long will it take them to look up 100 words?

together = 50 words/hr.

$$\boxed{2 \text{ hours}}$$

5. Two crews can service the space shuttle in 12 days. The faster crew can service the shuttle in 20 days alone.

How long would the slower crew need to service the shuttle working alone?

$$\frac{20a}{1} \left(\frac{12}{20} + \frac{12}{a} = 1 \right)$$

$$12a + 240 = 20a$$

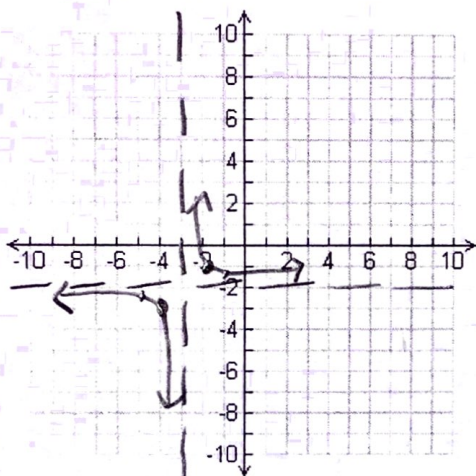
$$\begin{array}{r} 240 = 8a \\ 30 = a \\ \text{days} \end{array}$$

Review Sheet : Graphing Rational Functions

I. Graphing Parent Functions $y = \frac{1}{x}$ and $y = \frac{1}{x^2}$ Transformationally

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

Translations Needed to Graph: left 3
down 2



HA $y = -2$

VA $x = -3$

As $x \rightarrow \infty$

$y \rightarrow$ -2

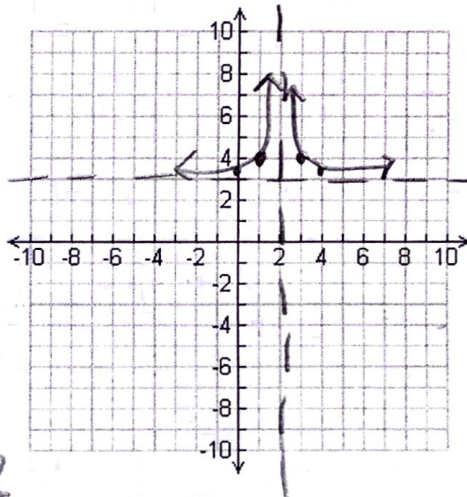
As $x \rightarrow -\infty$

$y \rightarrow$ -2

Domain: $\{x | x \neq -3\}$

7) $y = \frac{1}{(x-2)^2} + 3$

Translations Needed to Graph: up 3
right 2



HA $y = 3$

VA $x = 2$

As $x \rightarrow \infty$,

$y \rightarrow$ 3

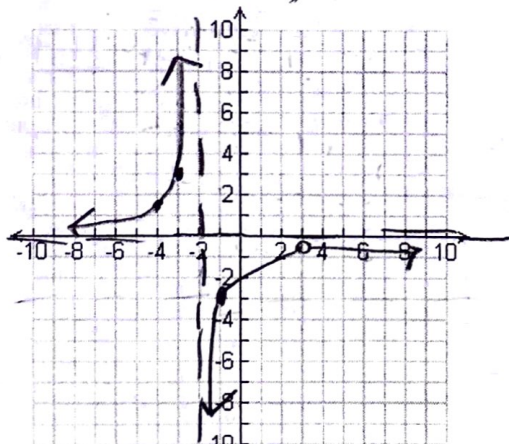
As $x \rightarrow -\infty$

$y \rightarrow$ 3

Domain: $\{x | x \neq 2\}$

II. Graphing Rational Functions

8) $y = \frac{-3x+9}{x^2-x-6} = \frac{-3(x-3)}{(x+2)(x-3)} = \frac{-3}{x+2}$



Hole $(3, \frac{3}{5})$

VA $x = -2$

HA $y = 0$

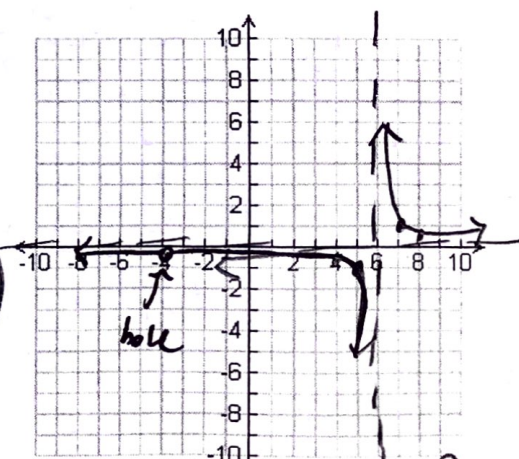
Roots None

Domain: $\{x | x \neq -2, 3\}$

As $x \rightarrow \infty$, $y \rightarrow$ 0

As $x \rightarrow -\infty$, $y \rightarrow$ 0

9) $f(x) = \frac{x+4}{x^2-2x-24} = \frac{(x+4)}{(x+4)(x-6)} = \frac{1}{x-6}$



Hole $(-4, \frac{1}{10})$

VA $x = 6$

HA $y = 0$

Roots none

Domain: $\{x | x \neq -4, 6\}$

As $x \rightarrow \infty$, $y \rightarrow$ 0

As $x \rightarrow -\infty$, $y \rightarrow$ 0