MCR 3U

RATIONAL FUNCTIONS

STEPS TO SKETCH RATIONAL FUNCTIONS

1. State the domain and range of the function.

   $\{x \in R, x \neq \_\_\_\_ \}$
   $\{y \in R, y \neq \_\_\_\_ \}$

2. The D and R represent areas where the graph of the function does not exist. These "areas" are designated by vertical and horizontal dashed lines and are known as **ASYMPTOTES**.

   Go to the location in the coordinate system where the asymptotes are located and draw horizontal and vertical dashed lines through the point.

3. The "a" value [located in the numerator of the rational function] is used to sketch points that belong to the rational function.

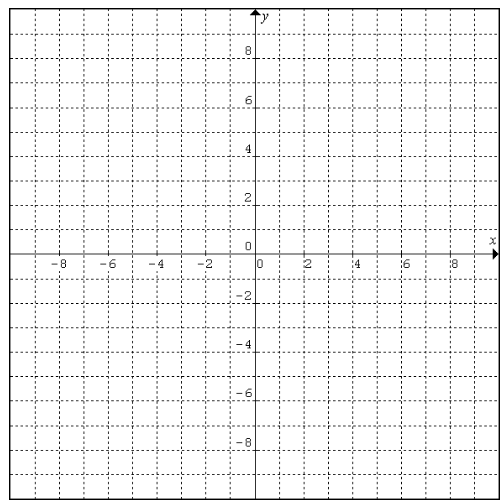
   State at least 4 pairs of factors that multiply to the "a" value. [use decimals, if necessary]. These pairs of factors translate into ordered pairs relative to the "new origin".

   From the "new origin", [where the asymptotes intersect], use the pairs of factors determined by the "a" value to plot points.

EXAMPLE:

$$f(x) = \frac{6}{x-3} - 4$$

$\{x \in R, x \neq 3\}$
$\{y \in R, y \neq -4\}$



Since $a = 6$, pairs of factors are:

1x6, -1 x -6
2x3, -2 x -3

From (3, - 4) [the new origin], use 1 x 6 by going 1 unit right and 6 units up, and plot a point. Then from the new origin, go 6 units right and 1 unit up, and plot a point. Do the same for the other pairs of factors.

Draw a smooth curve through the points and approaching the asymptotes, without touching the asymptotes. Draw arrows at each end of each curve.

EXERCISE:

PART A: Sketch and state the properties of each rational function.

1. $f(x) = \frac{6}{x} + 3$

2. $y = \frac{4}{x-2} - 2$

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

4. $h(x) = \frac{-8}{x-1}$

5. $k(x) = \frac{2}{x+5} - 3$

6. $g(x) = 4 - \frac{1}{x}$

7. $y = 3 + \frac{9}{x+1}$

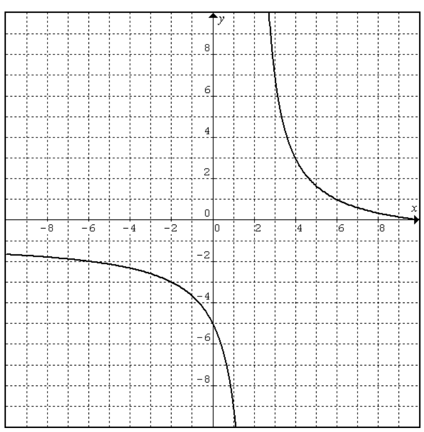
8. $a(x) = \frac{5}{x}$

9. $t(x) = 6 - \frac{3}{x-2}$

10. $f(x) = \frac{10}{x+2} + 2$

PART B: Determine the equation of each rational function.

1.



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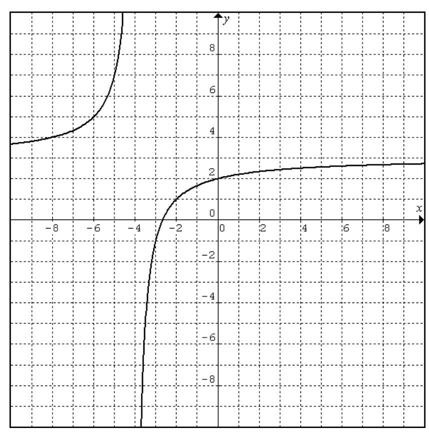

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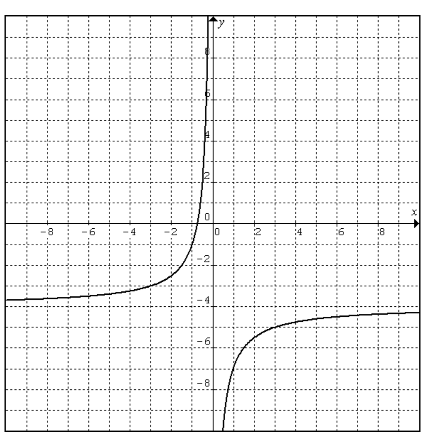

4.