

MHF4U Unit 3 Rational Functions

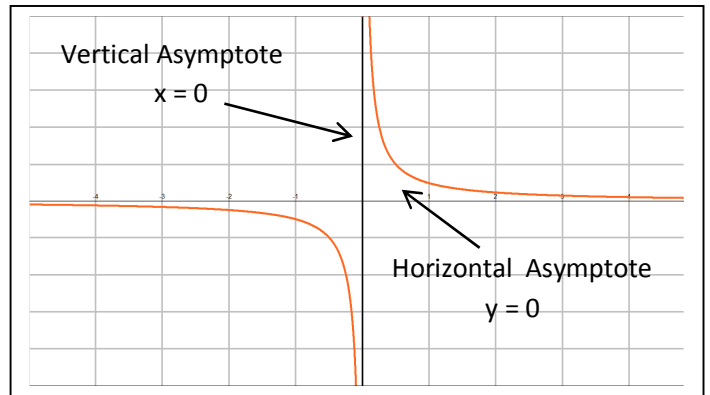
Section	Pages	Questions
Prereq Skills	146-147	#1, 2, 3bf, 4ac, 6, 7ace, 8cdef, 9bf, 10abe
3.1	153-155	#1ab, 2, 3, 5ad, 6ac, 7cdf, 8, 9, 14*
3.2	164-167	#1ac, 2, 3ab, 4ab, 5acde, 8dgh, 9, 11, 14*, 16*
3.3	174-175	#1ace, 2bdf, 3ace, 5, 6bcde, 7, 8, 9, 10bc
3.4	183-185	#1, 2, 4abcf, 5bd, 9cde, 10ac, 11
3.5	189-191	#2, 3, 4, 6, 8cd, 9(determine the oblique asymptotes, only graph a)
Review	192-193 194-195	#1, 2, 3ad, 4, 5acd, 6, 7, 8, 9bcd, 10, 11, 12a, 13, 15, 16 #1-5

Note: Questions with an asterisk* are extra questions that are optional for the daily homework. However, they are potential "extended-type" questions that could be included on a unit test.

Review of Reciprocal Functions

The graph of $f(x) = \frac{1}{x}$ is a graph with two asymptotes; one vertical, one horizontal.

An **asymptote** is a line that a curve approaches but never reaches.



Transformations

Horizontal:

If x is multiplied by a value (k), it is a **horizontal stretch or compression by a factor of $1/k$** .

And if k is negative, it is a **reflection in the y-axis** (a horizontal reflection). $f(x) = \frac{1}{kx}$

If a value (d) is added to x , it is a **horizontal translation of d units**. $f(x) = \frac{1}{x-d}$

If both transformations are applied together, the k -value must be factored out in order to determine the correct horizontal translation. $f(x) = \frac{1}{k(x-d)}$

Vertical:

If the function is multiplied by a value (a), it is a **vertical stretch or compression by a factor of a** . And if a is negative, it is a **reflection in the x-axis** (a vertical reflection). $f(x) = \frac{a}{x}$

If a value (c) is added to the function, it is a **vertical translation of c units**. $f(x) = \frac{1}{x} + c$

Remember that a stretch, compression, or reflection must be applied before a translation.

** R.S.T **

Domain and Range

The domain and range of a reciprocal linear function are all real numbers for x and y except for the x and y values along the two asymptotes.

For example, look at the graph of $f(x) = \frac{1}{x}$.

The domain is $\{x \in \mathbb{R}, x \neq 0\}$ and the range is $\{y \in \mathbb{R}, y \neq 0\}$

Examples: Consider the reciprocal functions below. Write an equation for the vertical and horizontal asymptotes. Use transformations to sketch the graph. Write the domain and range of the function.

a) $f(x) = \frac{1}{x+5} + 1$

b) $f(x) = \frac{-1}{2x-8}$

c) $f(x) = \frac{2}{-x-3} - 1.5$

Example: Graph $f(x) = \frac{-1}{x}$ and $f(x) = \frac{1}{-x}$ on the same grid. Compare the graphs.

