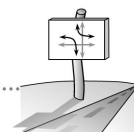


4.2.3 Is the feeling reciprocal?

Graphing Reciprocal Functions



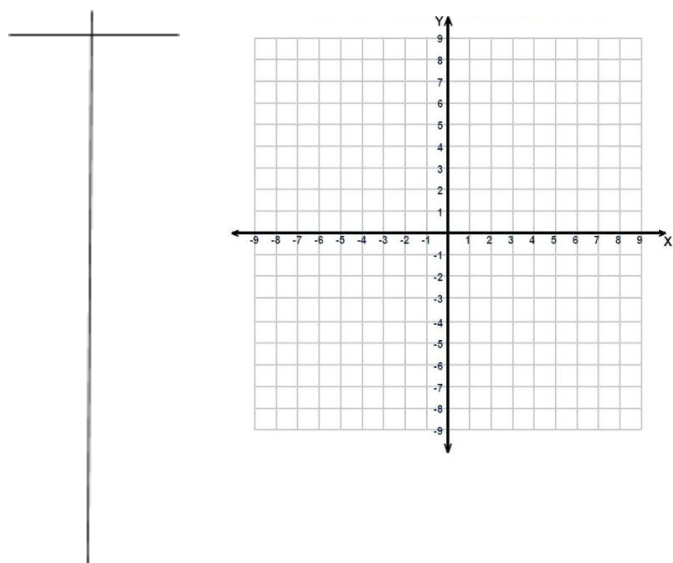
Today you examine a special type of fractional function. You will graph the reciprocal of a given function.

#90 Let $f(x) = x - 3$ and $g(x) = \frac{1}{f(x)}$.

a. Make a table for each function and then graph each function.

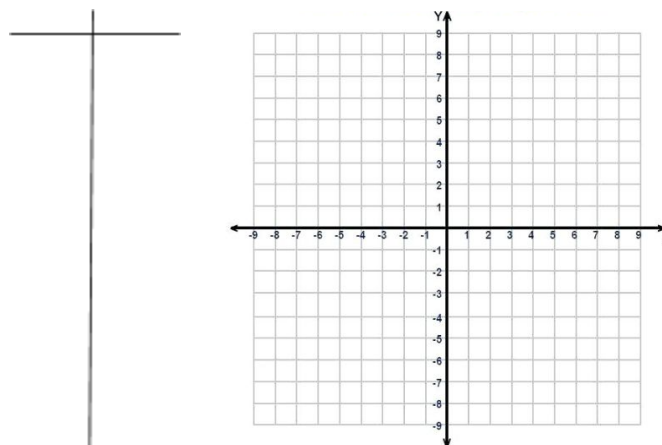
Original Function

$f(x) = x - 3$



Reciprocal Function

$g(x) = \frac{1}{f(x)} = \frac{1}{x-3}$



b. You should have noticed that when $x = 3$, $y = f(x)$ has an x -intercept, but $g(x)$ is undefined. Why?

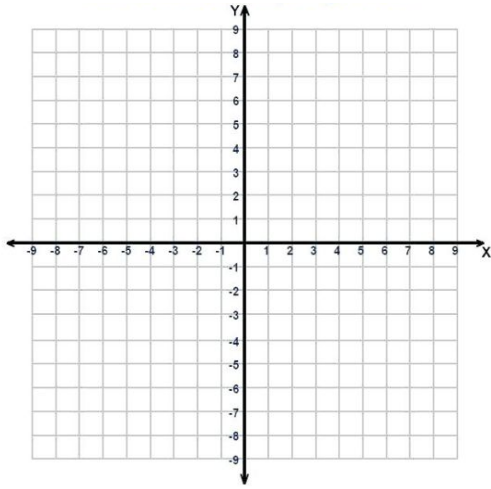
c. To more accurately sketch and understand the graph of $y = g(x)$, complete the table below. Then update your graph if necessary.

| | | | | | | | | | |
|--------|-----|------|-------|--------|------|--------|-------|------|-----|
| x | 2.9 | 2.99 | 2.999 | 2.9999 | 3 | 3.0001 | 3.001 | 3.01 | 3.1 |
| $g(x)$ | | | | | und. | | | | |

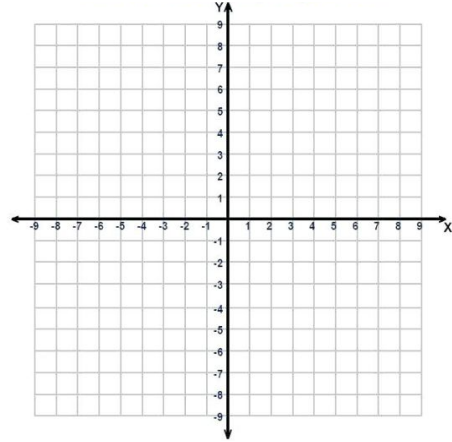
d. What happens to the graph of $y = g(x)$ near the x -intercept of $y = f(x)$? Why?

#91 Let $f(x) = x^2 - 4$.

a. Sketch a graph of $f(x) = x^2 - 4$.



b. Using only your graph of $y = f(x)$ and *without* using a calculator, predict what the graph of $g(x) = \frac{1}{f(x)} = \frac{1}{x^2 - 4}$ will look like. Sketch your prediction.



c. Does the graph of $y = f(x)$ have any x-intercepts? If so, where? If not, why not?

d. Does the graph of $y = g(x)$ have any vertical asymptotes? If so, write the equations and explain why. If not, explain why not.

e. Will the graph of $y = g(x)$ have a horizontal asymptote? If so, write its equation and explain why. If not, explain why not.

f. For what x-values will $g(x)$ be positive? Explain.

g. For what x-values will $g(x)$ be negative? Explain.

h. Graph $y = g(x)$ using a calculator and check your prediction.