

Reciprocal Functions

1. State the equation(s) of the vertical asymptote(s) for each function.
2. What are the x-intercept(s) and the y-intercept of each function?

a) $f(x) = \frac{1}{5x - 10}$

b) $f(x) = \frac{1}{3x + 7}$

c) $f(x) = \frac{1}{(x - 2)(x + 4)}$

d) $f(x) = \frac{1}{x^2 - 9x + 20}$

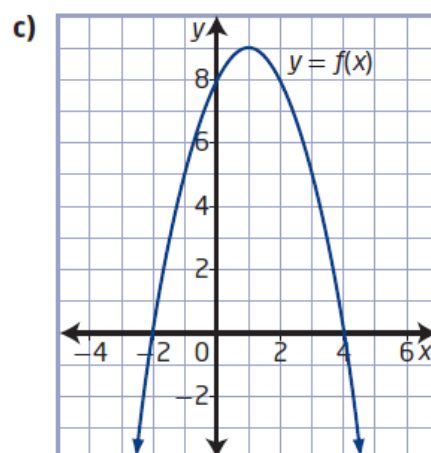
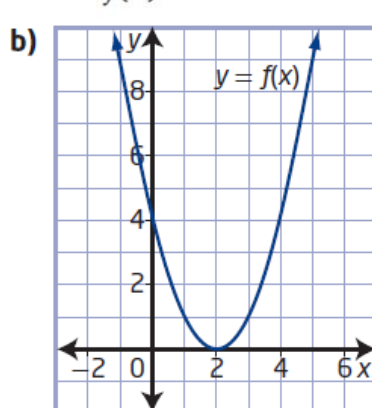
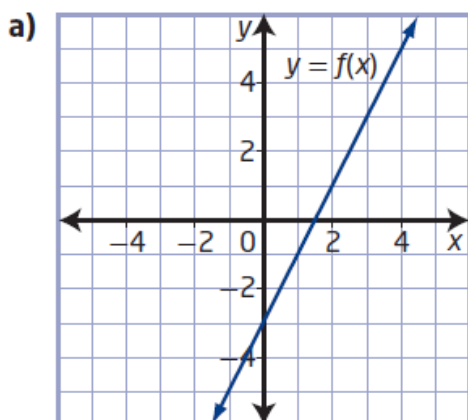
a) $f(x) = \frac{1}{x + 5}$

b) $f(x) = \frac{1}{3x - 4}$

c) $f(x) = \frac{1}{x^2 - 9}$

d) $f(x) = \frac{1}{x^2 + 7x + 12}$

3. Given each graph of $y = f(x)$, sketch the graph of the reciprocal function $y = \frac{1}{f(x)}$.

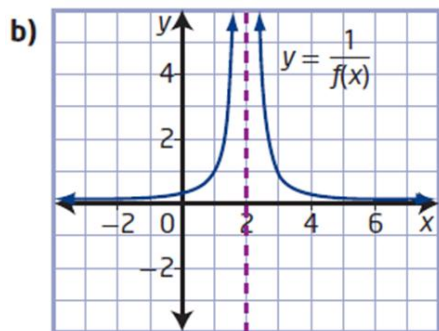
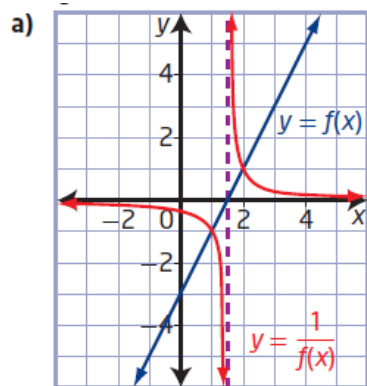


4. Sketch the graphs of $y = f(x)$ and $y = \frac{1}{f(x)}$ on the same set of axes. Label the asymptotes, the invariant points, and the intercepts.
5. The greatest amount of time, t , in minutes, that a scuba diver can take to rise toward the water surface without stopping for decompression is defined by the function $t = \frac{525}{d - 10}$, where d is the depth, in metres, of the diver.
- a) Graph the function using graphing technology.
- b) Determine a suitable domain which represents this application.
- c) Determine the maximum time without stopping for a scuba diver who is 40 m deep.
- a) $f(x) = 2x + 4$
- b) $f(x) = x^2 - 2x - 8$
- c) $f(x) = x^2 + 2$
- d) Graph a second function, $t = 40$. Find the intersection point of the two graphs. Interpret this point in terms of the scuba diver rising to the surface. Check this result algebraically with the original function.
- e) Does this graph have a horizontal asymptote? What does this mean with respect to the scuba diver?

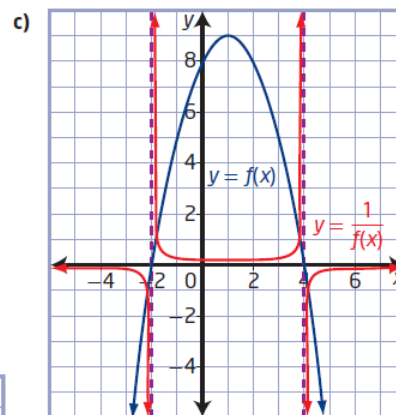
Answers:

1. a) $x = 2$ b) $x = -\frac{7}{3}$
 c) $x = 2, x = -4$ d) $x = 4, x = 5$

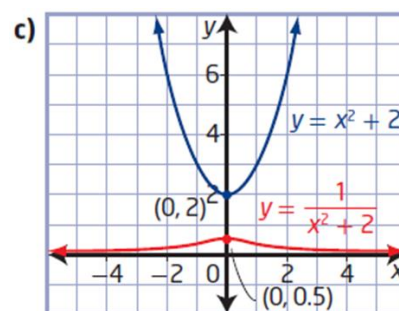
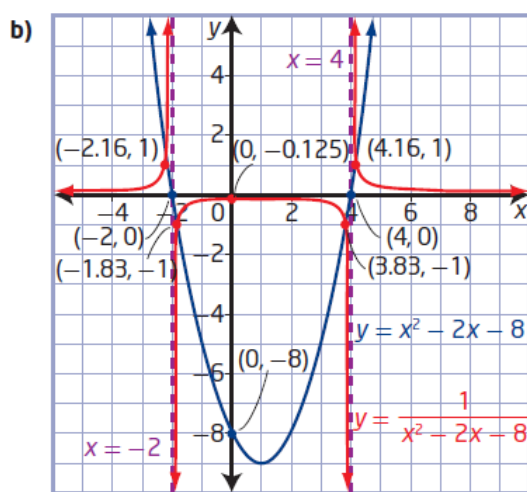
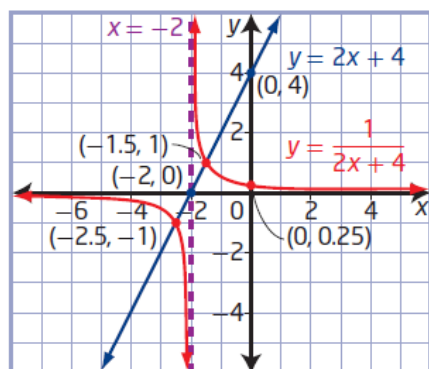
3.



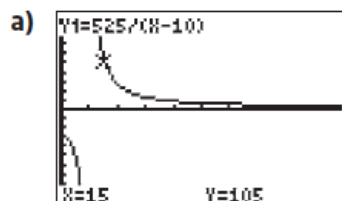
- a) no x-intercepts, y-intercept: $\frac{1}{5}$
 2. b) no x-intercepts, y-intercept: $-\frac{1}{4}$
 c) no x-intercepts, y-intercept: $-\frac{1}{9}$
 d) no x-intercepts, y-intercept: $\frac{1}{12}$



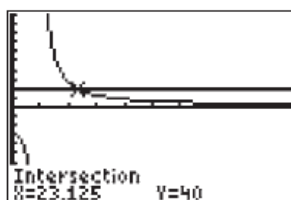
4. a)



5.



- b) $\{d \mid d > 10, d \in \mathbb{R}\}$
 c) 17.5 min
 d) 23.125 m; it means that the diver has a maximum of 40 min at a depth of 23.125 m.



- e) Yes; at large depths it is almost impossible to not stop for decompression.