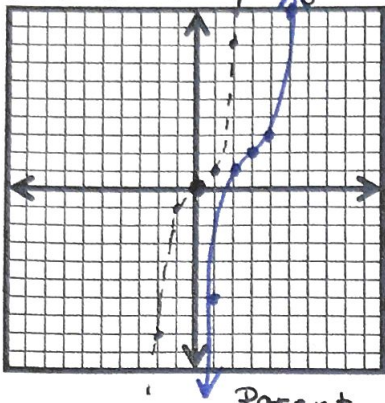


Parent

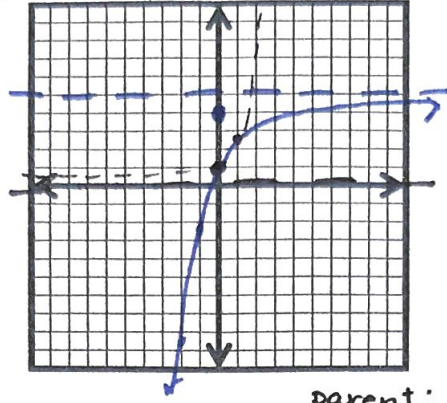
Practice ----- Transformations

Graph each of the following transformations of the parent functions without the use of your calculator (although you may feel free to use your calculator to CHECK and make sure your graphs are correct)

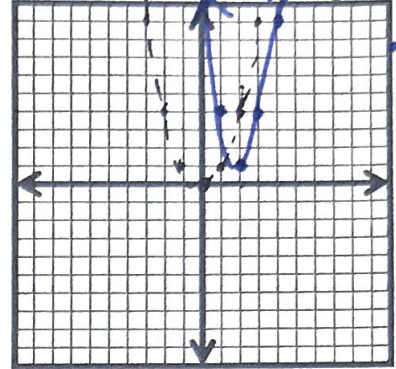
1) $f(x) = (x-3)^3 + 2$ parent: $y = x^3$



2) $f(x) = -e^{-x} + 5$ parent: $y = e^x$

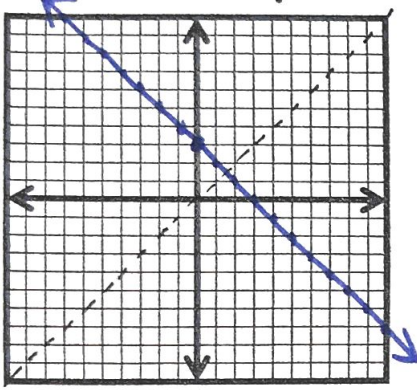


3) $f(x) = 3(x-2)^2 + 1$ parent: $y = x^2$

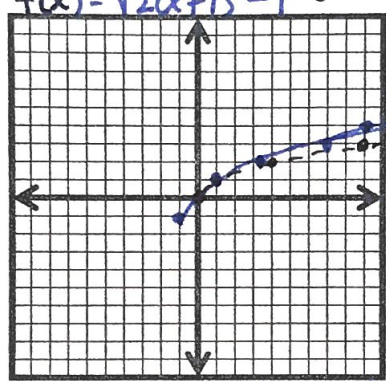


vertical stretch by 3
right 2
up

4) $f(x) = -x + 3$ parent: $y = x$

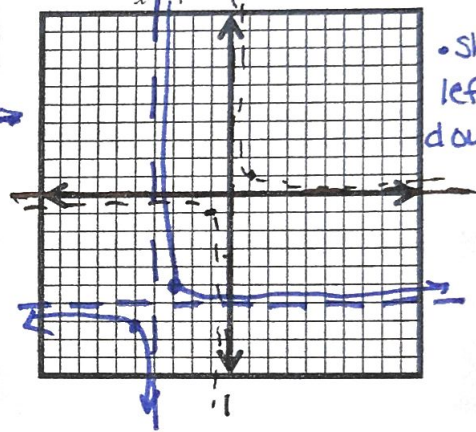


5) $f(x) = \sqrt{2x+2} - 1$ parent: $y = \sqrt{x}$



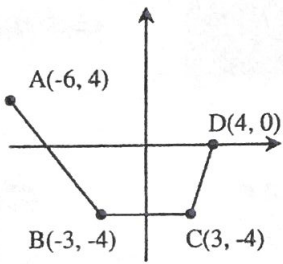
horizontal shrink by 1/2
shift left 1 down 1

6) $f(x) = \frac{1}{x+4} - 6$ parent: $f(x) = \frac{1}{x}$



shift left 4 down 6

7) The graph of $f(x)$ is shown below. Find the new coordinates after the following transformations have been applied:



- | | | | | | |
|----------------|------|--------------------|--------------------|--------------------|-------------------|
| $f(x)$ | ---- | A: <u>(-6, 4)</u> | B: <u>(-3, -4)</u> | C: <u>(3, -4)</u> | D: <u>(4, 0)</u> |
| (a) $-f(x)$ | ---- | A: <u>(-6, -4)</u> | B: <u>(-3, 4)</u> | C: <u>(3, 4)</u> | D: <u>(4, 0)</u> |
| (b) $f(-x)$ | ---- | A: <u>(6, 4)</u> | B: <u>(3, -4)</u> | C: <u>(-3, -4)</u> | D: <u>(-4, 0)</u> |
| (c) $f(x) + 3$ | ---- | A: <u>(-6, 7)</u> | B: <u>(-3, -1)</u> | C: <u>(3, -1)</u> | D: <u>(4, 3)</u> |
| (d) $f(x-3)$ | ---- | A: <u>(-9, 4)</u> | B: <u>(-6, -4)</u> | C: <u>(0, -4)</u> | D: <u>(1, 0)</u> |
| (e) $2f(x)$ | ---- | A: <u>(-6, 8)</u> | B: <u>(-3, -8)</u> | C: <u>(3, -8)</u> | D: <u>(4, 0)</u> |
| (f) $f(1/2x)$ | ---- | A: <u>(-12, 4)</u> | B: <u>(-6, -4)</u> | C: <u>(6, -4)</u> | D: <u>(8, 0)</u> |

8) Describe the transformation(s) of $f(x)$ indicated by each of the following functions:

(a) $f(-x+3)$ factor out b!!
 reflect over y-axis shift right 3

(b) $-3f(x+1)$ reflect over x-axis vertical stretch by 3 shift left 1

(c) $f(-3(x+4))$ factor out b!!
 reflect over y-axis horizontal shrink by 1/3 shift left 4

(d) $\frac{1}{2}f(x) - 7$ vertical shrink by 1/2 reflect over x-axis shift down 7

9) Write an equation for each situation described below:

a) The squaring function is reflected over x-axis and translated up 3 & left 2.

$$y = x^2$$

$$f(x) = -(x+2)^2 + 3$$

b) The cubic function vertically stretched by 3 and reflected over the y-axis.

$$y = x^3$$

$$f(x) = 3(-x)^3 = -3x^3$$

c) The square root function is horizontally shrunk by a factor of $\frac{3}{4}$ & translated right 6 spaces

$$y = \sqrt{x}$$

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

or $\sqrt{\frac{4}{3}x - 8}$

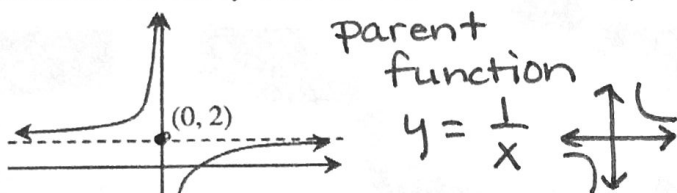
d) The reciprocal function is translated up 9 units and reflected over the y-axis.

$$y = \frac{1}{x}$$

$$f(x) = \frac{1}{(-x)} + 9 = -\frac{1}{x} + 9$$

10) Write an equation for each of the graphs below with the horizontal/vertical stretch/shrink indicated.

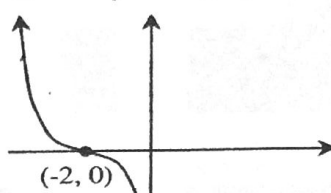
a) Horizontal stretch by a factor of 12



$$f(x) = -\frac{1}{\frac{1}{12}x} + 2 = -\frac{12}{x} + 2$$

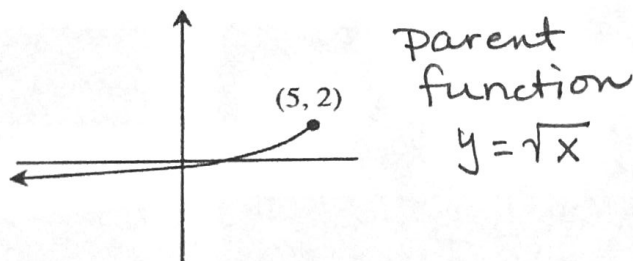
simplified

b) Vertical shrink by a factor of $\frac{3}{4}$



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

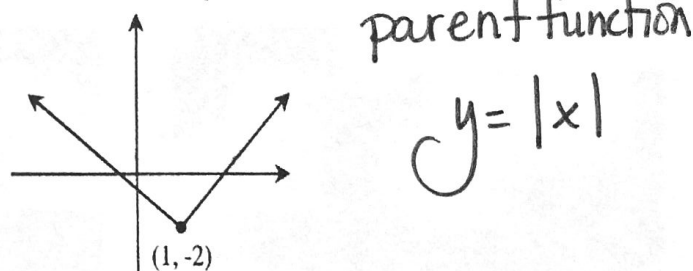
c) No horizontal or vertical shrink/stretch



$$f(x) = -\sqrt{-(x-5)} + 2$$

or

d) Vertical stretch by a factor of 4



$$f(x) = 4|x-1| - 2$$

$$f(x) = -\sqrt{-x+5} + 2$$