

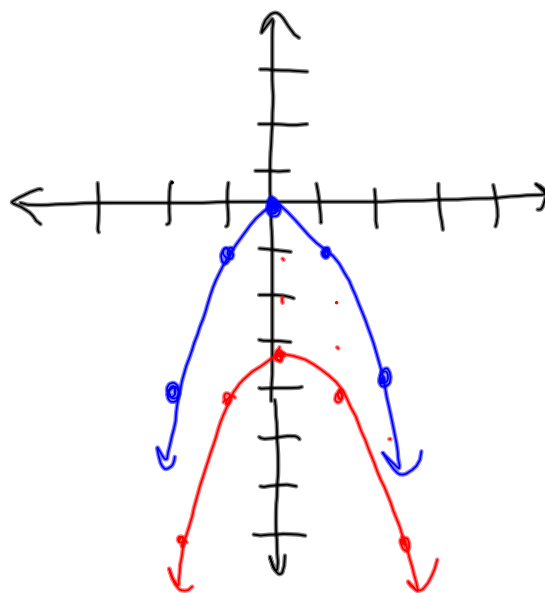
## Sec. 2.6 Families of Functions

parent function: the simplest form in a set of functions that form a family

Ex 1: How are  $y = x$  and  $y = x + 4$  and their graphs related?

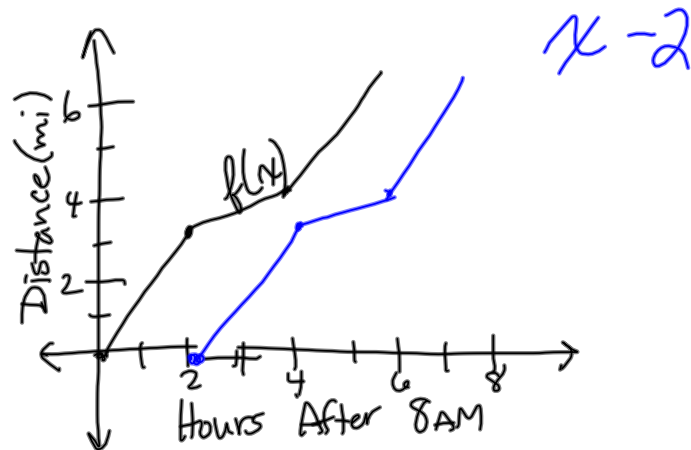
each output for  $y = x + 4$  is 4 more than the corresponding output for  $y = x$ ; the graph of  $y = x + 4$  is the graph of  $y = x$  translated up 4 units

Ex 1b: What is the graph of  $y = -x^2$  translated down 3 units



$x$	$y = -x^2$
-2	$-(-2)^2 = -4$
-1	$-(-1)^2 = -1 - 3$
0	$-(0)^2 = 0 - 3$
1	$-(1)^2 = -1 - 3$
2	$-(2)^2 = -4 - 3$

Ex 2: If you leave at 8 AM, the distance  $f(x)$  you hike is

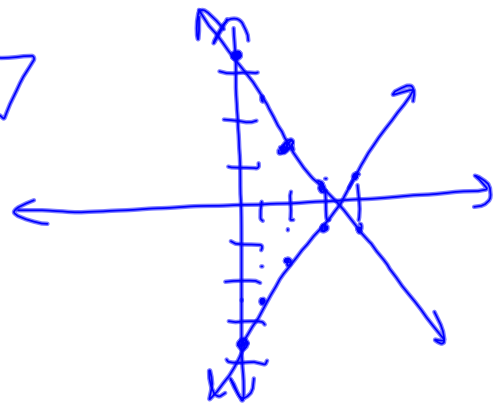


What function represents leaving at 10 AM?  
 $f(x-2)$

Ex 3: Let  $g(x)$  be the reflection of  $f(x) = 2x - 7$  in the  $x$ -axis. What is  $g(x)$ ?

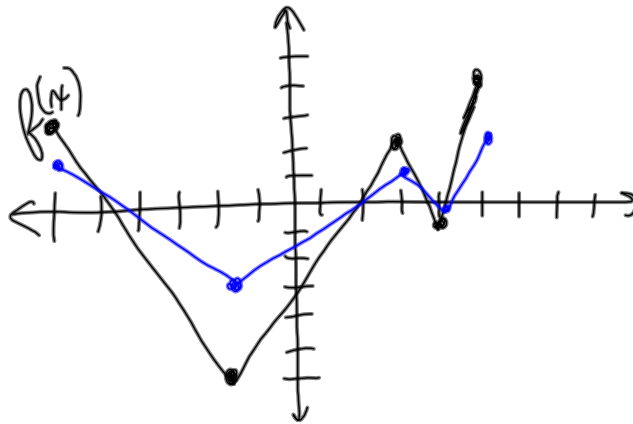
$$g(x) = -f(x) = -(2x - 7)$$

$$g(x) = -2x + 7$$



\* Reflection in the  $y$ -axis  $f(-x)$   
 $x$ -axis  $-f(x)$

Ex 4:  $f(x)$ : Graph  $h(x) = \underline{0.5} f(x)$



Ex 5:  $f(x) = 8x$

$g(x)$  {

- vertically compress by a factor of 0.5
- reflect in the  $x$ -axis

Find  $g(x)$ .

$$g(x) = -0.5(f(x)) = -0.5(8x)$$

$$g(x) = -4x$$

Ex 5b:  $f(x) = x^3$ ,  $g(x) = (\underline{x+4})^3 - 1$

What are the transformations?

$g(x)$  is  $f(x)$  translated 4 units left and 1 unit down