1. Write the equation of each function after the translation described.

   a. $f(x) = 2x$ after a translation 6 units to the right

   $$g(x) = f(x-6) = 2(x-6)$$

   b. $f(x) = -4^x$ after a translation 3 units up

   $$g(x) = f(x) + 3 = -4^x + 3$$

   c. $f(x) = 2x^2$ after a translation 5 units left

   $$g(x) = f(x+5) = 2(x+5)^2$$

   d. $f(x) = 3x$ after a translation 2 units down

   $$g(x) = f(x) - 2 = 3x - 2$$

   e. $f(x) = -6x^2$ after a reflection over the x-axis / horizontal line

   $$g(x) = -(-6x^2) = 6x^2$$

   f. $f(x) = 5^x$ after a reflection over the y-axis / vertical line

   $$g(x) = 5^{-x}$$

   g. $f(x) = -4x$ after a translation 6 units left

   $$g(x) = f(x+6) = -4(x+6)$$

2. Describe each graph in relation to its basic function.

   a. Compare $g(x) = b^x - 8$ to the basic function $f(x) = b^x$

   Vertical translation, down 8 units

   b. Compare $g(x) = b^{-x}$ to the basic function $f(x) = b^x$

   Reflection over the y-axis / Horizontal reflection

   c. Compare $g(x) = (x+1)$ to the basic function $f(x) = x$

   Horizontal translation, left 1 unit

   d. Compare $g(x) = -6x^2$ to the basic function $f(x) = 6x^2$

   Reflection over the x-axis / Vertical reflection

   e. Compare $g(x) = (x-1)^2$ to the basic function $f(x) = x^2$
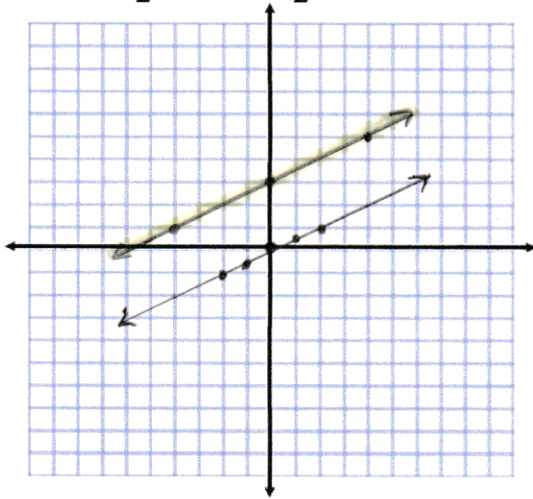
   Horizontal translation, right 1 unit

   f. Compare $g(x) = b^{(x+8)}$ to the basic function $f(x) = b^x$

   Horizontal translation, left 8 units

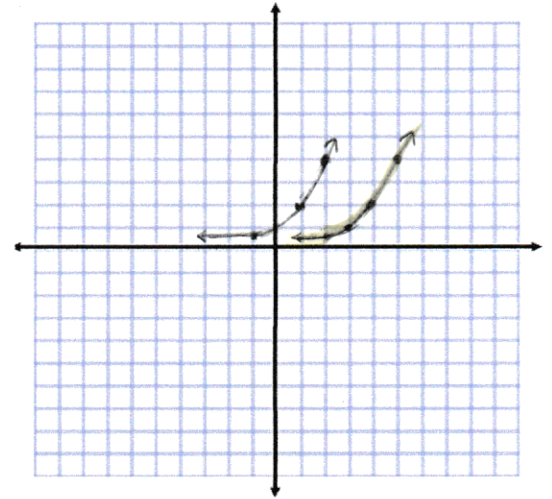3. Graph each function. Then graph the transformation.

a. $f(x) = \frac{1}{2}x$; $g(x) = \frac{1}{2}x + 3$ VT ↑ 3

x	y
-2	-1
-1	$-\frac{1}{2}$
0	0
1	$\frac{1}{2}$
2	1

b. $f(x) = 2^x$; $g(x) = 2^{(x-3)}$ HT → 3

x	y
-1	$\frac{1}{2}$
0	1
1	2
2	4
asym	y=0

c. $f(x) = 2x$; $g(x) = -2x$ VR

x	y
-2	-4
-1	-2
0	0
1	2
2	4
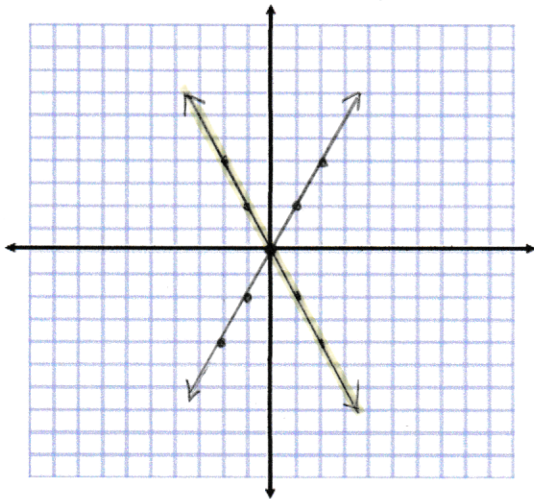
d. $f(x) = \left(\frac{1}{2}\right)^x$; $g(x) = \left(\frac{1}{2}\right)^x - 3$ VT ↓ 3

x	y
--3	8
-2	4
-1	2
0	1
1	$\frac{1}{2}$
asym	y=0
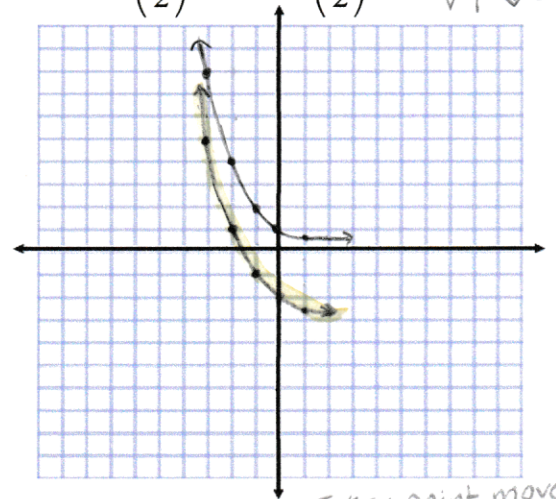
e. $f(x) = 3^x$; $g(x) = 3^{-x}$ HR

x	y
-1	$\frac{1}{3}$
0	1
1	3
2	9
asym	y=0
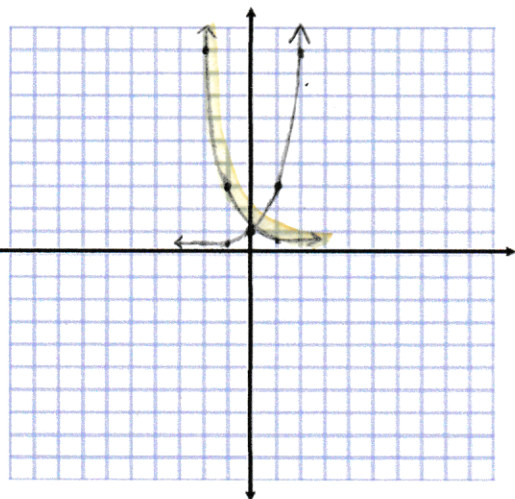
f. Bonus ☺ $f(x) = x^2$;

$g(x) = (x+1)^2 + 3$ HT ← 1
VT ↑ 3

Every point moves up 3 units and left 1 unit.

x	y
-2	4
-1	1
0	0
1	1
2	4