Geometry   Name_____

Module 7.6   period   1   2   3   5   6
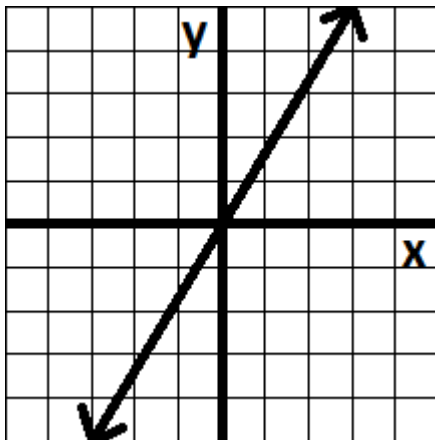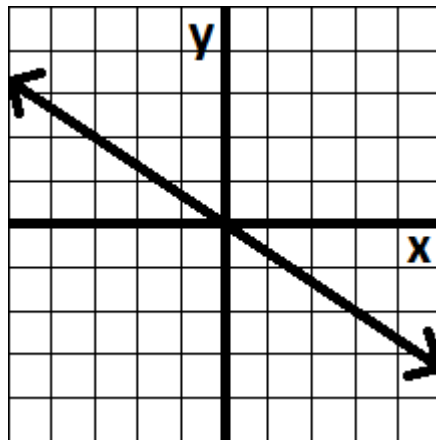
Shifty Functions: We will use the TI-84 graphing calculator to examine transformations of functions.
Write the equation for the graph of f(x) shown on the coordinate grid. Graph f(x) on the TI-84. Also graph g(x) and
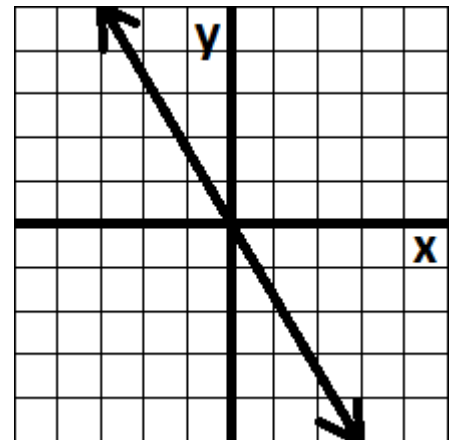h(x) using function notation on the TI-84.   Describe in words g(x) and h(x) as transformations of f(x).

1. f(x) = _____   2. f(x) = _____   3. f(x) = _____
    g(x) = f(x) + 2   g(x) = f(x) − 3   g(x) = f(x) − 1
        describe: describe: describe:
    h(x) = f(x + 4)   h(x) = f(x − 3)   h(x) = f(x − 4)
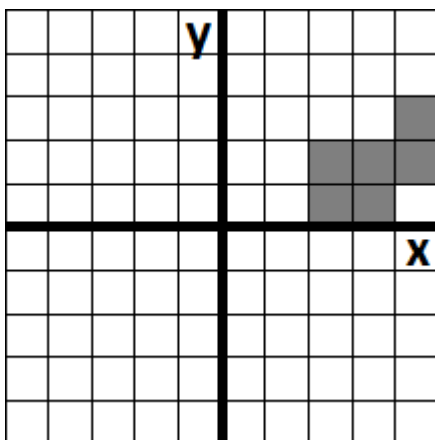   describe: describe: describe:

Shifty Shapes: Use the vertical and horizontal shifting ideas from above to graph and describe the transformations
of the shape below.

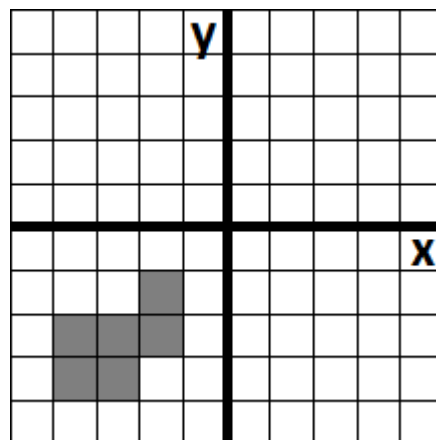Let's call the shape below…   Shape(X) which we say and read as "Shape of X"

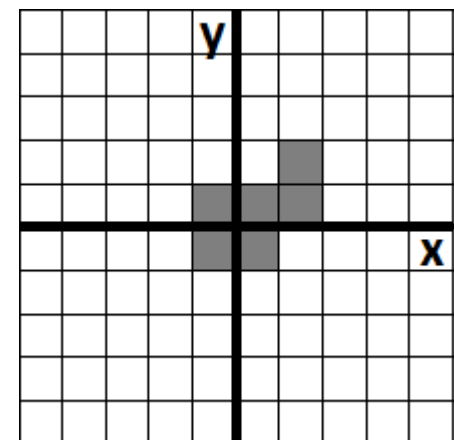4. Graph: **Shape(X) − 5**   5. Graph: **Shape(X) +6**   6. Graph: **Shape(X) − 4**
Describe: Describe: Describe:

Graph: **Shape(X+5)**   Graph: **Shape(X − 6)**   Graph: **Shape(X + 4)**
Describe: Describe: Describe:
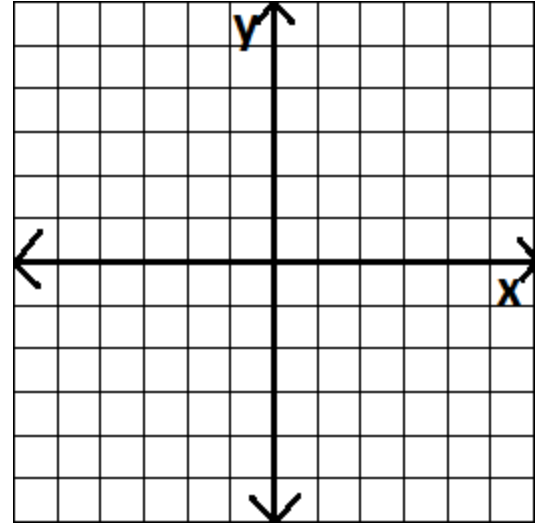
Shifting Functions using Tables:
- Re-write g(x) and h(x) in terms of x, rather than f(x) as given.
- Complete the table of values f(x), g(x) and h(x) for the given x-values.
- Graph all three functions on the same coordinate grid.
- Describe how g(x) values and h(x) values are transformed from f(x) values.

7.

$$f(x) = \frac{1}{2}x, \qquad g(x) = f(x) + 3, \qquad h(x) = f(x - 3)$$

$$g(x) = \underline{\hspace{2cm}} \qquad h(x) = \underline{\hspace{2cm}}$$

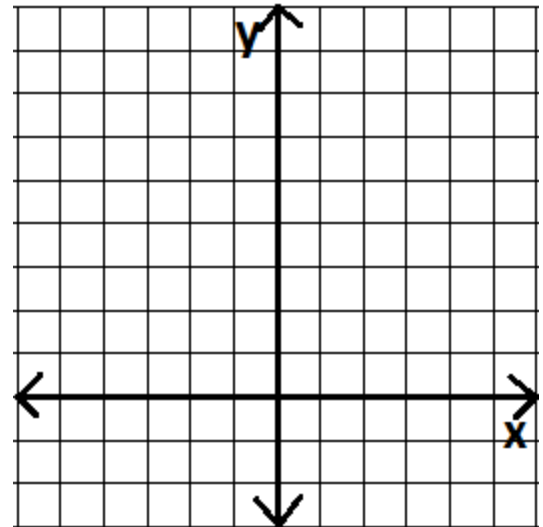| x	-3	-2	-1	0	1	2	3	4
$f(x)$								
$g(x)$								
$h(x)$								

Describe g(x) as a translation of f(x):

Describe h(x) as a translation of f(x):

8. Remember order of operations when completing the table.

$$f(x) = x^2, \qquad g(x) = f(x) - 3, \qquad h(x) = f(x + 3)$$

$$g(x) = \underline{\hspace{2cm}} \qquad h(x) = \underline{\hspace{2cm}}$$

x	-3	-2	-1	0	1	2	3	4
$f(x)$								
$g(x)$								
$h(x)$								

Describe g(x) as a translation of f(x):

Describe h(x) as a translation of f(x):

9. **Matching:** Fill in the Description Letter and the Transformation Letter in the column to match the $p(x)$ image function equation in the left-hand column.

The **Pre-Image Functions** are listed here:

$$f(x)=x \qquad g(x)=-x \qquad h(x)=\frac{1}{2}x \qquad j(x)=-2x \qquad k(x)=3x \qquad m(x)=-\frac{1}{3}x$$

Image Functions	Descr LETTER	Trans LETTER	Description	Transformation Equation
1 $p(x)=x+5$			**A** Translate g(x) left 7 units	**K** $p(x)=k(x-5)$
2 $p(x)=\frac{1}{2}x-7$			**B** Translate j(x) left 3 units & down 4 units	**L** $p(x)=m(x-4)+3$
3 $p(x)=3(x-5)$			**C** Translate k(x) right 5 units	**M** $p(x)=j(x+3)-4$
4 $p(x)=-(x+7)$			**D** Translate h(x) right 5 units & down 7 units	**N** $p(x)=h(x)-7$
5 $p(x)=-2(x+3)-4$			**E** Translate m(x) right 4 units & up 3 units	**P** $p(x)=h(x-5)-7$
6 $p(x)=-\frac{1}{3}(x-4)+3$			**F** Translate h(x) down 7 units	**Q** $p(x)=f(x)+5$
7 $p(x)=\frac{1}{2}(x-5)-7$			**G** Translate f(x) up 5 units	**R** $p(x)=g(x+7)$

10. **Communicate Your Understanding:**

If $f(x)=g(x)+k$, describe the transformation to g(x) that produces f(x) when

    …the k-value is positive: …the k-value is negative:

If $f(x)=g(x-h)$, describe the transformation to g(x) that produces f(x) when

    …the h-value is positive: …the h-value is negative:

If $f(x)=g(x-h)+k$, describe the transformation to g(x) that produces f(x) when

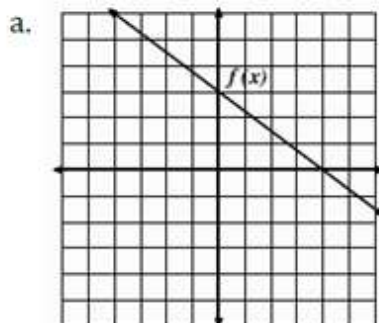   …the h-value and k-value are positive: …the h-value and k-value are negative:

Topic: Vertical translations of linear equations

The graph of $f(x)$ and the translation form equation of $g(x)$ are given. Graph $g(x)$ on the same grid and write the slope-intercept equation of $f(x)$ and $g(x)$.
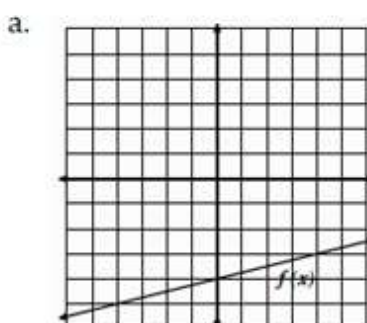
11. $g(x) = f(x) - 5$

a.

b. $f(x) =$ _____
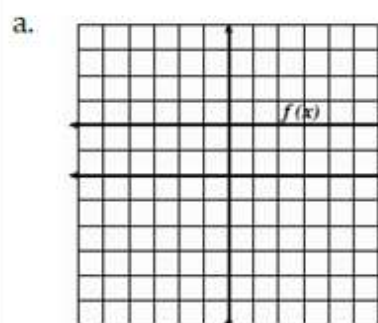
c. $g(x) =$ _____
   Slope-Intercept form

12 $g(x) = f(x) + 4$

a.

b. $f(x) =$ _____

c. $g(x) =$ _____
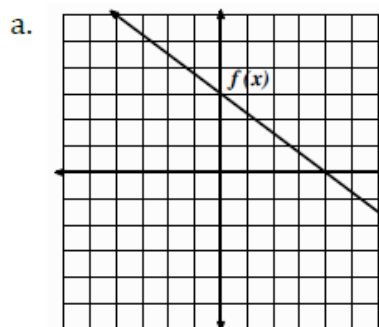   Slope-Intercept form

13. $g(x) = f(x) - 6$

a.

b. $f(x) =$ _____

c. $g(x) =$ _____
   Slope-Intercept form

Topic: Horizontal translations of linear equations

The graph of $f(x)$ and the translation form equation of $g(x)$ are given. Graph $g(x)$ on the same grid and write the slope-intercept equation of $f(x)$ and $g(x)$.
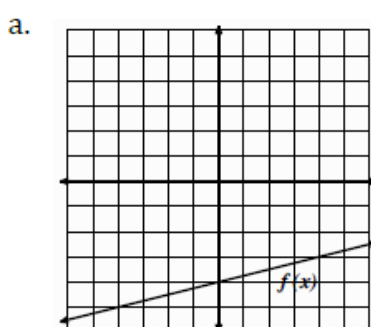
14. $g(x) = f(x+6)$

a.

b. $f(x) =$ _____

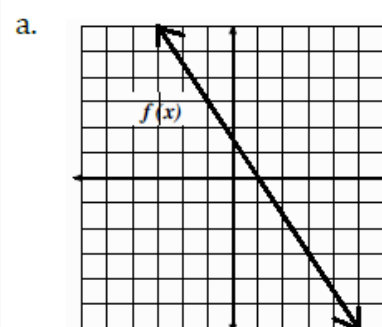c. $g(x) =$ _____
   Slope-Intercept form

15. $g(x) = f(x+5)$

a.

b. $f(x) =$ _____

c. $g(x) =$ _____
   Slope-Intercept form

16. $g(x) = f(x-4)$

a.

b. $f(x) =$ _____

c. $g(x) =$ _____
   Slope-Intercept form