2-6 Worksheet   Per: Name:

Families of Functions   Honors Algebra 3-4

Make a table of values for $f(x)$ after the given translation. Fill in the translation of the function.

1. 4 units down

x	f(x)	f(x)-4
−2	−7	−11
0	−5	−9
3	−2	−6
5	0	−4
6	1	−3

2. 3 units up

x	f(x)	f(x)+3
−2	2	5
−1	3	6
0	4	7
1	5	8
3	7	10

3. 1 unit down

x	f(x)	f(x)-1
−1	1	0
1	3	2
3	5	4
5	7	6
7	9	8

Write an equation for each translation of $y = f(x)$.

4. $\frac{1}{4}$ unit down $y = f(x) - \frac{1}{4}$

5 units up $y = f(x) + 5$

5. $\frac{3}{2}$ unit left $y = f(x + \frac{3}{2})$
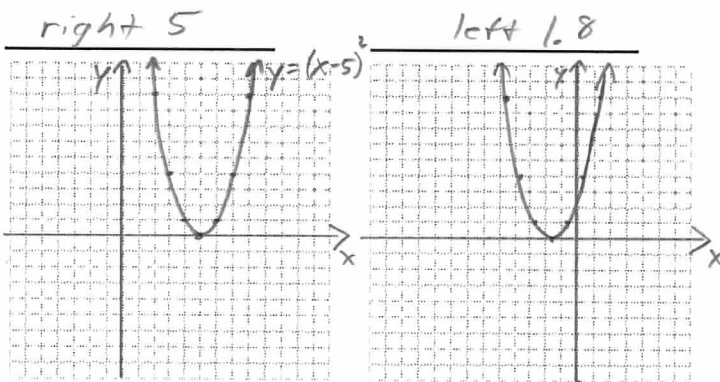
7 units right $y = f(x - 7)$

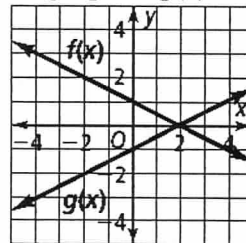**For each function, identify the horizontal translation of the parent function $f(x) = x^2$. Then graph the function.**
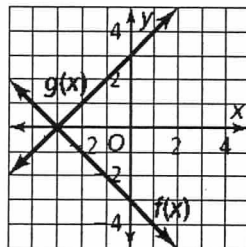
6. $y = (x - 5)^2$ right 5

7. $y = (x + 1.8)^2$ left 1.8

Write the equations for $f(x)$ and $g(x)$. Then identify the reflection that transforms the graph of $f(x)$ to the graph of $g(x)$.

8. $f(x) = -\frac{1}{2}x + 1$
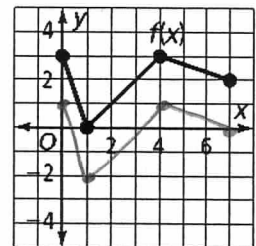
$g(x) = \frac{1}{2}x - 1$

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

9. $f(x) = x + 3$

$g(x) = -x - 3$

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

10. The graph of the function $f(x)$ is shown at the right.
   a. Make a table of values for $f(x)$ and $f(x) - 2$.
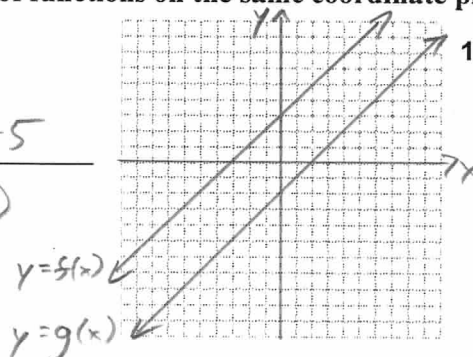   **b.** Graph $f(x) - 2$ on the same coordinate grid as $f(x)$.

x	f(x)	f(x)-2
0	3	1
1	0	−2
4	3	1
7	2	0

Graph each pair of functions on the same coordinate plane. Describe a transformation that changes $f(x)$ to $g(x)$.
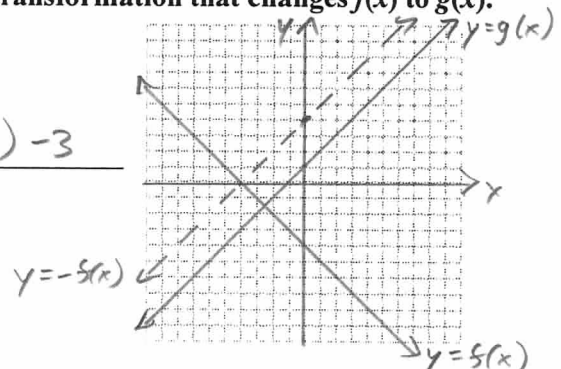
11. $f(x) = x + 3$
   $g(x) = x - 2$

$g(x) = $ $f(x) - 5$
or $f(x-5)$

12. $f(x) = -x - 4$
   $g(x) = x + 1$

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

2-6 Worksheet   Per: Name:

Families of Functions   Honors Algebra 3-4

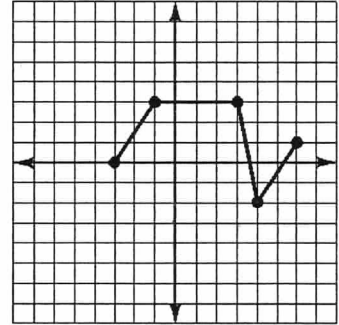**Describe the compound transformations of $f(x)$ that produce $g(x)$.**

13. $f(x) = 4x; g(x) = \dfrac{x}{2} - 1$ ___ $g(x) = \frac{1}{8}f(x) - 1$ $f(x)$ has a vertical compression by $\frac{1}{8}$ then is translated down 1.

14. $f(x) = 5x; g(x) = -2(5x - 1)$ ___ $g(x) = -2f(x-1)$ $f(x)$ is translated right 1, flipped vertically and stretched vertically by 2.

Transformations of a Graph

You can identify translations, reflections, vertical stretches, and compressions from an algebraic equation. You can apply transformations to a graph even when it is not easy to write an equation for the graph.

The graph at the right represents the function **y = f (x)**. Describe what effect each change to the equation will have on the graph of f (x).

15. $y = 2f(x)$ ___ vertical stretch by a factor of 2

16. $y = f(x) - 1$ ___ vertical translation down 1

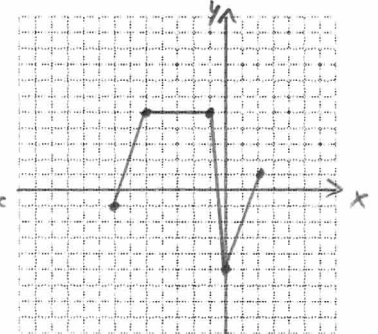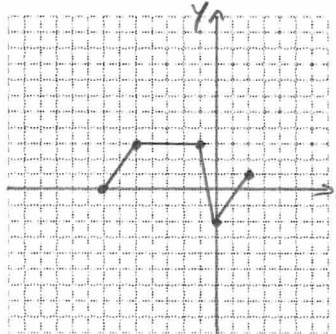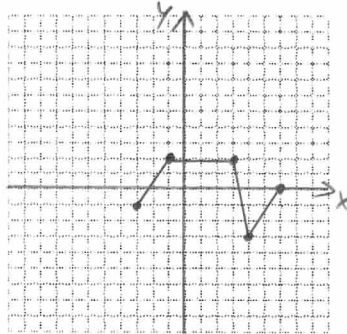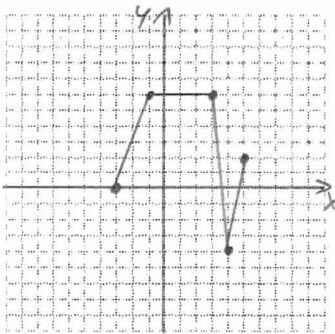**17.** $y = f(x+4)$ ___ horizontal translation left 4

For problems 18-20, draw new graphs by applying each transformation. Apply the transformation to the endpoints and corner points first, and then connect the new points to form the new graph. Then, for problem 21, make a new graph when all three transformations are applied together.

18. $y = 2f(x)$ V.str. ×2   **19.** $y = f(x) - 1$ down 1   **20.** $y = f(x+4)$ left 4   **21.** $y = 2f(x+4) - 1$ ②①③

Use the graph of $y = f(x)$ above. Make new graphs by applying the transformations.

22. $y = f(x-2)$ right 2   **23.** $y = -2f(x) + 1$ ②v.refl. ⓪v.str. ③up 1   **24.** $y = f(x+3) - 4$ ①left 3 ②down 4