

Name: _____

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Math 12P: HW Section 1.3 Horizontal and Vertical Reflections

1. When you reflect a function horizontally, which axis is it reflected over? The X axis or Y axis? Explain
2. When you reflect a function vertically, which axis is it reflected over? The X axis or Y axis? Explain
3. When a function is reflected horizontally, which coordinate is affected? The X or Y coordinate? Explain
4. When a function is reflected vertically, which coordinate is affected? The X or Y coordinate? Explain
5. Indicate whether if the following is a vertical, horizontal reflection, both, or either. Explain:

i) $y = x^2 \rightarrow y = -x^2$

ii) $y = \sqrt{x} \rightarrow y = \sqrt{-x}$

iii) $y = mx + b \rightarrow y = -mx - b$

iv) $y = \frac{1}{x} \rightarrow y = -\frac{1}{x}$

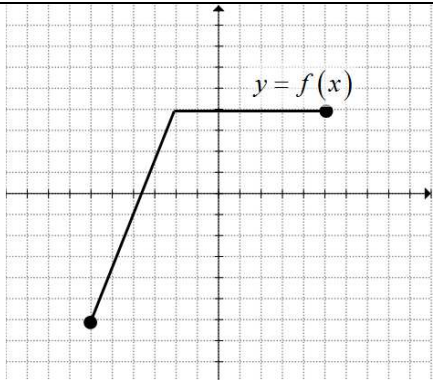
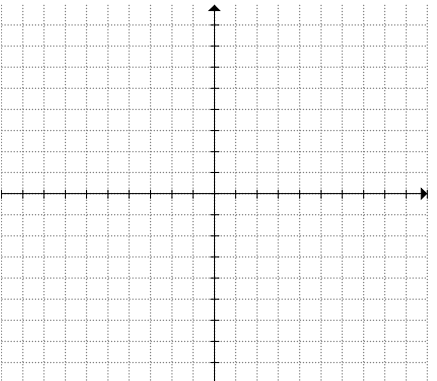
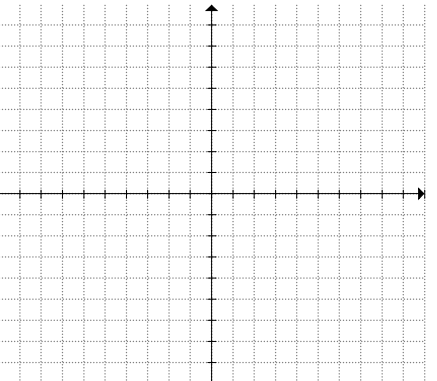
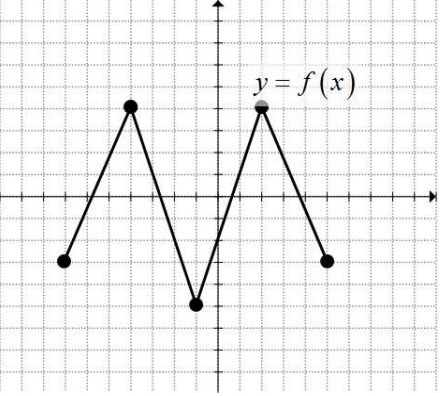
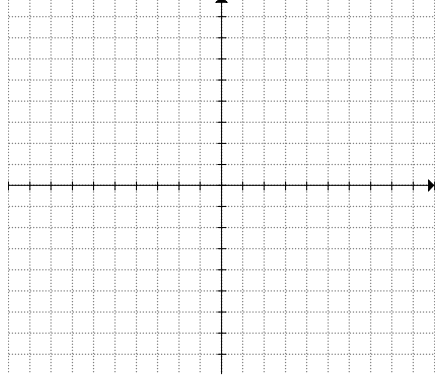
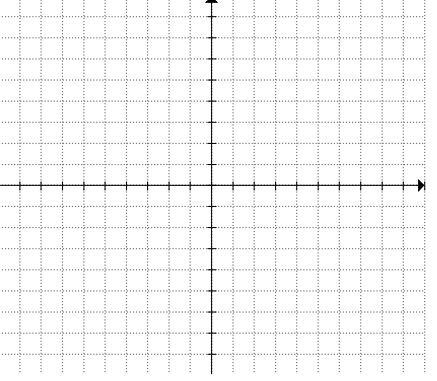
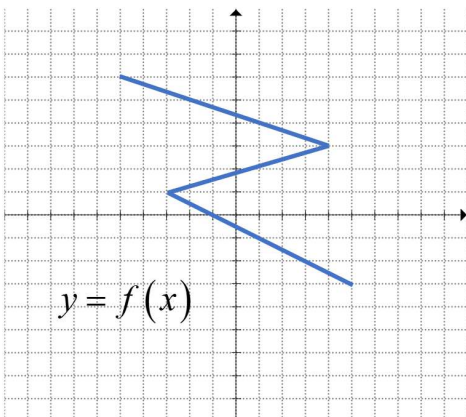
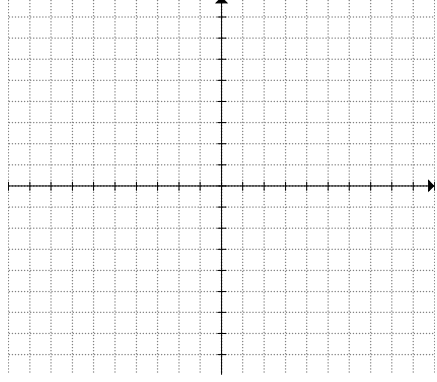
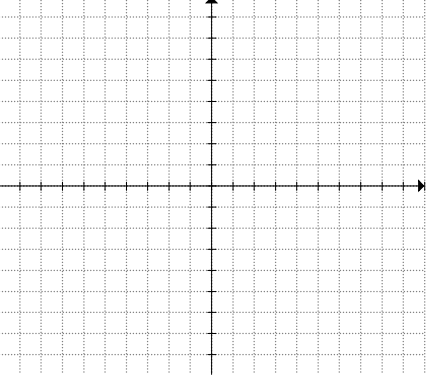
v) $y = x^3 + 2 \rightarrow y = -x^3 + 2$

vi) $y = (x-3)^2 + 4 \rightarrow y = -(x-3)^2 - 4$

vii) $y = (x-2)^2 - 5 \rightarrow y = (x+2)^2 - 5$

viii) $y = |x+2| \rightarrow y = -|x-2|$

6. Given the graph of $y = f(x)$, draw the resulting image after each transformation:

	i) $y = -f(x)$ 	ii) $y = f(-x)$ 
	i) $y = -f(x) + 3$ 	ii) $y = f(-x)$ 
	i) $y = -f(x)$ 	ii) $y = -f(-x)$ 

7. The following transformations from the function on the left to the function on the right involve translations and reflections. List the transformations in order:

a) $y = |x| \rightarrow y = -|x - 2|$

b) $y = \sqrt{x} \rightarrow y = \sqrt{3-x} - 7$

c) $y = 3x + 2 \rightarrow y = -3x - 2$

d) $y = x^2 \rightarrow y = -x^2 - 2x - 4$

e) $y = 2^{3x+1} \rightarrow x = 2^{3y+1}$

f) $y = \frac{1}{x} \rightarrow y = \frac{-1}{-x+5}$

8. Given the following transformation, $y = f(x) \rightarrow y = f(-x)$, which equation below will remain the same?

i) $y = x^2$ ii) $y = x^3 + 2x^2$ iii) $y = \sqrt{x^2}$ iv) $y = \frac{1}{2x+3}$ vi) $y = \left| 3(2^x) \right|$

9. Given each equation for $y = f(x)$, indicate the new equation after the transformations in the order stated:

a) $f(x) = 2x + 3$	1. A horizontal reflection over the Y-axis 2. A shift of 3 units right 3. A shift of 2 units up
b) $f(x) = \frac{2}{3}(x-1)^2 + 1$	1. A vertical reflection over the X-axis 2. A shift of 2 units left 3. A shift of 6 units down
c) $f(x) = \sqrt{x+2} - 3$	1. A reflection over the Y=x line 2. A shift of 4 units left 3. A shift of 6 units up
d) $f(x) = 5^x - 1$	1. A reflection in both the "x" and "y" axis 2. A shift of 3 units right 3. A shift of 11 units down
e) $x^2 + y^2 = 9$	1. A shift of 3 units right 2. A shift of 2 units up 3. A reflection over the "y" axis,
f) $y = \frac{1}{x+2} - 3$	1. A shift of 2 units left, 2. A shift of 6 units down 3. A reflection in the line $y = x$,
g) $y = x^4 + x^3 - 2x + 1$	1. A reflection in the line $y = x$ 2. A shift of 6 units down

h) $y = \left \frac{1}{x-1} \right + 3$	1. A reflection in the "y" axis 2. A shift of 4 units right 3. A shift of 11 units up 4. A reflection over the x-axis.
i) $y = x^3 - 3x$	1. A horizontal reflection over the Y-axis 2. Then an inverse reflection over the line $y = x$

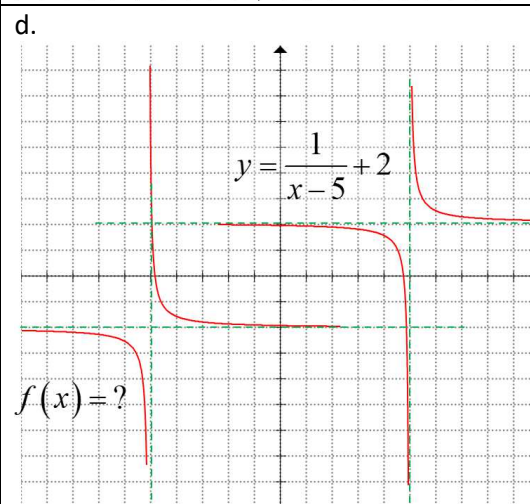
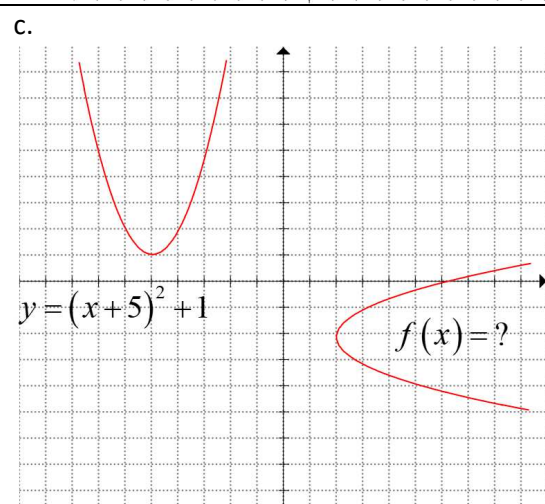
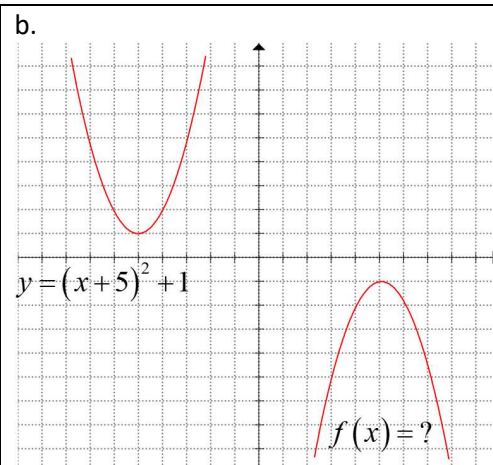
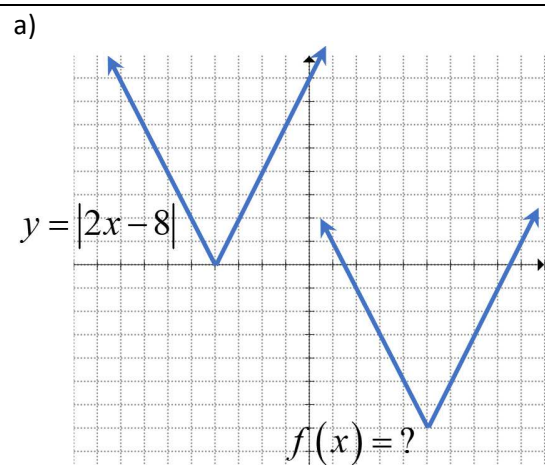
10. Given that the coordinates (a,b) are on the function $y = f(x)$. Indicate what this coordinate will become when $y=f(x)$ is transformed to each of the functions below:

a) $y = f(-x)$	b) $y = -f(x)$
c) $y = -f(x) + 2$	d) $y = -f(-x) + 2$
e) $y = -f(x+4) - 7$	f) $y = f(-(x-5))$
g) $y = -f(-x+7)$	h) $y = f(-(x+9))$

i) $-y = f(-x + 3)$

j) $11 + y = f(-x + 1) + 2$

11. Given the graph of $y = f(x)$ and the graph after transformation, what is the equation of the new graph?



12. Given that $f(x) = 2^x$ and $f_2(x) = 0.5^x$. What are all the transformation required for $f(x)$ to become $f_2(x)$?

13. Given that $f(x) = \sqrt{x}$ and $f_2(x) = -\sqrt{-x+3} + 4$. What are all the transformation required for $f(x)$ to become $f_2(x)$? List them in order.

14. If the function $f(x) = x^2 + 8x + 16$ is shifted 4 units up, 3 right, and reflected over the x-axis, the equation is now: $f(x) = a(x+b)^2 + c$, what is the value of $a+b+c$?