Name:_____ Date:_____

Math 12 Honours: HW Section 2.3 Horizontal, Vertical, and Inverse Reflections

1. Indicate the transformation from the function on the left to the function on the right:

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

2. Given each equation for $y=f(x)$, indicate the new equation after each transformation 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,

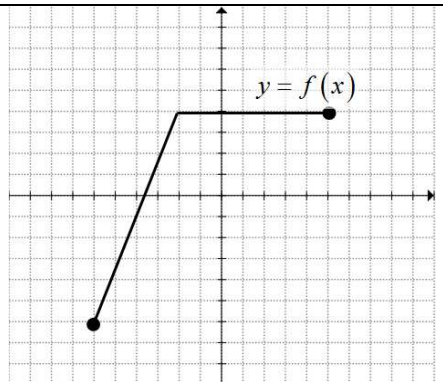
f) $y=\frac{1}{x+2}-3$	1. A shift of 2 units left, 2. A shift of 6 units down 3. A reflection in the line $y=x$,
g) $y=x^4+x^3-2x+1$	1. A reflection in the line $y=x$ 2. A shift of 6 units down
h) $y=\left\|\frac{1}{x-1}\right\|+3$	1. A reflection in the "y" axis 2. A shift of 4 units right 3.A shift 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 $y=x$

3. Given that the coordinates (a,b) are on the function $y=f(x)$, find the new coordinates for each function after the transformation:

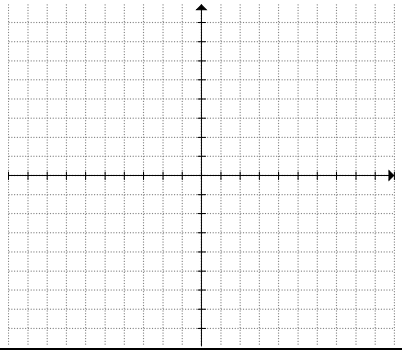
a) $y=f(-x)$	b) $y=f(-x+3)$
c) $y=-f(x+2)$	d) $y=f(-x)+2$
e) $y=-f(-x)+3$	f) $-x+1=f(2-y)$

g) $y=-f\left(-x+7\right)-5$	h) $4-x=f\left(3-y\right)$
i) $-y=f\left(-x+3\right)-2$	j) $11+x=f\left(-y+1\right)+2$
k) $y=f^{-1}\left(x\right)+2$	L) $y-2=\left\|f\left(x+1\right)\right\|$

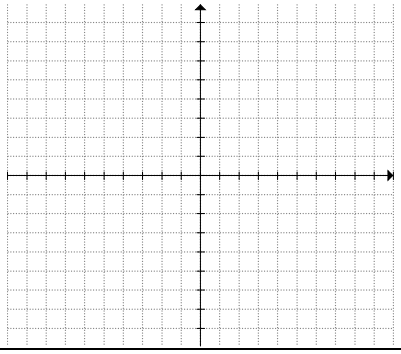
4. Given the graph of $y=f\left(x\right)$, draw the resulting image after each transformation:

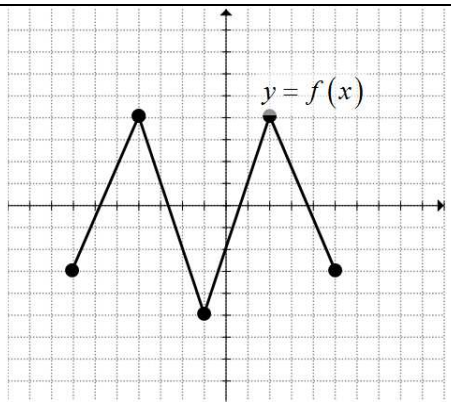


i) $y=-f\left(-x\right)$

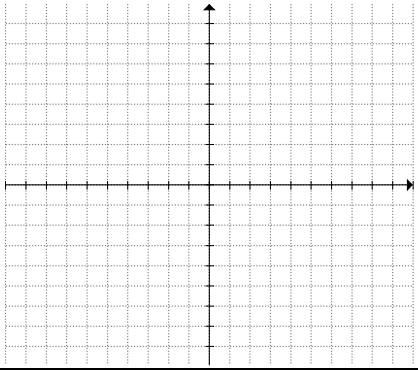


ii) $x=f\left(y\right)$

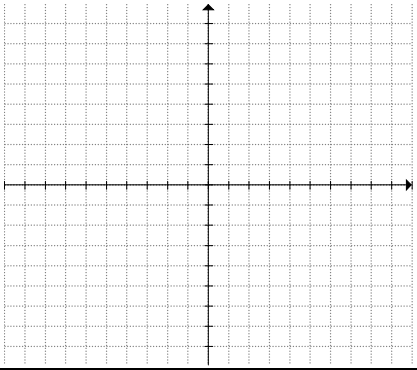


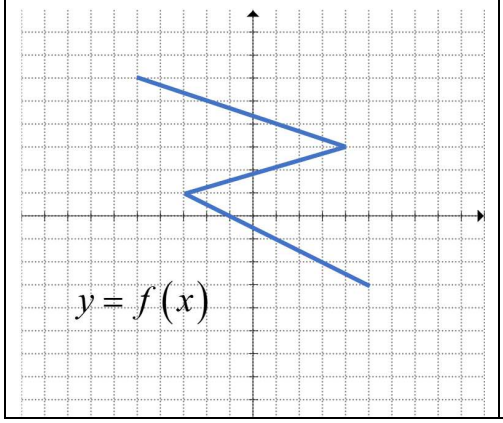


i) $y=-f\left(x\right)+3$

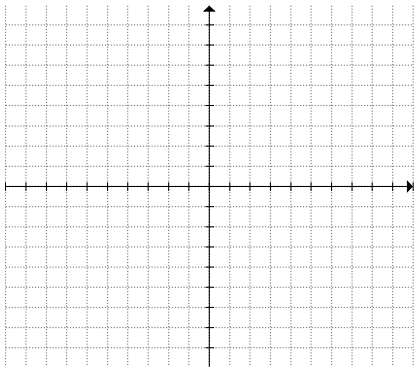


ii) $x=-f\left(y\right)$

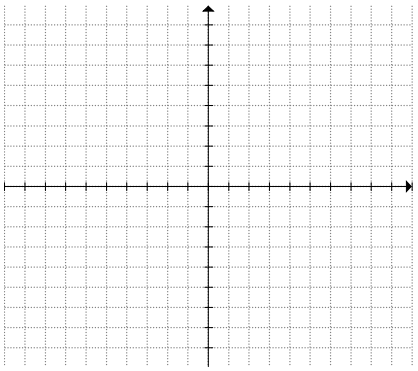




i) $y = -f(x) + 3$

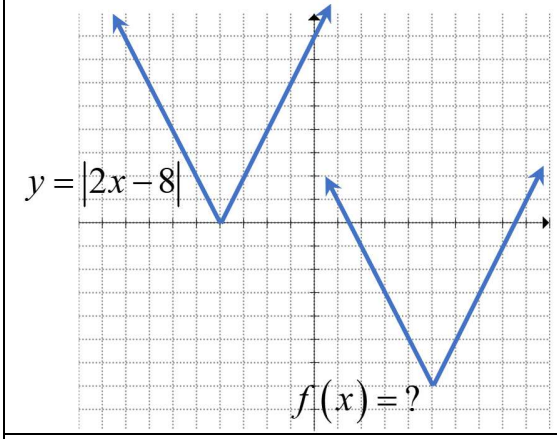


ii) $x = -f(y)$

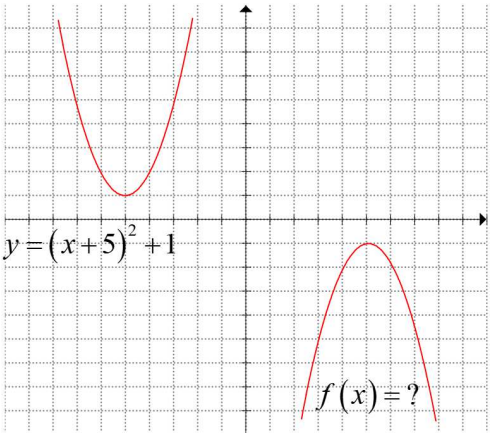


5. Given the graph of $y = f(x)$ and the graph after transformation, what is the equation of the new graph?

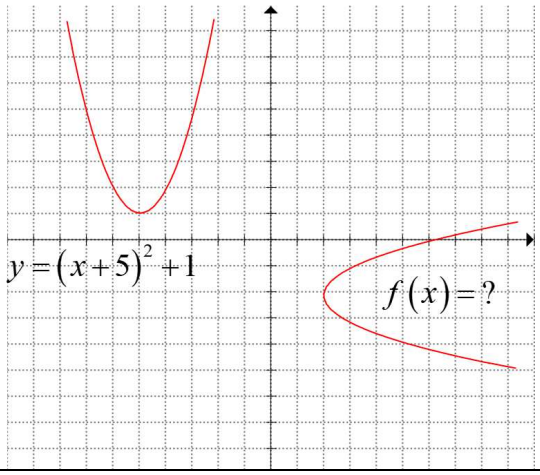
a)



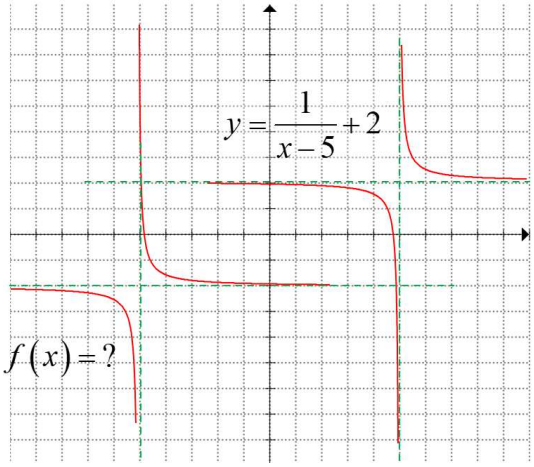
b.



c.



d.



6. 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) $y = \left|3\left(2^x\right)\right|$

7. Given that $y = x^3 - 2x^2 + 3x + 4$, what is the equation of the resulting graph after an inverse reflection over the line $y = x$?

8. The domain and range of $y = f(x)$ is $D: x > 7$ and $R: -4 < y < 10$. What is the domain and range of

   i) $y = f(-x)$ ii) $y = -f(x)$ iii) $y = -f(-x)$ iv) $x = f(y)$

9. Given that $f(x) = 3x + 2$ and $f_2(x) = -3x + 2$. What are all the transformation required for $f(x)$ to become $f_2(x)$?

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

11. 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.

12. 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 $a + b + c$?

13. Given that $f(x)=\frac{1}{x}+2$ and $f_2(x)=-\frac{1}{x+3}+4$. What are all the transformation required for $f(x)$ to become $f_2(x)$? List them in order.

14. Given that $f(x)=3x+2$ and $f_2(y)=-\frac{1}{3y+3}+2$. What are all the transformation required for $f(x)$ to become $f_2(y)$? List them in order.

15. If $f(x)=\frac{4x+1}{3}$, what is the value of $\left(f^{-1}(1)\right)^{-1}$?

16. If the domain and range of $f(x)$ is $-2\le x\le 7,\ 4\le y<11,\ and\ y>11$, what is the domain and range of $y=-f(-x+4)-3$?

17. A parabola with equation $y=ax^2+bx+c$ and vertex (h,k) is reflected about the line $y=k$. This results in the parabola with equation $y=dx^2+cx+f$. Which of the following equals $a+b+c+d+e+f$? Amc 12-2001

a) 2b b) 2c c) 2a+2b d) 2h e)2k

18. What are all ordered pairs of numbers (x,y) which satisfy: CNML v2 4-6
$x^2-xy+y^2=13$ and $x-xy+y=-5$?