1. Which of the following represents the equation of $y = f(x)$ after it has been shifted 2 units to the right and 1 unit down?

A) $y = f(x-2)-1$ B) $y = f(x-2)+1$

C) $y = f(x+2)+1$ D) $y = f(x+2)-1$

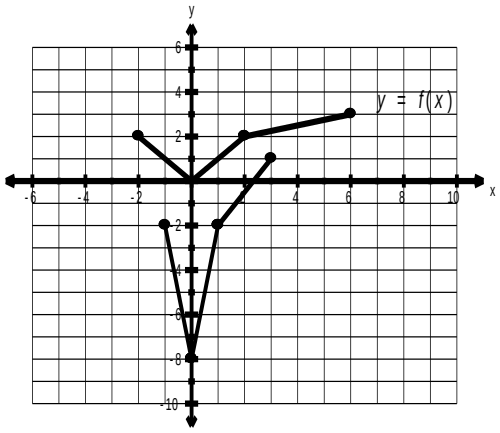
2. The graph of $y = f(x)$ has been reflected across the y-axis and stretched vertically by a factor of $\frac{1}{2}$. Which of the equations would describe the new graph?

A) $y = -f(2x)$ B) $y = 2f(-x)$ C) $y = -\frac{1}{2}f(x)$ D) $y = \frac{1}{2}f(-x)$

3. The graph of $y = f(x)$ has a domain of $-2 \le x \le 6$ and a range of $0 \le y \le 10$. Which of the following would best describe the domain and range for $y = -f(2x)+1$?

A) $D: -2 \le x \le 6$, $R: -9 \le y \le 1$ B) $D: -6 \le x \le 2$, $R: 1 \le y \le 11$ C) $D: -1 \le x \le 3$, $R: -9 \le y \le 1$ D) $D: -3 \le x \le 1$, $R: 1 \le y \le 11$

4. Which equation best describes the transformations that have been applied to $y = f(x)$ as shown in the graph?




A) $y = 3f\left(\frac{1}{2}x\right) - 8$

B) $y = 3f(2x) - 8$

C) $y = \frac{1}{3}f(2x) + 8$

D) $y = \frac{1}{3}f\left(\frac{1}{2}x\right) + 8$

5. The graph of a function has a point with coordinates $(a, -b)$. If the graph has been reflected about the x-axis, horizontally stretched about the y-axis by a factor of 2 and translated 5 units down, what would the coordinates of the image point be?

A) $(a, 2b-5)$ B) $(2a, b-5)$ C) $(-2a, b-5)$ D) $(-a, 2b-5)$

6. Given the point (0,5) is on a graph. For which of the following transformations would it remain an invariant point?

A) reflection in the x-axis, vertical stretch
B) reflection in the y-axis, horizontal stretch
C) horizontal translation
D) vertical translation

7. What is the mapping rule for $y=-f\left(\frac{2}{3}x+4\right)-3$?

A) $(x,y)\to\left(\frac{2}{3}x-4,-y+3\right)$

B) $(x,y)\to\left(\frac{3}{2}x-4,-y+3\right)$

C) $(x,y)\to\left(\frac{2}{3}x+6,-y-3\right)$

D) $(x,y)\to\left(\frac{3}{2}x-6,-y-3\right)$

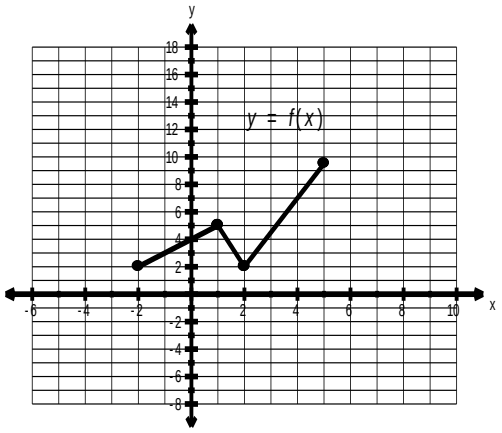
8. For the graph of $y=f(x)$ shown, which of the following statements is not true?

A) $(0,4)$ will be an invariant point for $y=f(-x)$

B) $(2,2)$ will be an invariant point for $y=f^{-1}(x)$

C) $(0,4)$ will be an invariant point for $y=-f(x)$

D) There are no invariant points for $y=-f(x)$



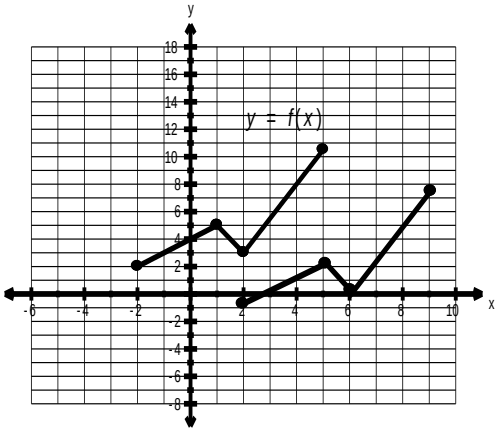

9. What is the equation for the image graph of $y=f(x)$ as shown?

A) $y=f(x-4)+3$

B) $y=f(x+4)+3$

C) $y=f(x+4)-3$

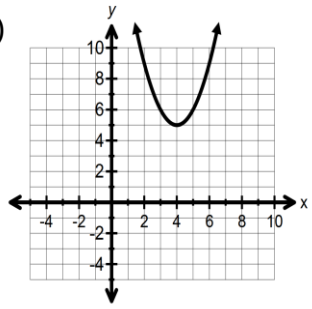
D) $y=f(x-4)-3$

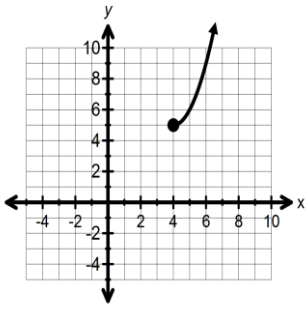


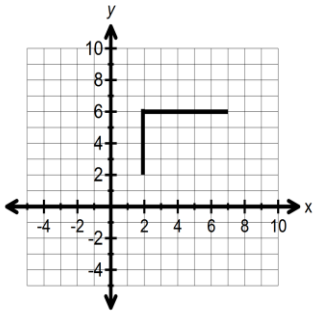
10. If a function has a point with coordinates $(a,-b)$ , what are the coordinates of a point on the graph of $y=f^{-1}(x)$?

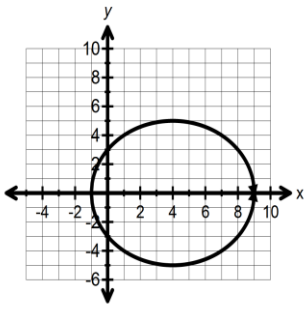
A) $(a,-b)$ B) $(b,-a)$ C) $(-b,a)$ D) $(-a,b)$

11. Which of the graphs shown is the graph of a function which will have an inverse that is a function?

A) 


B) 


C) 


D) 

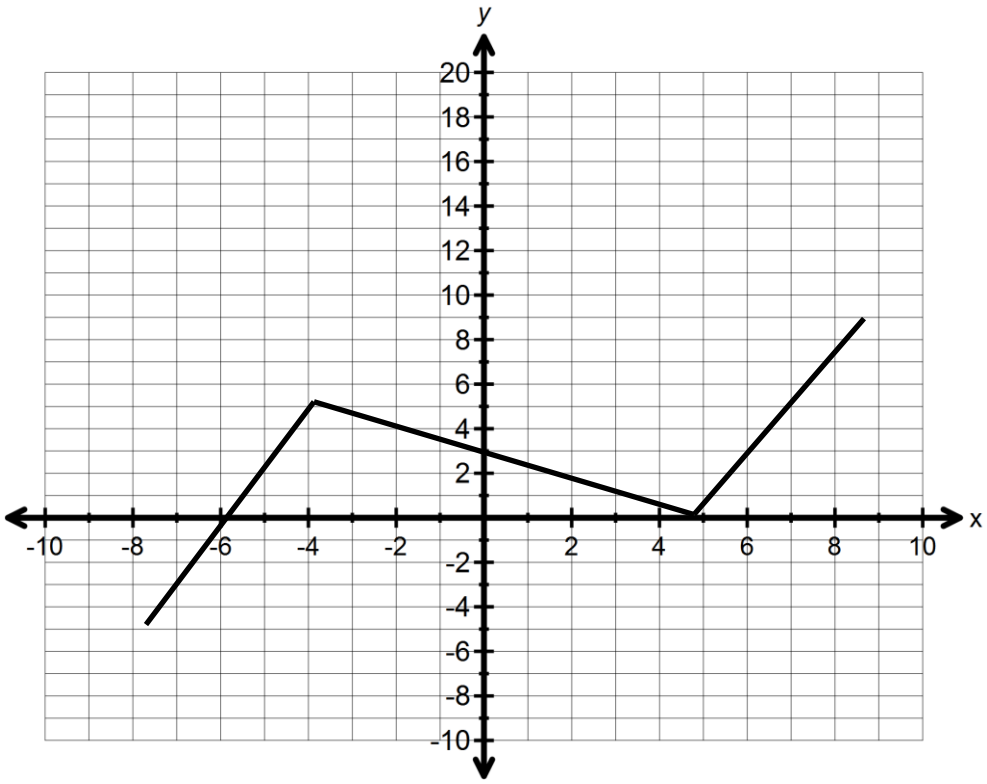

12. Given $y=f(x)$ has been transformed by a reflection in the x-axis, a horizontal stretch of $4$, a horizontal translation of 1 unit left and a vertical translation of 2 units up, what is the new equation for the image graph?

A) $y=-f(4x+1)+2$ B) $y=f\left(-4\left(x-1\right)\right)+2$

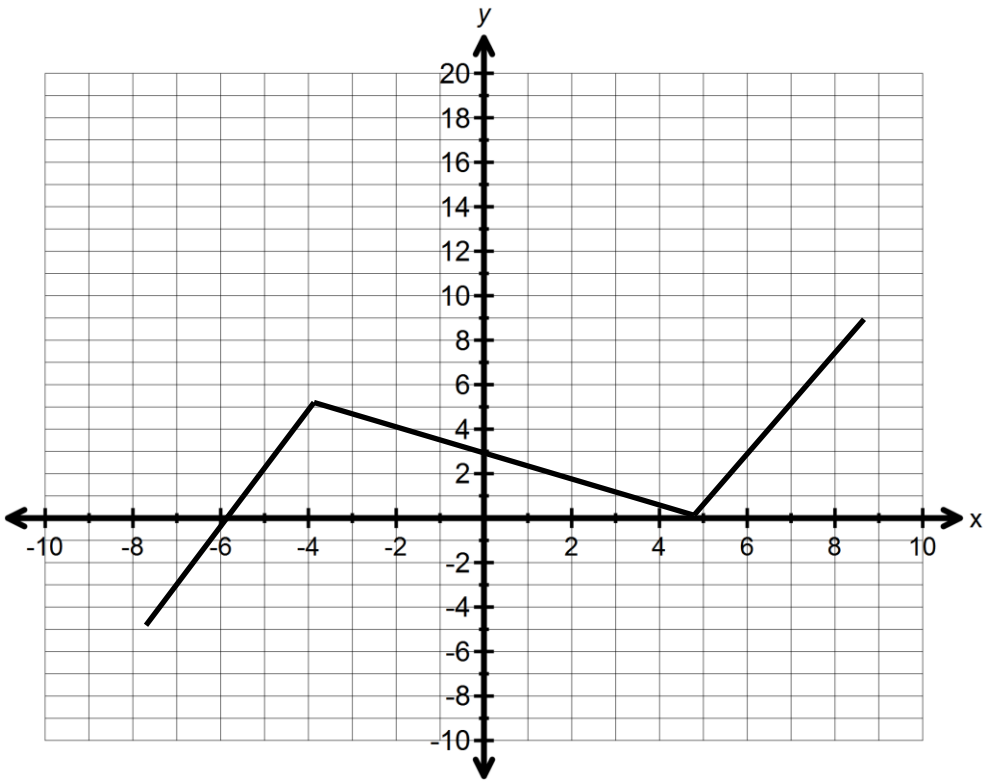
C) $y=-f(\frac{1}{4}\left(x+1\right))+2$ D) $y=f(-\frac{1}{4}x+1)+2$

13. Given the graph $y = f(x)$ shown, sketch the graph for each of the following and state any invariant points

i) $y = 2f\left(-3\left(x+1\right)\right)-2$

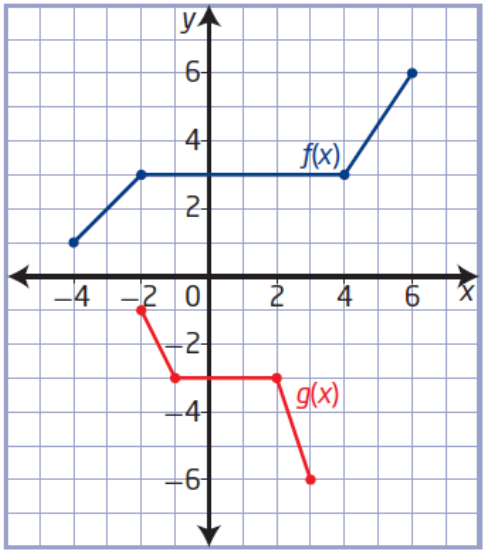


ii) $y = f^{-1}(x)$

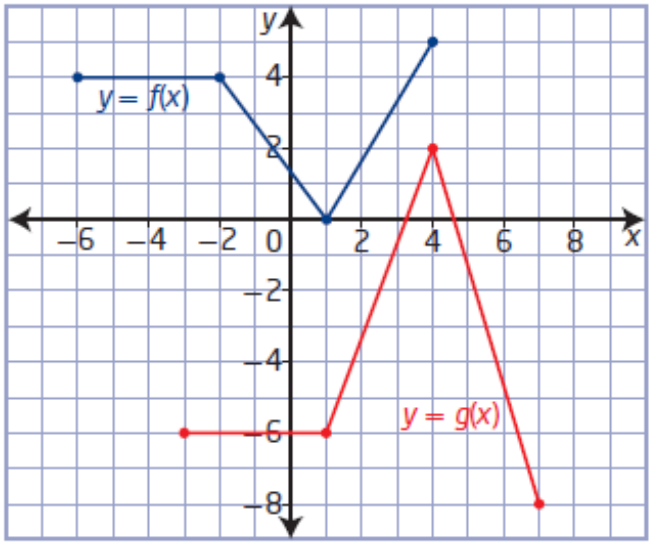


14. Determine the equation for the image of $y = f(x)$.

A)




B)



15. Algebraically determine the inverse of $f(x)=(x+1)^2+4$.
State the restricted domain for the relation so that the inverse is a function.

16. The graph of $y=f(x)$ is transformed to produce the graph of $y=-5f(2x-6)-1$. What is the horizontal translation? If the point (-4, 10) lies on the graph of $f(x)$ what is the image point on the graph of $y=-5f(2x-6)-1$.

17. Explain how the transformations described by $y=f(\frac{1}{2}x+1)$ and $y=f(\frac{1}{2}(x+1))$ are similar and how are they different.

**Answers:**

1. A 2. D 3. C 4. B 5. B 6. B 7. D 8. C 9. D 10. C 11. B 12. C

13. new graph should have key points

A) i) $\left(\frac{5}{3},-12\right)$, $\left(\frac{1}{3},8\right)$, $\left(-\frac{8}{3},-2\right)$ and $(-4,16)$

ii) $(-5,-8)$, $(5,-4)$, $(0,5)$ and $(9,9)$

B) i) no invariant points ii) (2,2) (9,9)

14. A) $g(x)=-f(2x)$ B) $y=-2f(x-3)+2$

15. $y=-1+\sqrt{x-4}, \quad x\geq -1$ **or** $y=-1-\sqrt{x-4}, \quad x\leq -1$

16. $y=-5f(2(x-3))-1$ HT = 3 right, $(-4,10)\rightarrow(1,-51)$

17. $y=f(\frac{1}{2}(x+2))$ HT = -2

$y=f(\frac{1}{2}(x+1))$ HT = -1

Both functions have the same horizontal stretch of $\frac{1}{2}$ but different horizontal translations.