

Part I – Multiple Choice – Answer each of the following questions by choosing the best answer and placing the corresponding letter in the space provided at the end. (1 mark each)

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?

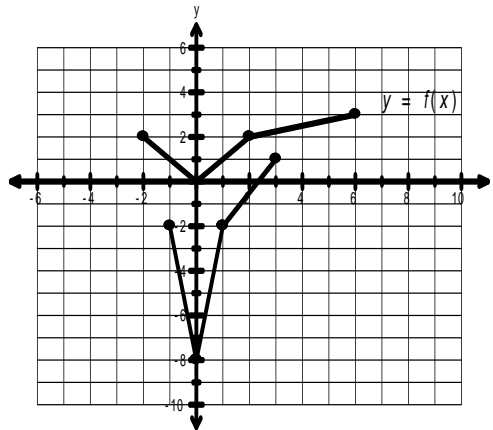
- A) $y = -f(2x)$ B) $y = 2f(-x)$ C) $y = -\frac{1}{2}f(x)$ D) $y = \frac{1}{2}f(-x)$

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

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

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

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

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

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

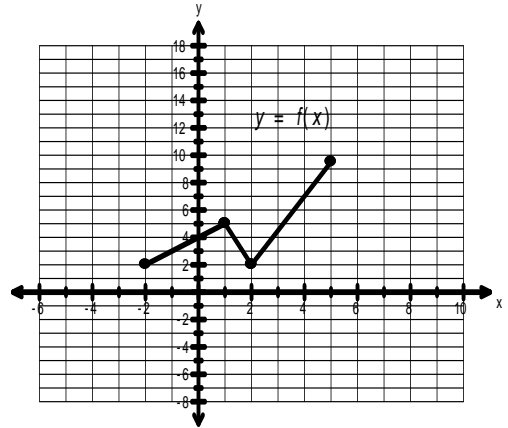
8. For the graph of $y = f(x)$ shown, which of the following statements is not true?

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 $y = -f(x)$



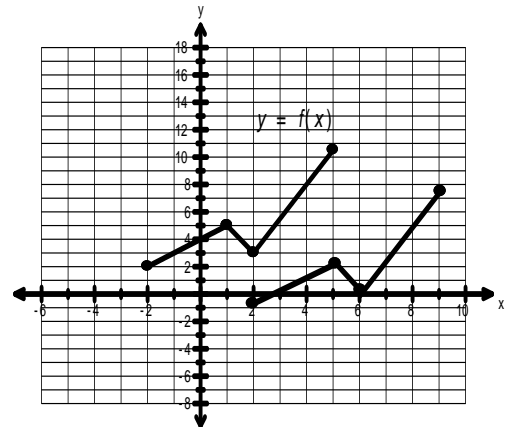
9. What is the equation for the image graph of $y = f(x)$ as shown?

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

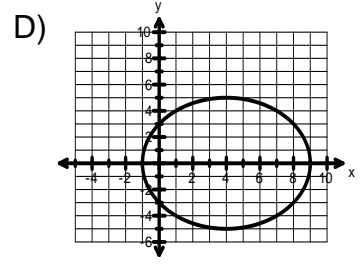
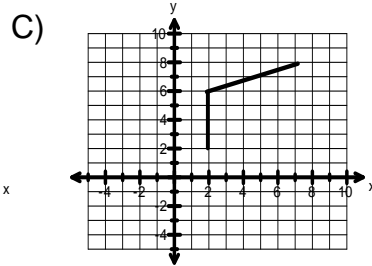
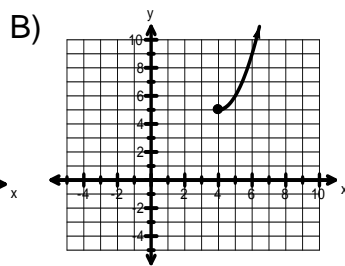
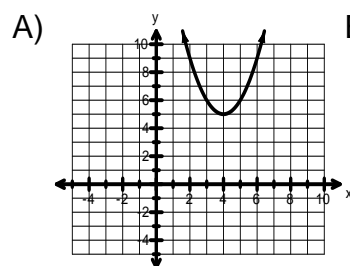
A) $(a, -b)$

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?



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?

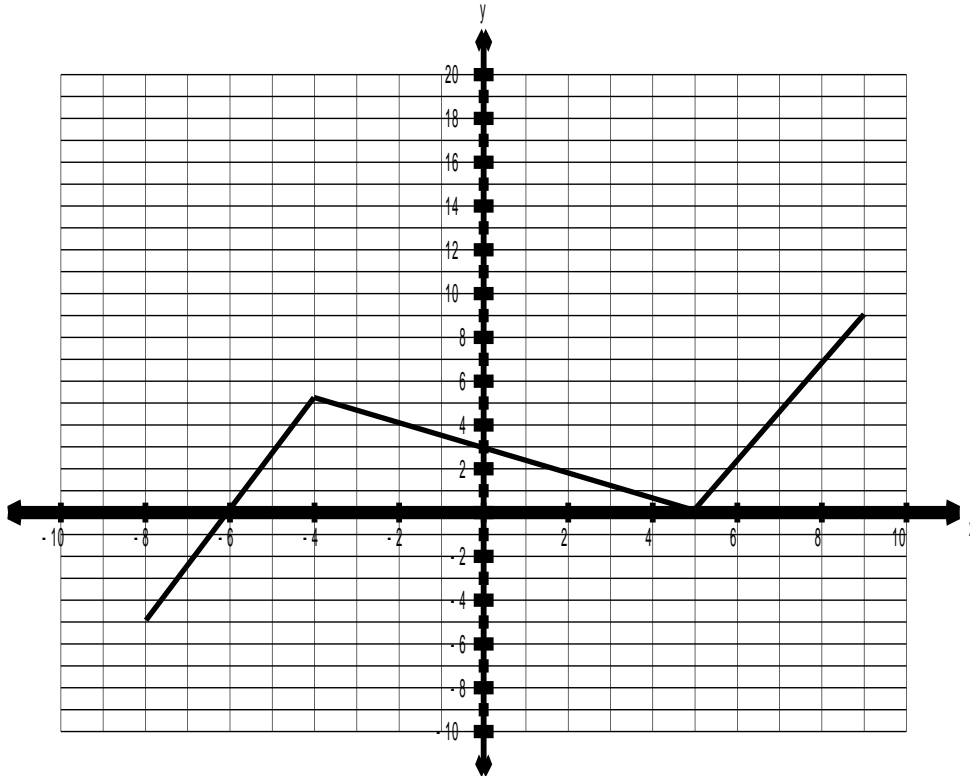
A) $y = -f(4x+1)+2$

B) $y = f(-4(x-1))+2$

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

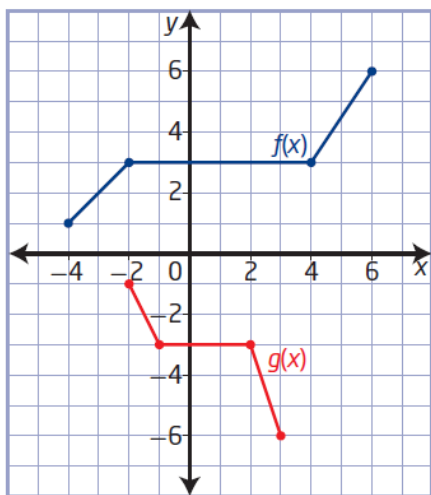
D) $y = f\left(-\frac{1}{4}x+1\right)+2$

13. Given the graph $y = f(x)$ shown,
- A) sketch the graph of i) $y = 2f(-3x - 3) - 2$ ii) $y = f^{-1}(x)$
- B) state any invariant points

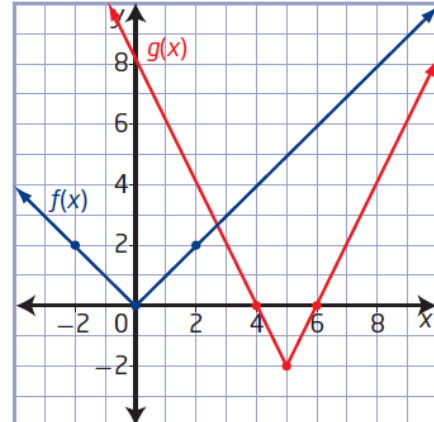


14. Determine the equation for the image of $y = f(x)$.

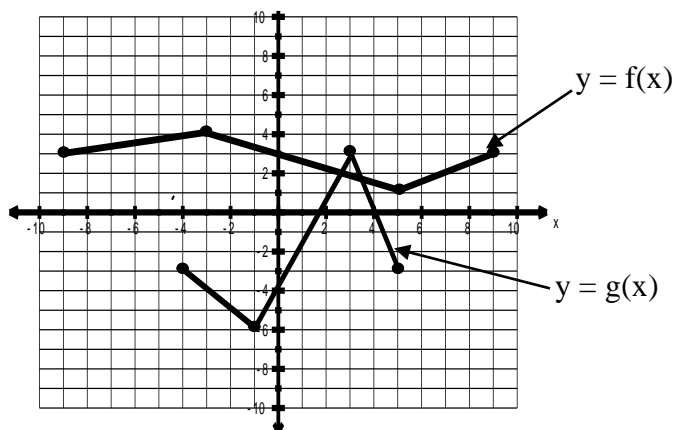
A)



B)



C)



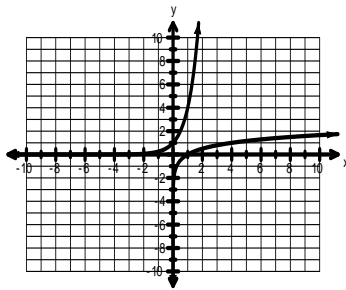
15. The domain of a graph is $x \in (-3, 6]$. What is the range of its inverse?

16. Algebraically determine the inverse of $f(x) = (x+1)^2 + 4$. (Use a restriction on the domain so that the inverse is a function)

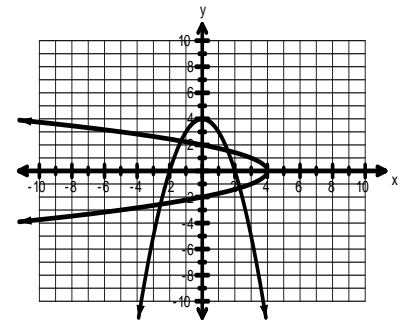
17. Which of the following are inverses of each other?

A) $y = 2x + 3$ and $y = \frac{x-3}{2}$

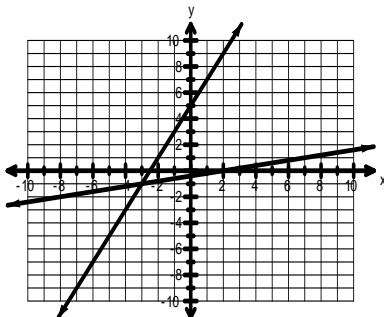
B)



C)



D)



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) $g(x) = f(2(x-5)) - 2$ C) $g(x) = -3f\left(2\left(x - \frac{1}{2}\right)\right) + 6$

15. $y \in (-3, 6]$

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

17. A, B, C