Transformations Problems

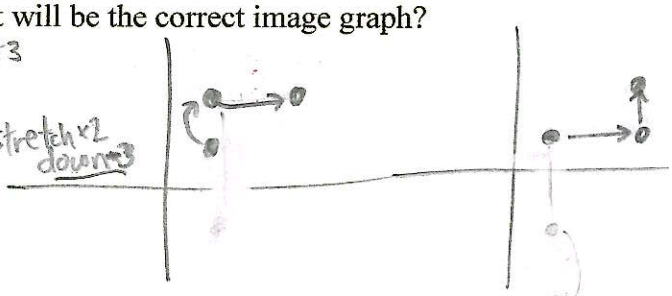
Solutions.

1. The graph $y = f(x)$ contains the point (3, 4). Which of the following equations describe the transformations given by $(3, 4) \rightarrow (5, 5)$?

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

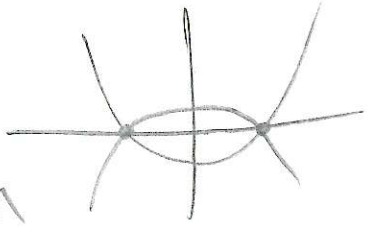
2. For which one of the following can the transformations of the graph of $y = f(x)$ be performed in any order and the result will be the correct image graph?

   vertstretch right 3
   A. $y = 2f(x - 3)$
   B. $y = 2f(x) - 3$ vertstretch ×2 down 3
   C. $y = f(3x + 6)$ $3(x+2)$
   D. $y = -f(x) + 3$



3. Which of the following transformations would produce a graph with the same x-intercepts as the graph of $y = f(x)$?

   A. $y = f(x) + 7$
   B. $y = f(x + 7)$
   C. $y = f(-x)$
   D. $y = -f(x)$ vertical reflection



4. Describe in words the horizontal stretch factor about the y-axis and the vertical stretch factor about the x-axis required to transform the coordinates of point (x, y) on a graph of a function to the image coordinates $\left(\frac{1}{3}x, 3y\right)$.

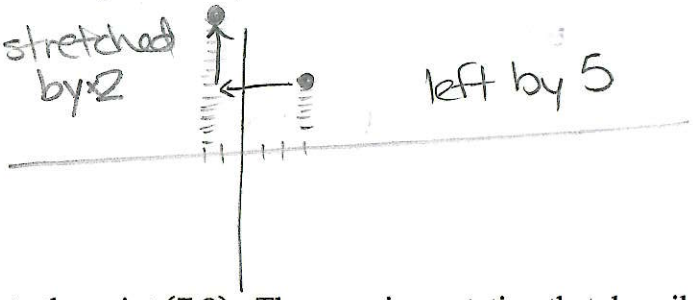
   ↑ stretched vertically ×3
   ↑ compressed horizontally by $\frac{1}{3}$

5. The equation which represents the graph of $y = g(x)$ after it is translated 5 up is

   a. $y - 5 = g(x) + 5$
   b. $y = g(x - 5)$
   c. $y + 5 = g(x)$
   d. $y = g(x + 5)$

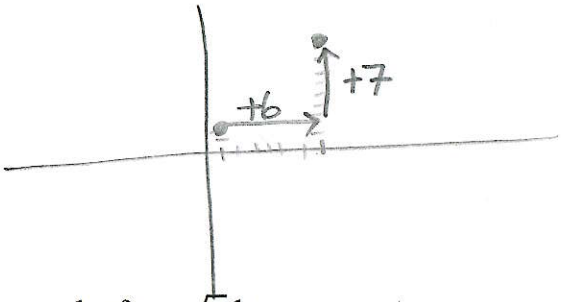
6. A point P(3,7) on the function $y = f(x)$ is mapped to $Q(-2,14)$ after the transformations of a horizontal shift and a vertical stretch. A possible equation for the new function could be

a. $\frac{1}{2}y = f(x + 5)$
b. $\frac{1}{2}y = f(x - 5)$
c. $2y = f(x - 5)$
d. $2y = f(x + 5)$



7. The point (1,2) is transformed into the point (7,9). The mapping notation that describes the transformations is

a. $(x, y) \rightarrow (x - 6, y + 7)$
b. $(x, y) \rightarrow (x - 6, y - 7)$
c. $(x, y) \rightarrow (x + 6, y - 7)$
d. $(x, y) \rightarrow (x + 6, y + 7)$



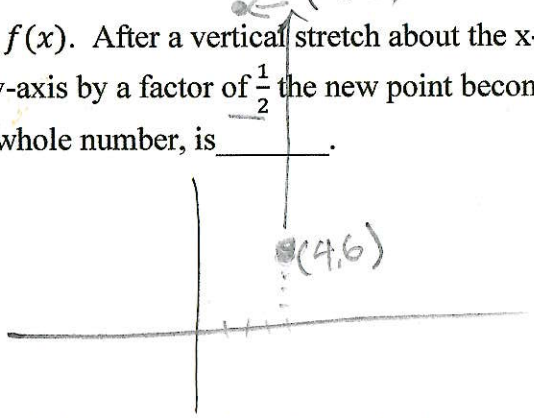
8. The graph of $y = \sqrt{4x}$ is related to the graph of $y = \sqrt{x}$ by a

horizontal stretch

a. vertical stretch of a factor of $\frac{1}{4}$ about the x axis.
b. horizontal stretch of a factor of $\frac{1}{4}$ about the y axis.
c. vertical stretch of a factor of 4 about the x axis.
d. horizontal stretch by a factor of 4 about the y axis.

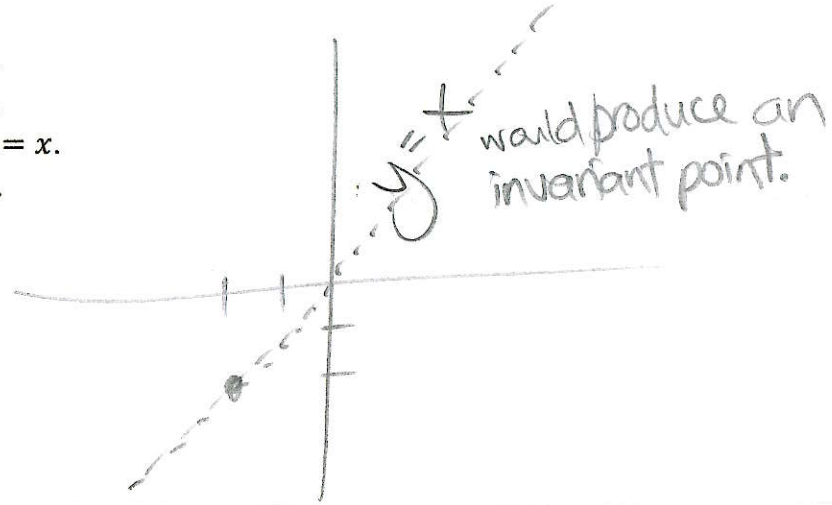
If $y = \sqrt{x}$ then $y = \sqrt{4x}$

9. The point (4,6) lies on the graph of $y = f(x)$. After a vertical stretch about the x-axis by a factor of 3, and a horizontal stretch about the y-axis by a factor of $\frac{1}{2}$ the new point becomes (m, n). The value of $m + n$, rounded to the nearest whole number, is_____.



10. The type of reflection where $(-2, -2)$ will always be an invariant point is

a. a reflection in the x axis.
b. a reflection in the y axis.
c. a reflection in the line $y = x$.
d. a reflection in the origin.

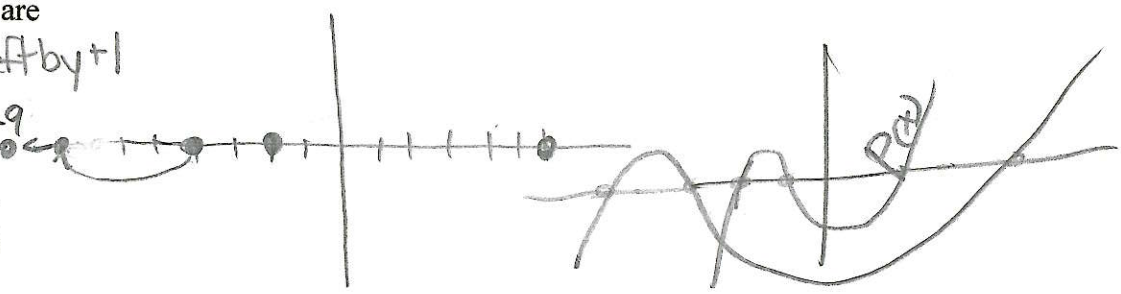


$P(x) = (x+4)(x+2)(x-6)$

11. The zeroes of the function $y = P(x)$ are $-4, -2,$ and 6. The zeroes of the transformed function $y = P\left(\frac{1}{2}(x+1)\right)$ are

stretched by ×2 ↑ ↑ left by +1

a. $-1, 0, 4$
b. $-3, -2, 2$
c. $-9, -5, 11$
d. $-7, -3, 13$



12. The inverse of function $y = 2(x-4)^2 + 6$ can be written in the form $y = \pm\sqrt{a(x-h)} + k$. The value of a, to the nearest tenth, is_____.

$x = 2(y-4)^2 + 6$

$\frac{1}{2}(x-6) = 2(y-4)^2$

$\sqrt{\frac{1}{2}(x-6)} = \sqrt{(y-4)^2}$

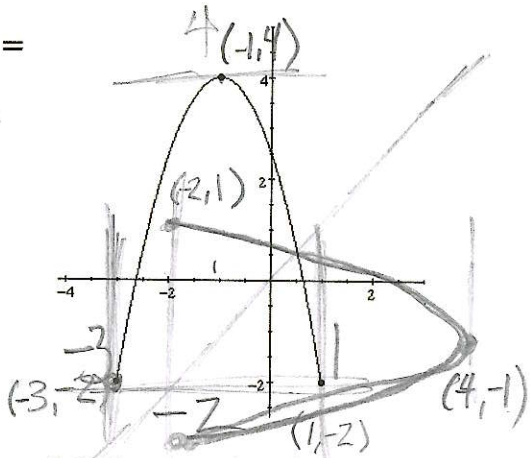
$\sqrt{\frac{1}{2}(x-6)} = y - 4$

$+4$

$\sqrt{\frac{1}{2}(x-6)} + 4 = y$

13. The graph of $y = h(x)$ is shown. The domain of the inverse of $y = h(x)$ is

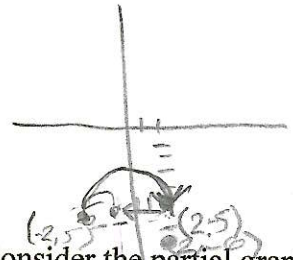
A. $\{-1 \le x \le 3, x \in \Re\}$
B. $\{-3 \le x \le 1, x \in \Re\}$
C. $\{-2 \le x \le 4, x \in \Re\}$
D. $\{-4 \le x \le 2, x \in \Re\}$



14. The point (2, -5) is on the graph of $y = h(x)$. Write the coordinates of the image point after the transformations described by $y + 1 = h(-2(x+3)) - 1$

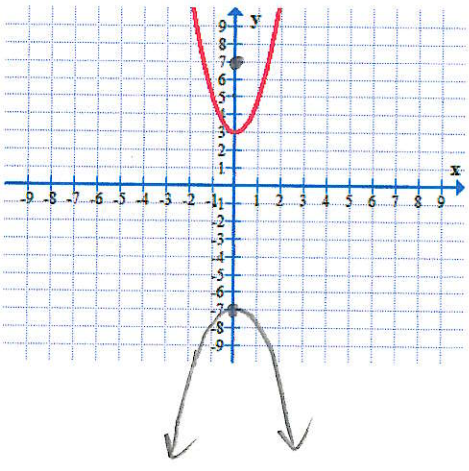
reflected horizontally ↓ stretch ↓ stretch ×2 horizontally

↑ left 3 ↑ down 1



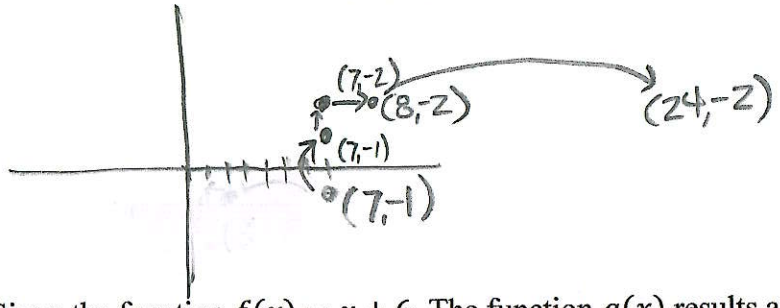
15. Consider the partial graph of the function $f(x) = 2x^2 + 3$. Sketch the graph of $g(x) = -f(x) + 4$.

↑ reflected vertically ↑ up +4



16. The point (7, -1) is on the graph of the image function $r(x)$ where $r(x) = -\frac{1}{2}f(3(x+1))$. What are the coordinates of the original point on the graph of $f(x)$?

compressed by 3 horizontally
left 1
compressed by $\frac{1}{2}$ vertically
reflected vertically

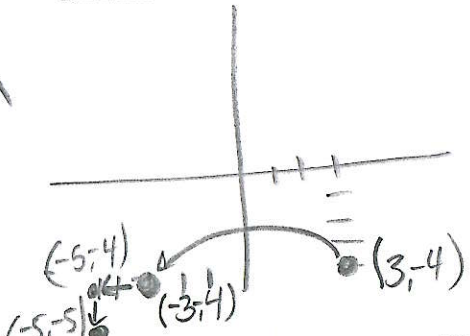


17. Given the function $f(x) = x + 6$. The function $g(x)$ results after the function $f(x)$ after it has been translated 2 units to the right and 4 unit downs. Determine the equation of $g(x)$.

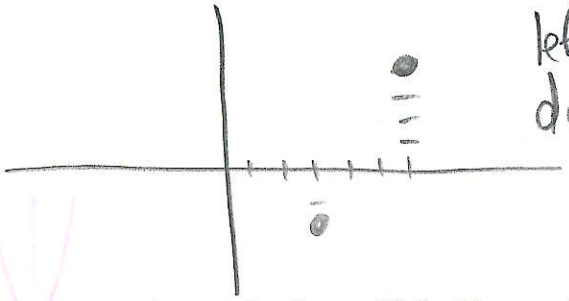
$y = f(x-2) - 4$

18. The point (3, -4) is on the graph of $y = f(x)$. Determine a point that would be on the graph of $y = f(-(x+2)) - 1$.

horizontal reflection
left 2
down 1

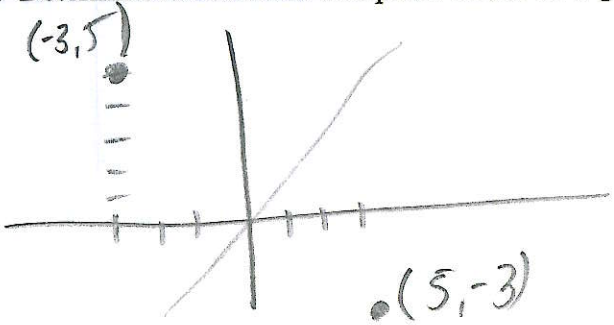


19. The point (6, 4) is on the graph of $y = f(x)$. The graph of $y = f(x)$ is transformed to become $y = g(x)$. The point (3, -2) is on the graph of $y = g(x)$ after certain transformations have occurred. List possible transformations that may have occurred.

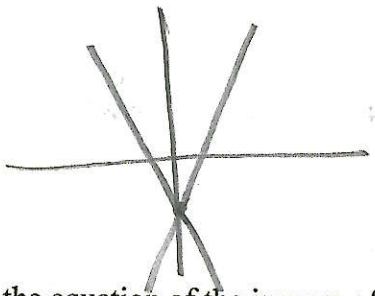


left by 3
down by 6.

20. The point (-3, 5) is on the graph of $y = f(x)$. The graph of $y = f(x)$ is then reflected in the line $y = x$. Determine coordinates of a point on the new graph.



21. The graph of $y = 3x - 2$ is reflected in the y-axis. Determine the equation of the new graph.



$y = 3(-x) - 2$

$y = -3x - 2$

22. Determine the equation of the inverse of $y = x^2 + 1$.

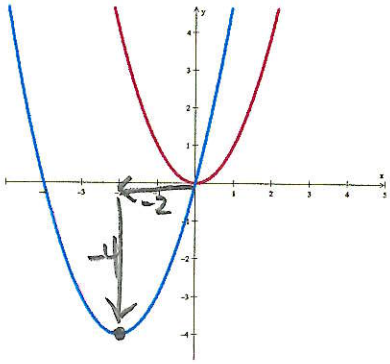
$y = x^2 + 1$

$x = y^2 + 1$

$\sqrt{x+1} = \sqrt{y^2}$

$y = \sqrt{x+1}$

23. If the vertex of the transformed graph is (-2,-4), what is the equation of the transformed graph?



a. $y = (x-2)^2 - 4$
b. $y = (x+2)^2 + 4$
c. $y = -(x+2)^2 - 4$
d. $y = (x+2)^2 - 4$

24. Which of the following represents a cubic function ($y = x^3$) that has been translated 5 units to the left and 8 units down.

a. $y + 8 = (x-5)^3 + 8$
b. $y - 8 = (x+5)^3 + 8$
c. $y + 8 = (x+5)^3 - 8$
d. $y + 8 = (x-5)^3 - 8$

25. The graph $y = f(x)$ contains the point (3, 4). Which of the following equations describe the transformations given by $(3, 4) \rightarrow (5, 5)$?

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

#1 repeat

26. If the graph of the transformed function $y = f(x)$ is horizontally stretched by a factor of $\frac{1}{3}$, the new equation can be expressed as:

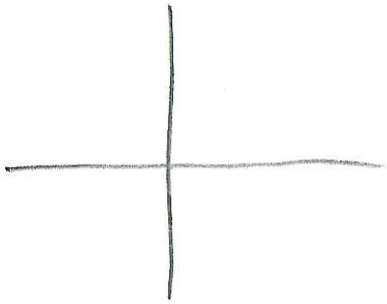
a. $y = \frac{1}{3}f(x)$
b. $y = 3f(x)$
c. $y = f(\frac{1}{3}x)$
d. $y = f(3x)$

27. The graph of $3y = f(x)$ has been vertically stretched by a factor of $\frac{1}{3}$.

$y = \frac{1}{3}f(x)$

28. The graph of $y = f(x)$ is reflected about the x-axis, horizontally stretched by a factor of 2 about the y axis, then translated 3 units to the left and 1 unit down. The equation of the transformed graph is

a. $y = -f\left(\frac{1}{2}(x-3)\right) - 1$
b. $y = -f\left(\frac{1}{2}(x+3)\right) - 1$
c. $y = -f(2(x-3)) - 1$
d. $y = -f(2(x+3)) - 1$



reflected vertically
stretched horizontally ×2
3 units left
1 down.

29. Which of the following transformations would produce a graph with the same x-intercepts as the graph of $y = f(x)$?

a. $y = f(x) + 7$
b. $y = f(x + 7)$
c. $y = f(-x)$
d. $y = -f(x)$

Double #3

30. When the graph of $y = f(x)$ is transformed into the graph of $x = f(y)$, which of the following points are invariant?

a. The x intercept(s)
b. The y intercept
c. The points that satisfy $y = x$
d. The points that satisfy $y = \frac{1}{x}$