

Transforming Coordinates

For each question below: A point lies on the graph of $y = f(x)$. A transformation is applied to produce a new function $g(x)$. Determine the coordinates of the image of the given point on the graph of $g(x)$.

1. The point $(8, 3)$ lies on the graph of $y = f(x)$.
Find its image on the graph of $g(x) = \frac{1}{2}f(4(x - 4)) - 6$.
2. The point $(6, -1)$ lies on the graph of $y = f(x)$.
Find its image on the graph of $g(x) = 3f(-4(x - 2)) - 1$.
3. The point $(10, -5)$ lies on the graph of $y = f(x)$.
Find its image on the graph of $g(x) = \frac{5}{2}f(2x - 10) - 4$.
4. The point $(-3, 1)$ lies on the graph of $y = f(x)$.
Find its image on the graph of $g(x) = 6 - 2f(3x + 9)$.

For each question below: Rewrite each equation in the form $g(x) = af(b(x - h)) + k$ before determining the image of the coordinate.

5. The point $(6, 4)$ lies on the graph of $y = f(x)$.
Find its image on the graph defined by $y + 5 = -3f(2x - 4)$.
6. The point $(-4, 9)$ lies on the graph of $y = f(x)$.
Find its image on the graph defined by $3(y - 1) = f\left(\frac{x}{2} + 3\right)$.
7. The point $(12, -3)$ lies on the graph of $y = f(x)$.
Find its image on the graph of $g(x) = 9 - 3f(6 - 3x)$.
8. The point $(6, 4)$ lies on the graph of $y = f(x)$.
Find its image on the graph of $g(x) = 3 - 5f(0.5(x - 8))$.

Find one possible transformation of the form $g(x) = \pm af(\pm b(x - h)) + k$ that would cause this movement. More than one answer may be possible. Give at least one valid solution.

9. If a point moves from $(8, -3) \rightarrow (2, 6)$, find one possible transformation that would produce this result.
10. If a point moves from $(10, 2) \rightarrow (5, -1)$, find one possible transformation that would produce this result.
11. If a point moves from $(-8, 4) \rightarrow (-2, -2)$, find one possible transformation that would produce this result.

12. If a point moves from $(2, 7) \rightarrow (-1, -14)$, find one possible transformation that would produce this result.
13. A point moves from $(8, 4) \rightarrow (-2, -8)$. Find a transformation that includes:
- A horizontal compression
 - A vertical stretch
 - A vertical shift
14. A point moves from $(-6, 5) \rightarrow (3, -15)$. Find a transformation that includes:
- A horizontal reflection
 - A horizontal stretch
 - No vertical shift
15. Find a transformation with no horizontal or vertical shift: $(12, -4) \rightarrow (4, 8)$
16. If a point moves from $(5, 3) \rightarrow (2, -4)$, find **two different transformation equations** that would produce this result.
17. If a point moves from $(9, -6) \rightarrow (3, 3)$, find a transformation that involves:
- A horizontal reflection
 - A vertical reflection
 - A stretch/compression
18. Find two completely different transformations that move the point $(6, 4) \rightarrow (3, -8)$.
19. Suppose one point moves from $(6, 4) \rightarrow (3, -8)$, and another point moves from $(2, 1) \rightarrow (1, -2)$. Find a transformation that moves **both** points correctly.
20. A transformation sends $(6, 4) \rightarrow (3, -8)$ and $(2, 1) \rightarrow (1, -2)$. Find the transformation.
21. Suppose a point moves under two transformations. First: $(x, y) \rightarrow \left(\frac{x}{2}, -y\right)$
Second: $(x, y) \rightarrow (x - 3, y + 4)$. Find the single transformation equation equivalent to performing both.
22. A point moves from $(6, 4) \rightarrow (3, -8)$. Find three fundamentally different transformations that accomplish this:
- a. One using only scaling/reflection
 - b. One using scaling + shift
 - c. One using reflection + shift