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More Than Meets the Eye
Transformations of Quadratic Functions

Vocabulary

Write a definition for each term in your own words.

1. vertical dilation

2. dilation factor

Problem Set

Describe the transformation performed on each function $g(x)$ to result in $d(x)$.

1. $g(x) = x^2$
   $d(x) = x^2 - 5$
   The graph of $g(x)$ is translated down 5 units.

2. $g(x) = x^2$
   $d(x) = x^2 + 2$

3. $g(x) = 3x^2$
   $d(x) = 3x^2 + 6$

4. $g(x) = \frac{1}{2}x^2$
   $d(x) = \frac{1}{2}x^2 - 1$

5. $g(x) = (x + 2)^2$
   $d(x) = (x + 2)^2 - 3$

6. $g(x) = -(x - 2)^2$
   $d(x) = -(x - 2)^2 + 5$

Describe the transformation performed on each function $g(x)$ to result in $m(x)$.

7. $g(x) = x^2$
$m(x) = (x + 4)^2$
The graph of $g(x)$ is translated left 4 units.

8. $g(x) = x^2$
$m(x) = (x - 8)^2$

9. $g(x) = x^2$
$m(x) = (x + 1)^2$

10. $g(x) = x^2 - 7$
$m(x) = (x + 2)^2 - 7$

11. $g(x) = x^2 + 8$
$m(x) = (x + 3)^2 + 8$

12. $g(x) = x^2 - 6$
$m(x) = (x - 5)^2 - 6$

Describe the transformation performed on each function $g(x)$ to result in $p(x)$.

13. $g(x) = x^2$
$p(x) = -x^2$
The graph of $p(x)$ is a horizontal reflection of the graph of $g(x)$.

14. $g(x) = x^2$
$p(x) = (-x)^2$

15. $g(x) = x^2 + 2$
$p(x) = -(x^2 + 2)$

16. $g(x) = x^2 - 5$
$p(x) = (-x)^2 - 5$

17. $g(x) = \frac{2}{3}x^2 + 4$
$p(x) = \frac{2}{3}(-x)^2 + 4$

18. $g(x) = 5x^2 - 7$
$p(x) = -(5x^2 - 7)$

Represent each function $n(x)$ as a vertical dilation of $g(x)$ using coordinate notation.

19. $g(x) = x^2$
$n(x) = 4x^2$
$(x, y) \rightarrow (x, 4y)$

20. $g(x) = x^2$
$n(x) = \frac{1}{2}x^2$

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21. $g(x) = -x^2$
$n(x) = -5x^2$

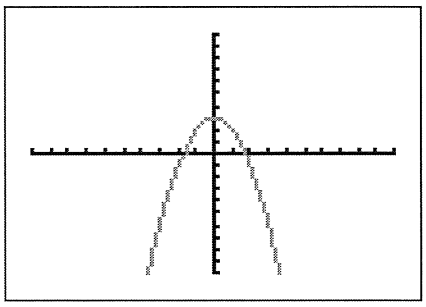
22. $g(x) = -x^2$
$n(x) = -\frac{3}{4}x^2$

23. $g(x) = (x + 1)^2$
$n(x) = 2(x + 1)^2$

24. $g(x) = (x - 3)^2$
$n(x) = \frac{1}{2}(x - 3)^2$

Write an equation in vertex form for a function $g(x)$ with the given characteristics. Sketch a graph of each function $g(x)$.

25. The function $g(x)$ is quadratic.
The function $g(x)$ is continuous.
The graph of $g(x)$ is a horizontal reflection of the graph of $f(x) = x^2$.
The function $g(x)$ is translated 3 units up from $f(x) = -x^2$.
$g(x) = -(x - 0)^2 + 3$

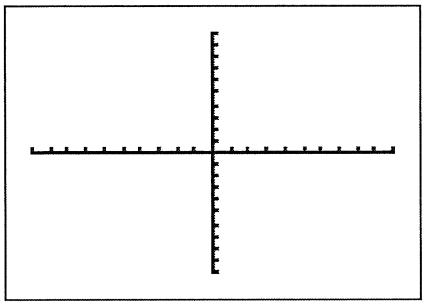


26. The function $g(x)$ is quadratic.

The function $g(x)$ is continuous.

The graph of $g(x)$ is a horizontal reflection of the graph of $f(x) = x^2$.

The function $g(x)$ is translated 2 units down and 5 units left from $f(x) = -x^2$.

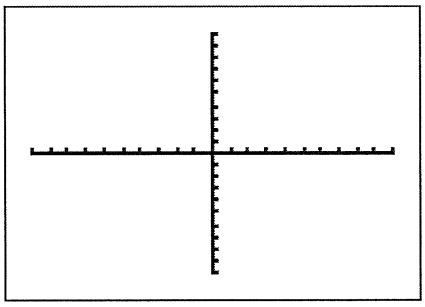


27. The function $g(x)$ is quadratic.

The function $g(x)$ is continuous.

The function $g(x)$ is vertically dilated with a dilation factor of 6.

The function $g(x)$ is translated 1 unit up and 4 units right from $f(x) = 6x^2$.



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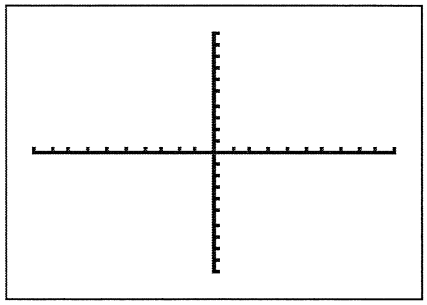
28. The function $g(x)$ is quadratic.

The function $g(x)$ is continuous.

The function $g(x)$ is vertically dilated with a dilation factor of $\frac{1}{2}$.

The function $g(x)$ is translated 2 units down and 6 units left from $f(x) = \frac{1}{2}x^2$.



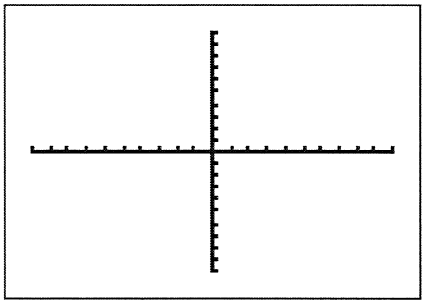
29. The function $g(x)$ is quadratic.

The function $g(x)$ is continuous.

The graph of $g(x)$ is a horizontal reflection of the graph of $f(x) = x^2$.

The function $g(x)$ is vertically dilated with a dilation factor of 3.

The function $g(x)$ is translated 2 units down and 4 units right from $f(x) = -3x^2$.

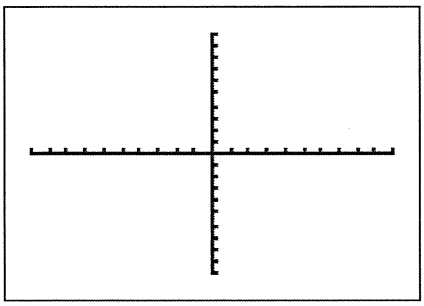


30. The function $g(x)$ is quadratic.

The function $g(x)$ is continuous.

The function $g(x)$ is vertically dilated with a dilation factor of $\frac{1}{4}$.

The function $g(x)$ is translated 3 units up and 2 units left from $f(x) = \frac{1}{4}x^2$.



Describe the transformation(s) necessary to translate the graph of the function $f(x) = x^2$ into the graph of each function $g(x)$.

31. $g(x) = x^2 + 7$

The function $g(x)$ is translated 7 units up from $f(x) = x^2$.

32. $g(x) = -x^2 - 4$

33. $g(x) = (x - 2)^2 + 8$

34. $g(x) = 4x^2 + 1$

35. $g(x) = \frac{2}{3}(x + 4)^2 - 9$

36. $g(x) = -(x - 6)^2 + 3$