

**LESSON 2.3 Skills Practice**

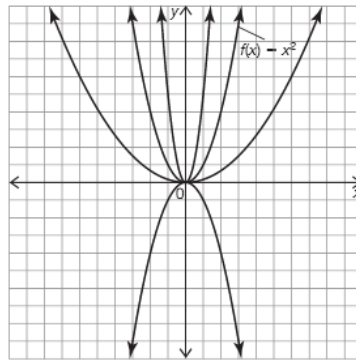
Name \_\_\_\_\_ Date \_\_\_\_\_

**Up and Down  
Vertical Dilations of Quadratic Functions**

**2**

**Vocabulary**

- Label the graph to identify the vertical dilations (vertical compression and vertical stretching) and the reflection of the function  $f(x) = x^2$ . Also label the line of reflection.

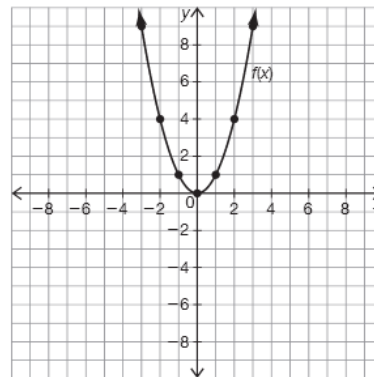
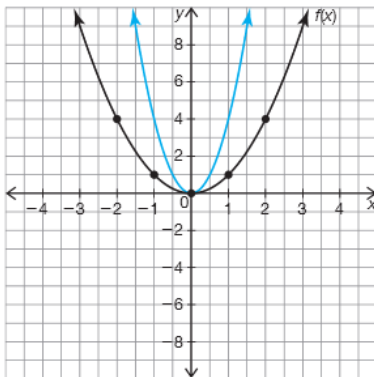


**Problem Set**

Graph each vertical dilation of  $f(x) = x^2$  and tell whether the transformation is a vertical stretch or a vertical compression and if the graph includes a reflection.

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

2.  $p(x) = \frac{1}{8}x^2$



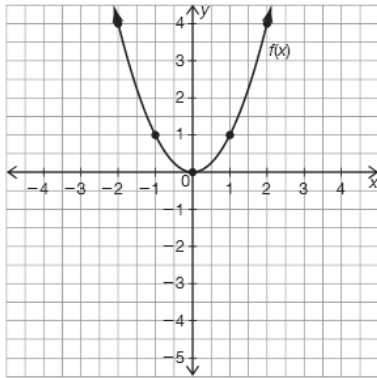
vertical stretch

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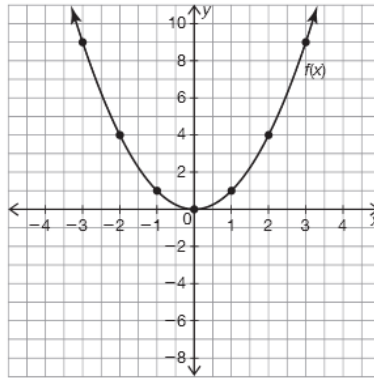
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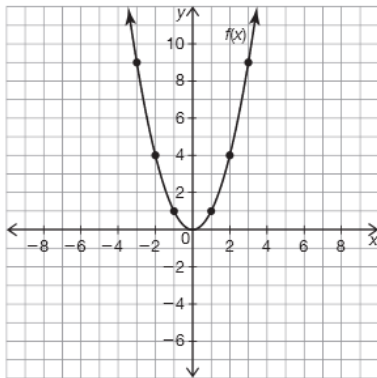
3.  $h(x) = -5x^2$



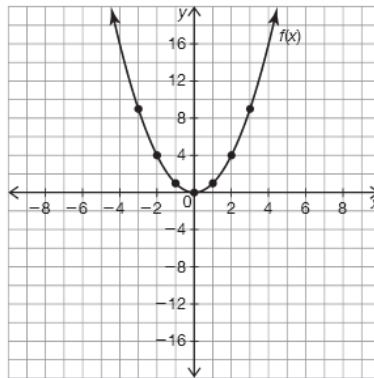
4.  $m(x) = 2.5x^2$



5.  $d(x) = \frac{2}{5}x^2$



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



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Each given function is in transformational function form  $g(x) = Af(B(x - C)) + D$ , where  $f(x) = x^2$ . Describe how  $g(x)$  compares to  $f(x)$ . Then, use coordinate notation to represent how the  $A$ -,  $C$ -, and  $D$ -values transform  $f(x)$  to generate  $g(x)$ .

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7.  $g(x) = -3(f(x)) - 1$

The  $A$ -value is  $-3$ , so the graph will have a vertical stretch by a factor of 3 and will be reflected about the line  $y = -1$ . The  $C$ -value is 0 and the  $D$ -value is  $-1$  so the vertex will be shifted 1 unit down to  $(0, -1)$ .

$$(x, y) \rightarrow (x, -3y - 1)$$

8.  $g(x) = \frac{1}{4}(f(x)) + 8$

9.  $g(x) = -4(f(x + 3))$

10.  $g(x) = \frac{1}{3}f(x - 6) - 3$

11.  $g(x) = -0.75f(x + 4) - 2$

12.  $g(x) = \frac{4}{3}f\left(x - \frac{1}{3}\right) + \frac{2}{3}$

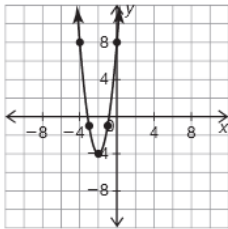
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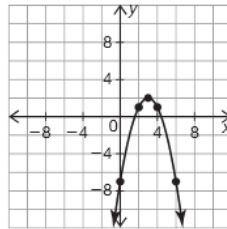
Write the function that represents each graph.

13.

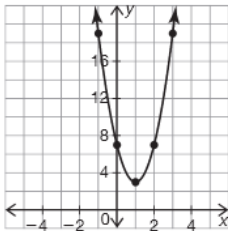


$$f(x) = 3(x + 2)^2 - 4$$

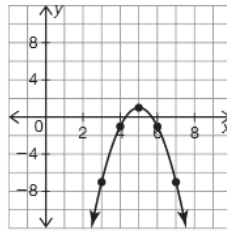
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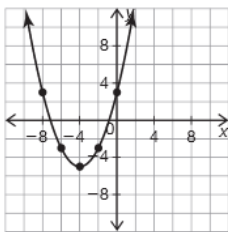
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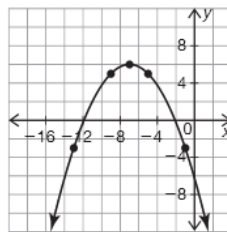
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