

**PRACTICE EXERCISES**

1. The graph of  $y = (-x - 3)^2$  is the graph of  $y = (x - 3)^2$  reflected in the  $y$ -axis.

2. Given  $y = x^2 - x - 3$ , write the equation representing the graph of this function reflected in the  $y$ -axis. replace  $x$  with  $-x$

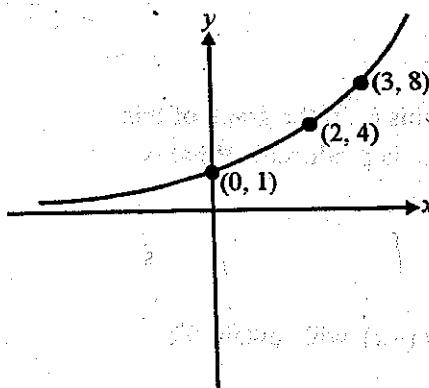
$$\therefore y = (-x)^2 - (-x) - 3 \longrightarrow y = x^2 + x - 3$$

3. The graph of  $y = -(x + 2)^2$  is the graph of  $y = (x + 2)^2$  reflected in the  $x$ -axis.

4. Given  $y = x^2 - 5x - 3$ , write the equation representing the graph of this function reflected in the  $x$ -axis. Solve this equation for  $y$ . replace  $y$  with  $-y$

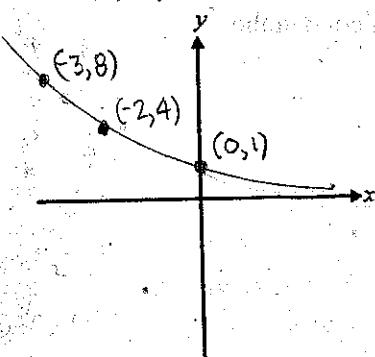
$$\therefore -y = x^2 - 5x - 3 \longrightarrow y = -(x^2 - 5x - 3) \longrightarrow y = -x^2 + 5x + 3$$

5. The graph of the exponential function  $y = 2^x$  is shown below.

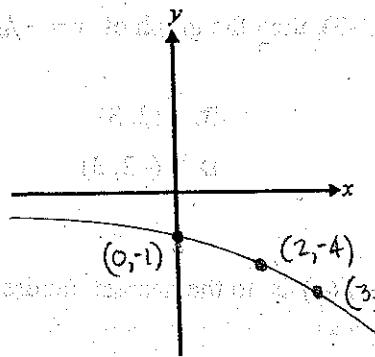


Show the transformation for each point shown and sketch the graph if  $y = 2^x$  is reflected in the

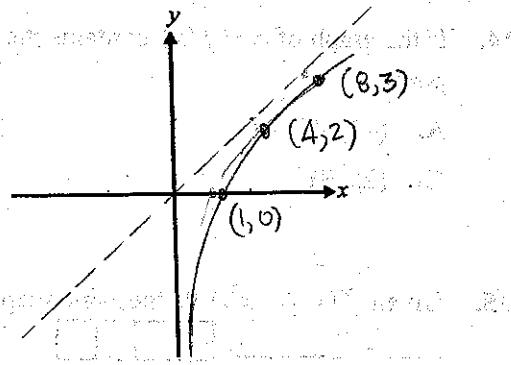
a)  $y$ -axis



b)  $x$ -axis



c) line  $y = x$



6. Write the equation representing the graph of the function  $y = x^3 - 8$  reflected in the  $y$ -axis.

replace  $x$  with  $-x$

$$y = (-x)^3 - 8$$

$$y = -x^3 - 8$$

**TRANSFORMATIONS—Practice Exercises**

7. The graph of  $y = -(x^3 + 5)$  is the graph of  $y = x^3 + 5$  reflected in the x-axis.

8. Write the equation representing the graph of the function  $y = \sqrt{2x+5}$  reflected in the x-axis.

replace  $y$  with  $-y$   $-y = \sqrt{2x+5} \rightarrow y = -\sqrt{2x+5}$

9. For  $y = x^2$ , write the equation representing the graph of this function reflected in the y-axis. If both of these equations are graphed, describe the result.

$$y = (-x)^2$$

replace  $x$  with  $-x$

$$y = x^2 \quad \text{this results in the same graph.}$$

10. Given  $y = x^3$ , explain why  $y = -x^3$  can be considered a reflection in the x-axis or the y-axis.

Both reflections result in the same graph  $\therefore f(-x) = -f(x)$

11. Given  $f(x) = 3x - 7$ , find  $f^{-1}(x)$ .

$$y = 3x - 7$$

$$x = 3y - 7$$

$$x + 7 = 3y \rightarrow \frac{x+7}{3} = y$$

$$f^{-1}(x) = \frac{x+7}{3}$$

12. The graph of  $(x - 2)^2 + (y + 3)^2 = 36$  is a circle with centre  $(2, -3)$  and radius 6. If the graph of this circle is reflected in the line  $y = x$ , what is the equation of the new circle that is produced? What is the centre of this new circle? "switch"  $x$  and  $y$

$$(y - 2)^2 + (x + 3)^2 = 36$$

$$\text{centre: } (-3, 2)$$

13. If the graph of  $y = f(x)$  contains the point  $(3, -5)$ , then the graph of  $y = f(-x)$  will contain the point

$x$  is replaced with  $-x$

A.  $(-5, 3)$

B.  $(-3, 5)$

C.  $(-3, -5)$

D.  $(3, 5)$

14. If the graph of  $y = f(x)$  contains the point  $(-2, -3)$ , then the graph of  $y = -f(x)$  will contain the point

$y$  is replaced with  $-y$

A.  $(-3, -2)$

B.  $(2, 3)$

C.  $(2, -3)$

D.  $(-2, 3)$

15. Given  $f(x) = -x^3 + 9$ , the x-intercept for  $y = -f(x)$  is, to the nearest hundredth,  $x$ -int occurs at  $y=0$ .

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x-intercept does not change because graph is reflected in the x-axis.

$$\therefore \text{let } y = 0 \rightarrow 0 = -x^3 + 9 \rightarrow x^3 = 9 \rightarrow x = \sqrt[3]{9}$$

16. Given  $f(x) = 3^x - 9$ , the y-intercept for  $y = f^{-1}(x)$  is (0, 2)

x-int of  $f(x) = 3^x - 9$  is y-int of  $f^{-1}(x)$

$$\therefore 0 = 3^x - 9 \rightarrow 9 = 3^x \rightarrow x = 2$$

x-int @  $(2, 0)$

y-int of  $f^{-1}(x)$

$(0, 2)$