Advanced Algebra   Name _____

Homework 2.4

Transformations of Functions   Period _____

SHOW ALL WORK.

Complete Parts A & B OR Parts B & C

<u>PART A:</u>

a) identify the parent function
b) describe any transformations (reflection, scale, translation)
c) write the rule

1. $y = (x - 3)^2$ **2.** $y = 5|x|$ **3.** $y = 2 + \sqrt{x}$ **4.** $y = -x$

a) _____   a) _____   a) _____   a) _____

b) _____   b) _____   b) _____   b) _____

c) _____   c) _____   c) _____   c) _____

<u>PART B:</u>

a) identify the parent function
b) describe any transformations (reflection, scale, translation)
c) write the rule

5. $y = -2|x - 7|$ **6.** $y = \sqrt{x + 8} - 3$ **7.** $y = 5x - 4$ **8.** $y = -(x + 4)^2 - 1$

a) _____   a) _____   a) _____   a) _____

b) _____   b) _____   b) _____   b) _____
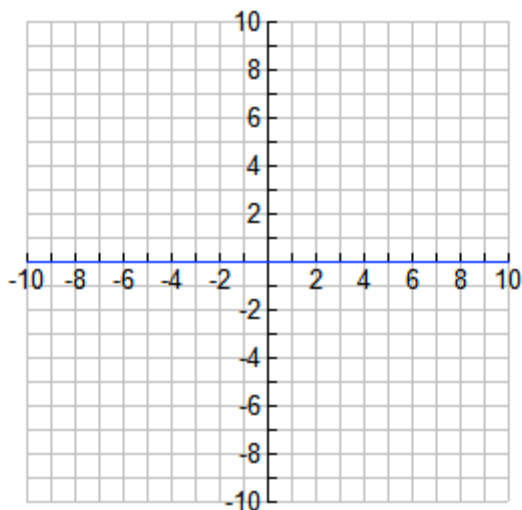
c) _____   c) _____   c) _____   c) _____

9. Write an equation for the parent function $y = x^2$ being translated 3 units right and 8 units down.
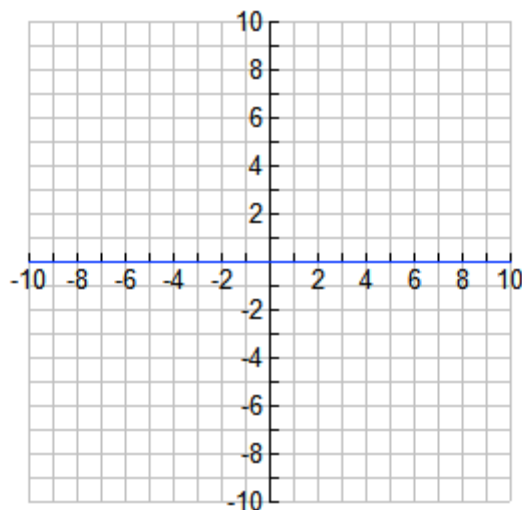
10. Write an equation for the parent function $y = \sqrt{x}$ being translated 5 units up and being reflected over the x-axis.

11. Write an equation for the parent function $y = |x|$ being vertically stretched by a factor of 2 and being translated 7 units left.

12. Graph $y = -3|x| + 2$

13. Graph $y = -\sqrt{x+2} - 4$

PART C:

14. Is it true in general that $|x+h| = |x| + |h|$? Justify your answer by considering how the graphs of $y = |x+h|$ and $y = |x| + |h|$ are related to the graph of $y = |x|$.

15. A hiker walks up and down a hill. The hill has a cross section that can be modeled by $y = -\frac{4}{3}|x - 300| + 400$ where x and y are measured in feet and $0 \le x \le 600$. How far does the hiker walk?

Homework 2.4 Answers

1a. $y = x^2$ **1b.** translation 3 units right   **1c.** $(x, y) \rightarrow (x+3, y)$

2a. $y = |x|$ **2b.** vertical stretch by a factor of 5   **2c.** $(x, y) \rightarrow (x, 5y)$

3a. $y = \sqrt{x}$ **3b.** translation 3 units up   **3c.** $(x, y) \rightarrow (x, y+2)$

4a. $y = x$ **4b.** reflection over the x-axis   **4c.** $(x, y) \rightarrow (x, -y)$

5a. $y = |x|$ **5b.** translation 7 units right, reflection over the x-axis, vertical stretch by a factor of 2.   **5c.** $(x, y) \rightarrow (x+7, -2y)$

6a. $y = \sqrt{x}$ **6b.** translation 8 units left and 3 units down.   **6c.** $(x, y) \rightarrow (x-8, y-3)$

7a. $y = x$ **7b.** translation 4 units down, vertical stretch by a factor of 5.   **7c.** $(x, y) \rightarrow (x, 5y-4)$

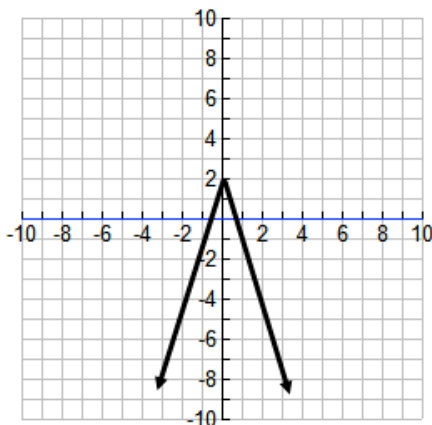**8a.** $y = x^2$ **8b.** translation 4 units left and 1 unit down, reflection over the x-axis.   **8c.** $(x, y) \rightarrow (x-4, -y-1)$
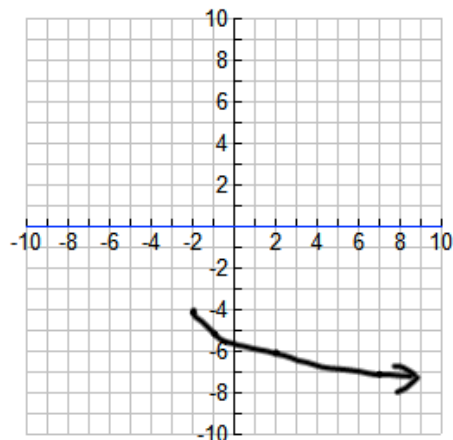
9. $y = (x-3)^2 - 8$ **10.** $y = -\sqrt{x} + 5$ **11.** $y = 2|x+7|$

12.

13.

14. No, the graph of $y = |x+h|$ is the graph of $y = |x|$ with a horizontal translation. The graph of $y = |x| + |h|$ is the graph of $y = |x|$ with a vertical translation. If the graphs are different, then these expressions are not equal.

15. 1000 feet