

PART I: MULTIPLE CHOICE Each problem has only one correct answer. Place your answer in the space provided. Each problem is worth 4 points. Partial credit will be given on some questions but not all of them.

a 1. What are the transformations for the following equation: $f(x) = 2(x - 3)^2 + 1$
 ← up 1
 v. s. ↑ right 3

- a. vertical stretch, right 3, up 1
- b. vertical compression, left 3, up 1
- c. vertical stretch, left 3, up 1
- d. vertical compression, right 3, down 1
- e. none of the above

d 2. Identify the vertex of the following equation: $f(x) = (x + 4)^2 - 3$

- a. (4, -3)
- b. (-4, 3)
- c. (4, 3)
- d. (-4, -3)
- e. A turtle named 'Bam'

$$(x - -4)^2 - 3$$

↑ h ↑ k

d 3. Write the following equation given in standard form in vertex form, $y = a(x - h)^2 + k$, and identify the vertex, (h, k), for:

$$f(x) = 2x^2 + 16x + 31$$

- a. $y = 2(x - 4)^2 - 1$; (4, -1)
- b. $y = 2(x + 4)^2 - 65$; (-4, -65)
- c. $y = 2(x - 4)^2 + 1$; (4, 1)
- d. $y = 2(x + 4)^2 - 1$; (-4, -1)
- e. None of the above

$$a = 2 \quad b = 16$$

$$h = \frac{-b}{2a} = \frac{-16}{2(2)} = -4$$

$$k = f(-4) = 2(-4)^2 + 16(-4) + 31 = 32 - 64 + 31 = -1$$

$$f(x) = 2(x - -4)^2 - 1$$

(h, k)
(-4, -1)

C 4. The path of a diver is given by $y = -0.5x^2 + 3x + 12$, where y is the height (in feet) and x is the horizontal distance (in feet) from the end of the diving board. What is the maximum height of the diver?

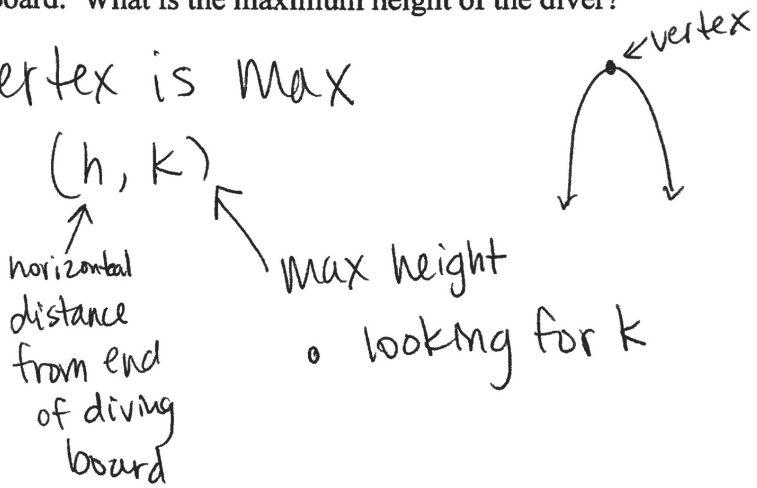
- a. 12 feet
- b. 25.5 feet
- c. 16.5 feet
- d. 3 feet
- e. none of the above

$$a = -0.5 \quad b = 3$$

$$h = \frac{-b}{2a} = \frac{-3}{2(-0.5)} = 3$$

vertex is Max

$$k = f(3) = -0.5(3)^2 + 3(3) + 12 = -4.5 + 9 + 12 = 4.5 + 12 = 16.5 \text{ ft}$$

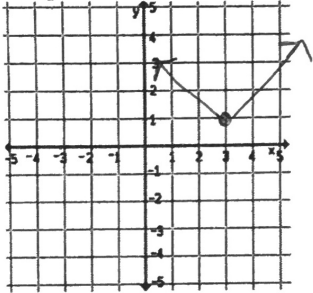


Identify the **parent** function, and sketch each transformed graph.

5. $y = |x - 3| + 1$

Parent Function: Absolute Value

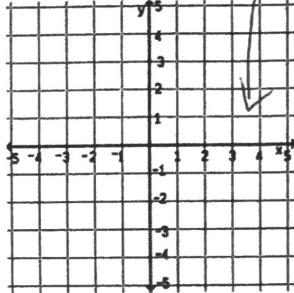
Graph:



6. $y = 2(x - 5)^3 + 9$

Parent Function: Cubic

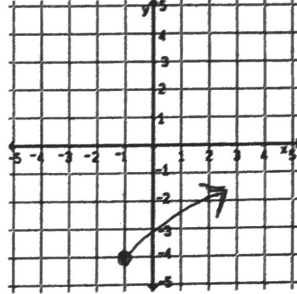
Graph:



7. $y = \sqrt{3x + 1} - 4$

Parent Function: Square root

Graph:



Describe the following Transformation

8. $f(x) = -3x^2 + 6$

- reflect over x
- stretch by 3
- up 6

9. $g(x) = \sqrt{-x + 3} - 9$

- reflect over y
- left 3
- down 9

10. $h(x) = \frac{1}{2}(x - 1)^3 - 7$

- vertical compression $\frac{1}{2}$
- right 1
- down 7.

Find the inverses for the following

11. $f(x) = \{(0,3), (5,4), (8,9)\}$

$f^{-1}(x) = \{(3,0), (4,5), (9,8)\}$

12. $f(x) = \{(0,5), (5,7), (8,3)\}$

$f^{-1}(x) = \{(5,0), (7,5), (3,8)\}$

13. $f(x) = \{(1,6), (7,4), (2,3)\}$

$f^{-1}(x) = \{(6,1), (4,7), (3,2)\}$

14. $f(x) = 4x + 3$

replace f(x)

$y = 4x + 3$

swap x & y

$x = 4y + 3$

solve for y

$x - 3 = 4y$

$\frac{x-3}{4} = y$ $f^{-1}(x) = \frac{x-3}{4}$

15. $g(x) = \sqrt{2x} - 7$

$y = \sqrt{2x} - 7$

$x = \sqrt{2y} - 7$

$x + 7 = \sqrt{2y}$

$(x+7)^2 = 2y$

$\frac{(x+7)^2}{2} = y$

$g^{-1}(x) = \frac{(x+7)^2}{2}$

16. $h(x) = \frac{4}{x}$

$y = \frac{4}{x}$

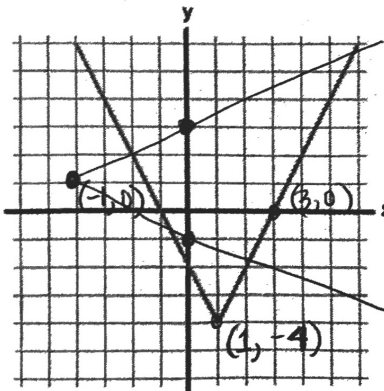
$y \cdot x = \frac{4}{y} \cdot y$

$y \cdot \frac{x}{x} = \frac{4}{\frac{1}{x}}$

$y = \frac{4}{x}$
 $h^{-1}(x) = \frac{4}{x}$

The graphs of functions are given below, graph their inverses on the same coordinate plane:

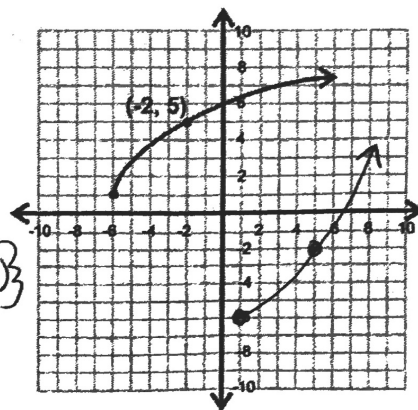
17.



$f(x) = \{(-1,0), (3,0), (3,-4)\}$

$f^{-1}(x) = \{(0,-1), (0,3), (-4,1)\}$

18.



$f(x) = \{(-6,1), (2,5)\}$

$f^{-1}(x) = \{(1,-6), (5,-2)\}$

✱ Also review one-to-one functions.