

UNIT 1: Parent Functions and Transformations

What is the definition of a function? *Each input is paired with exactly one output*

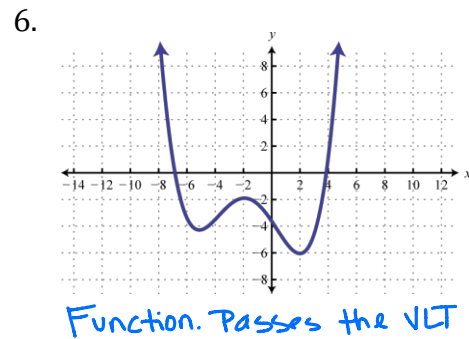
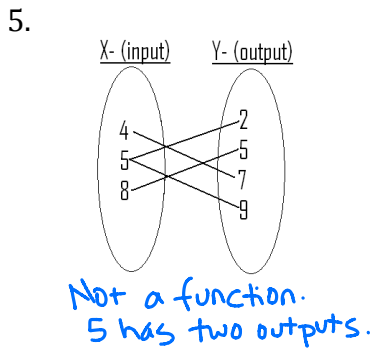
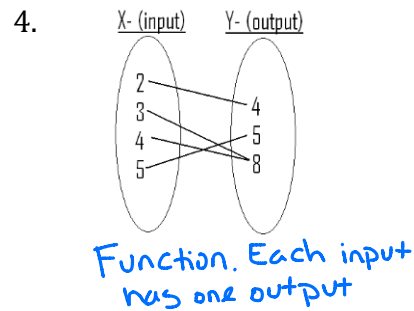
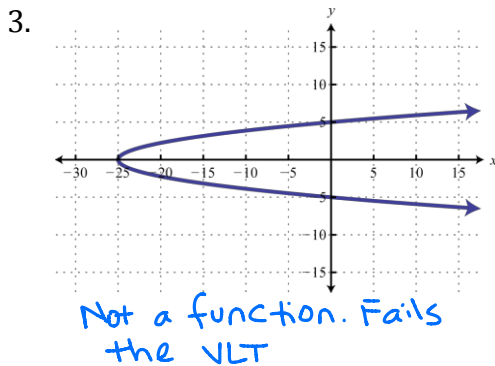
Explain whether the following relations are functions or not.

1.

| | | | | | |
|---|----|---|---|----|---|
| x | -1 | 0 | 2 | -1 | 4 |
| y | 3 | 6 | 7 | 3 | 8 |

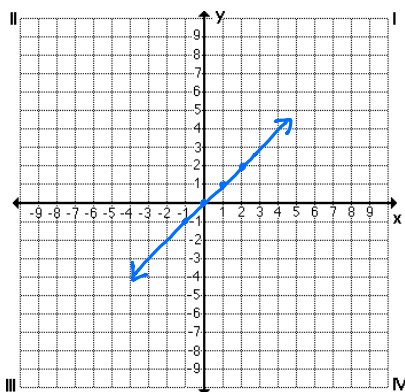
Function

2. $\{(1,4), (3,6), (5,7), (3,9), (8,10)\}$
Not a function

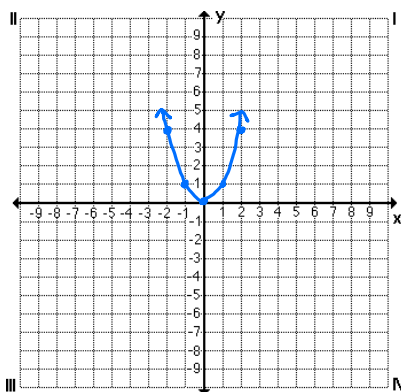


Sketch a graph of the following parent functions. Label *at least* 4 points on the graph for each.

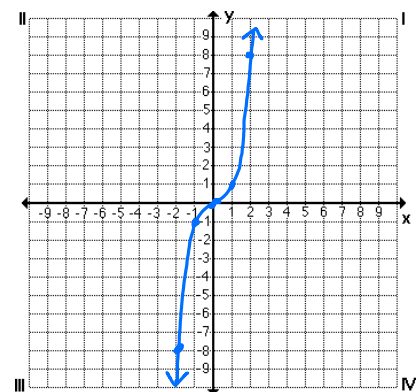
7. $y = x$



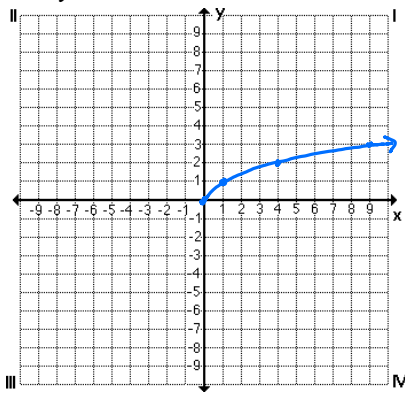
8. $y = x^2$



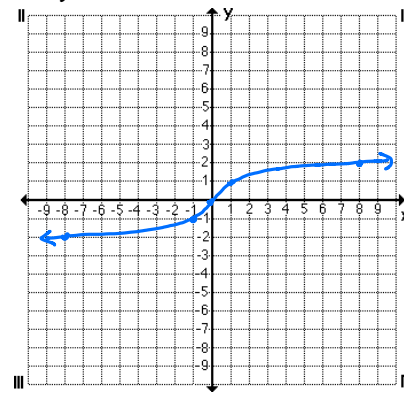
9. $y = x^3$



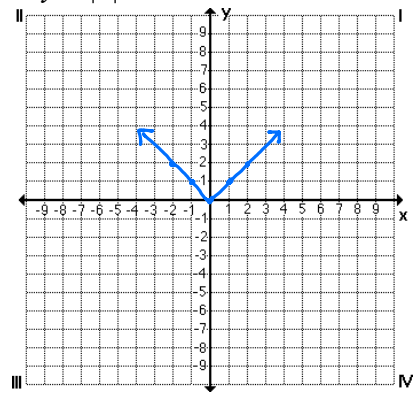
10. $y = \sqrt{x}$



11. $y = \sqrt[3]{x}$

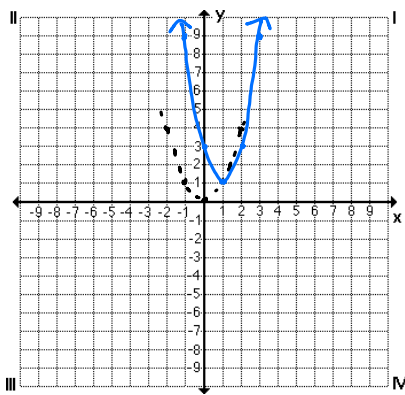


12. $y = |x|$



Graph the following transformations and identify the key characteristics listed.

13. $f(x) = 2(x-1)^2 + 1$



Domain: \mathbb{R}

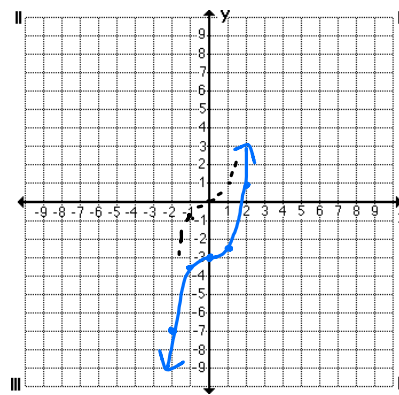
Range: $[1, \infty)$

y-intercept: $2(0-1)^2 + 1 = 3$

End Behavior:
 $x \rightarrow \infty, f(x) \rightarrow \infty$
 $x \rightarrow -\infty, f(x) \rightarrow \infty$

Intervals of increase/decrease:
 Increase: $(1, \infty)$
 Decrease: $(-\infty, 1)$

14. $f(x) = \frac{1}{2}x^3 - 3$



Domain: \mathbb{R}

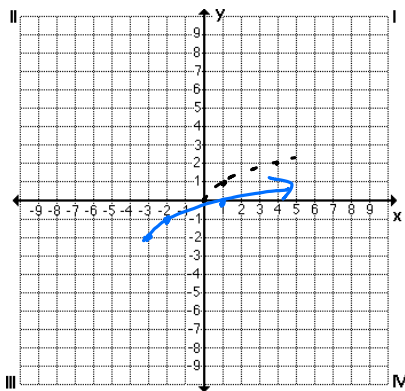
Range: \mathbb{R}

y-intercept: $\frac{1}{2} \cdot 0^3 - 3 = -3$

End Behavior:
 $x \rightarrow \infty, f(x) \rightarrow \infty$
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$

Intervals of increase/decrease:
 Increase: $(-\infty, \infty)$

15. $f(x) = \sqrt{x+3} - 2$



Domain: $[-3, \infty)$

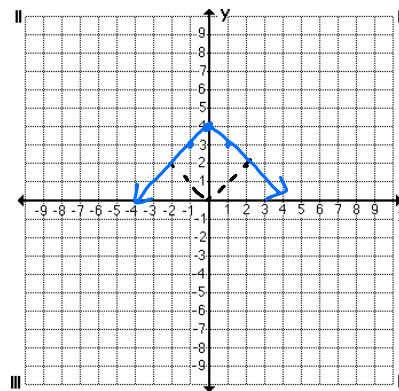
Range: $[-2, \infty)$

y-intercept: $\sqrt{0+3} - 2 = \sqrt{3} - 2$

End Behavior:
 $x \rightarrow \infty, f(x) \rightarrow \infty$

Intervals of increase/decrease:
 Increase: $[-3, \infty)$

16. $f(x) = -|x| + 4$



Domain: \mathbb{R}

Range: $(-\infty, 4]$

y-intercept: $-|0| + 4 = 4$

End Behavior:
 $x \rightarrow \infty, f(x) \rightarrow -\infty$
 $x \rightarrow -\infty, f(x) \rightarrow -\infty$

Intervals of increase/decrease:
 Increase: $(-\infty, 0)$
 Decrease: $(0, \infty)$