

Practice Test 2
Transformations

Every function on this test will be a transformation of either x^2 , \sqrt{x} , 2^x , $|x|$, or x .

For questions 1-4, list the parent function and all transformations.

1. $y = -(x + 3)^2$

Parent function: x^2

Shifts: Left 3

Reflections: Vertical

Stretches/Shrinks: None

2. $y = -2\sqrt{x} + 5$

Parent function: \sqrt{x}

Shifts: Up 5

Reflections: vertical

Stretches/Shrinks: Stretch by 2

3. $y = -2^{x+1}$

Parent function: 2^x

Shifts: Left 1

Reflections: Vertical

Stretches/Shrinks: None

4. $y = \frac{1}{2}|-x + 1| - 7.2$

Parent function: $|x|$

Shifts: Left 1, down 7.2

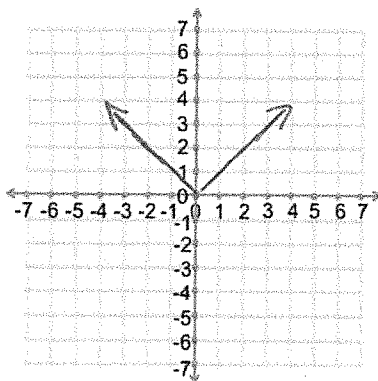
Reflections: Horizontal (won't change)

Stretches/Shrinks: Shrink by $\frac{1}{2}$

5. In the equation $y^2 = x$, is y a function of x ? Explain.

No... there are inputs that have more than one output. For example, for $x=4$ we have $2^2=4$ and $(-2)^2=4$.

6. Let $f(x) = |x|$. Graph $y = f(x)$ on the coordinate plane below and state the domain and range of f .



Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

7. Now let $g(x) = |x + 3| - 12$.

a) How would the graph of g be different from the graph of f ? (You don't have to graph it, just say how we have transformed f .)

Shift f to the left 3 and down 12.

b) What is the domain and range of g . (Again, don't graph, just use your answers from 6 and 7a to help you.)

$$D: (-\infty, \infty)$$

$$R: [-12, \infty)$$

For questions 8-10, put each linear function in slope-intercept form.

$$\begin{array}{r} 8. \quad 3x + y = x + 1 \\ -3x \quad -3x \\ \hline y = -2x + 1 \end{array}$$

$$\begin{array}{r} 9. \quad y + 1 = \frac{2}{3}(x - 3) \\ \hline y + 1 = \frac{2}{3}x - 2 \\ -1 \quad -1 \\ \hline y = \frac{2}{3}x - 3 \end{array}$$

$$\begin{array}{r} 10. \quad 4x - 2y = 7 \\ -4x \quad -4x \\ \hline -2y = -4x + 7 \\ -2 \quad -2 \\ \hline y = 2x - \frac{7}{2} \end{array}$$

For questions 11-14, let $f(x) = 5^x$. Write an equation that would transform f in the manners described.

11. Down 6

$$y = 5^x - 6$$

12. Right 5 and horizontal reflection

$$y = 5^{-x-5}$$

13. Vertical reflection and vertical shrink by $\frac{1}{2}$.

$$y = -\frac{1}{2} \cdot 5^x$$

14. Vertical reflection, left 6, and up 4.8

$$y = -5^{x+6} + 4.8$$

15. Beginning at the top of mount Shasta, a professional skier begins sliding down the slopes at a rate of 50 meters per second. After 20 seconds, her elevation is 3,300 meters.

a) Write an equation in point-slope form that gives elevation (y) as a function of time (x).

$$y - 3300 = -50(x - 20)$$

b) Put your equation from part a in slope-intercept form.

$$y = 50x + 4300$$

c) What is the y-intercept of the line representing this situation? Write one sentence explaining what the y-intercept means in the context of this problem.

$(0, 4300)$ The elevation at the peak of Mt Shasta is 4300 m.

d) What is the x-intercept of the line representing this situation? Write one sentence explaining what the x-intercept means in the context of this problem.

$$0 = -50x + 4300$$

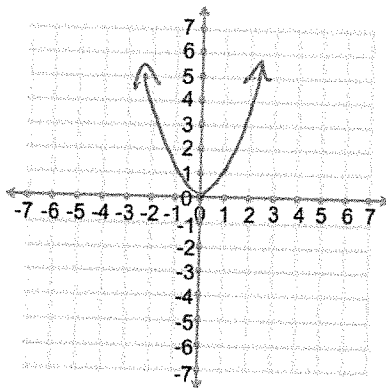
$$50x = 4300$$

$$x = 86$$

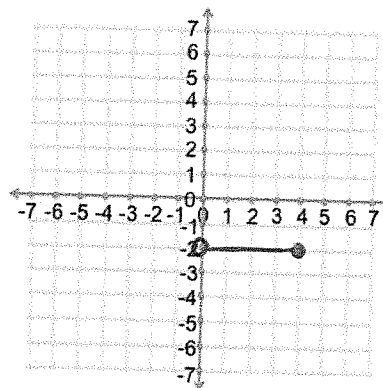
If it takes the skier 86 seconds to reach the bottom.

For questions 16 and 17, draw a function that has the given domain and range.

16. Domain: $(-\infty, \infty)$
Range: $[0, \infty)$



17. Domain: $[0, 4]$
Range: $\{-2\}$



18. What are the domain and range of the function $y = 2^x$?

$$D: (-\infty, \infty)$$

$$R: (0, \infty)$$

19. What are the domain and range of the function $y = 2^{x+3} - 7$?

$$D: (-\infty, \infty)$$

$$R: (-7, \infty)$$

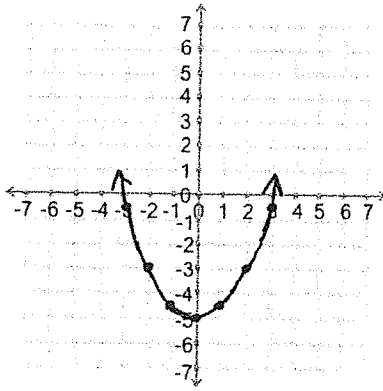
20. What are the domain and range of the function $y = -2^x$?

$$D: (-\infty, \infty)$$

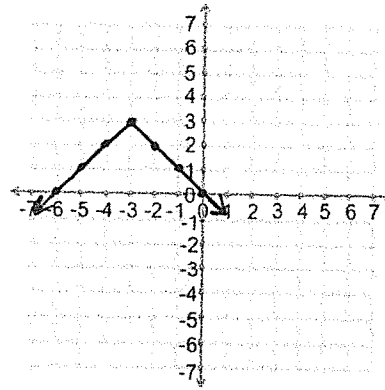
$$R: (-\infty, 0)$$

What functions are drawn in each of the coordinate planes below?

21. $y = \frac{1}{2}x^2 - 5$



22. $y = -|x+3| + 3$



Graph and label each function below.

23. $f(x) = -(x + 11)^2$

24. $g(x) = 4x - 7$

25. $h(x) = -\frac{1}{2} \cdot 2^{x+6}$

