

Algebra 1 · Transformations, Absolute Value and Piecewise Functions · Quiz

Common Core F-BF.B.3, F-IF.C.7b · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

Answer these 10 multiple-choice questions on transformations, absolute value, piecewise and step functions. Each question has exactly one correct answer. Read each graph carefully, then check your choice with the explanation.

Algebra 1 Common Core: F-BF.B.3 · F-IF.C.7b

Questions

Question 1

How does the graph of $y = |x| + 6$ compare with the graph of $y = |x|$?

- A. It moves down 6 units
- B. It moves up 6 units
- C. It moves left 6 units
- D. It moves right 6 units

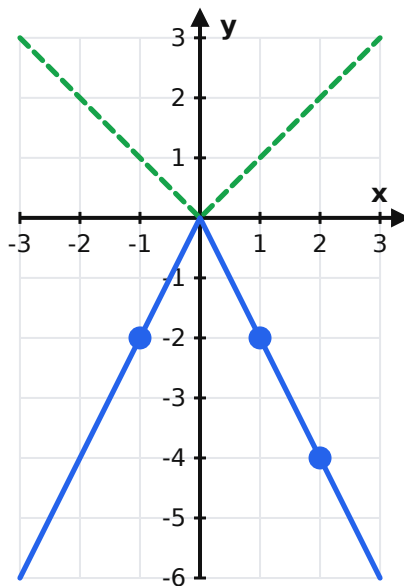
Question 2

What is the vertex of the graph of $y = (x - 3)^2$?

- A. $(-3, 0)$
- B. $(0, 3)$
- C. $(3, 0)$
- D. $(0, -3)$

Question 3

Which equation matches the solid graph?



The dashed graph is $y = |x|$.

- A. $y = -2|x|$
- B. $y = 2|x|$
- C. $y = -\frac{1}{2}|x|$
- D. $y = |x| - 2$

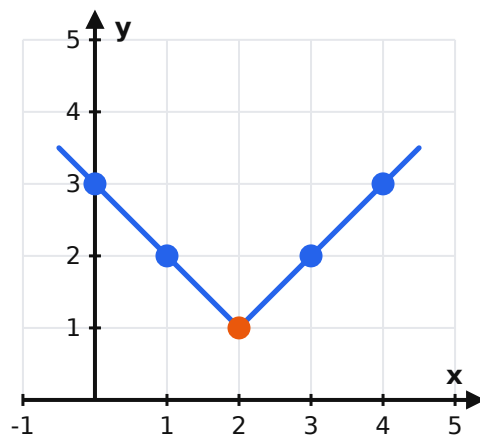
Question 4

Let $f(x) = x^2$. What is $f(x+2)$ when $x = 1$?

- A. 3
- B. 9
- C. 5
- D. 6

Question 5

What is the vertex of the graph shown?



A shifted absolute value graph.

- A. $(-2, 1)$
- B. $(2, 1)$
- C. $(1, 2)$
- D. $(2, -1)$

Question 6

Compared with the graph of $y = x^2$, the graph of $y = -3x^2$ is

- A. flipped over the x-axis and stretched by a factor of 3
- B. flipped over the x-axis and shrunk by a factor of 3
- C. flipped over the y-axis and stretched by a factor of 3
- D. shifted down 3 units and opening downward

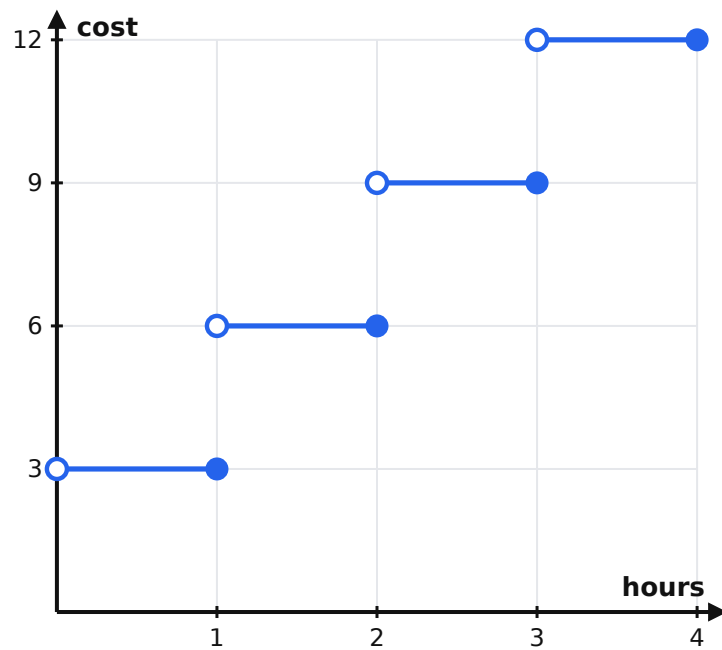
Question 7

Let $f(x) = x + 1$ when $x < 3$, and $f(x) = 2x - 3$ when $x \geq 3$. What is $f(3)$?

- A. 4
- B. 6
- C. 0
- D. 3

Question 8

The graph shows the cost of renting a scooter for each hour or part of an hour. What is the cost for 2.4 hours?



Closed circles at the right end of each step.

- A. \$7.20
- B. \$6
- C. \$9
- D. \$12

Question 9

How many x-intercepts does the graph of $y = |x| + 3$ have?

- A. 1
- B. 2
- C. 0
- D. 3

Question 10

What is the vertex of the graph of $y = \frac{1}{2}|x - 6| - 1$?

- A. $(-6, -1)$
- B. $(6, 1)$
- C. $(3, -1)$
- D. $(6, -1)$

Answer key

1. **B** - Adding 6 to every output moves the graph up 6 units. Changes outside the absolute value are vertical.
2. **C** - The squared part is 0 when $x = 3$, so the vertex is $(3,0)$. Subtracting inside moves the graph right, not left.
3. **A** - The graph passes through $(1,-2)$, so each y-value is -2 times the dashed graph's value: a flip and a stretch by 2.
4. **B** - $f(1+2) = f(3) = 9$. The value 3 comes from computing $f(1)+2$, which adds 2 outside instead.
5. **B** - The lowest point of the V is $(2,1)$, matching $y = |x-2|+1$. Mixing up x and y gives $(1,2)$.
6. **A** - The factor 3 is greater than 1, so the graph is stretched, and the negative sign flips it over the x-axis.
7. **D** - Since $3 \geq 3$, use the second rule: $2(3)-3 = 3$. Using the first rule gives 4, which is the open-circle value.
8. **C** - 2.4 hours lies between 2 and 3, where the step is at 9. Multiplying 3 by 2.4 ignores that the price jumps in whole hours.
9. **C** - $|x| \geq 0$, so $|x|+3 \geq 3$ and the graph never reaches the x-axis. It lies entirely above it.
10. **D** - Read h and k from $a|x-h|+k$: $h = 6$, $k = -1$. The factor $\frac{1}{2}$ changes the steepness, not the vertex.

Remember:

- Standards F-BF.B.3 and F-IF.C.7b: describe how $f(x)+k$, $f(x+k)$ and $kf(x)$ change a graph, and graph absolute value, piecewise-defined and step functions.
- Outside changes act on y and are intuitive; inside changes act on x and work backward: $x - 4$ moves right 4.
- The graph of $a|x - h| + k$ has its vertex at (h, k) and opens up when $a > 0$ and down when $a < 0$.
- On a piecewise graph, a closed circle includes the endpoint and an open circle excludes it.
- A step function has horizontal pieces and jumps, like a price charged per box or per hour or part of an hour.