

Algebra 2 · Transformations of Functions · Quiz

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

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

Ten multiple-choice questions check your skill with transformations of functions: shifts, reflections, stretches, even and odd symmetry, and the graphs of square root, cube root and exponential functions. Choose the one correct answer, then read the explanation.

Algebra 2 Common Core: F-BF.B.3 · F-IF.C.7b

Questions

Question 1

How is the graph of $y = (x-3)^2$ related to the graph of $y = x^2$?

- A. Shifted left 3
- B. Shifted up 3
- C. Shifted down 3
- D. Shifted right 3

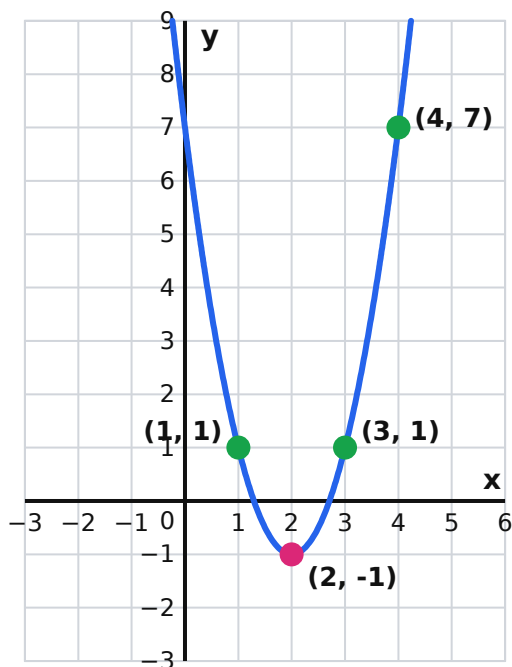
Question 2

Which describes the graph of $g(x) = |x+4| - 2$ compared with $y = |x|$?

- A. Left 4 and down 2
- B. Right 4 and down 2
- C. Left 4 and up 2
- D. Left 2 and down 4

Question 3

Which equation matches the parabola?



A parabola with vertex $(2, -1)$.

- A. $y = 2(x+2)^2 - 1$
- B. $y = \frac{1}{2}(x-2)^2 - 1$
- C. $y = 2(x-2)^2 - 1$
- D. $y = 2(x-2)^2 + 1$

Question 4

Is $f(x) = x^3 - x$ even, odd or neither?

- A. Even
- B. Odd
- C. Neither
- D. Both even and odd

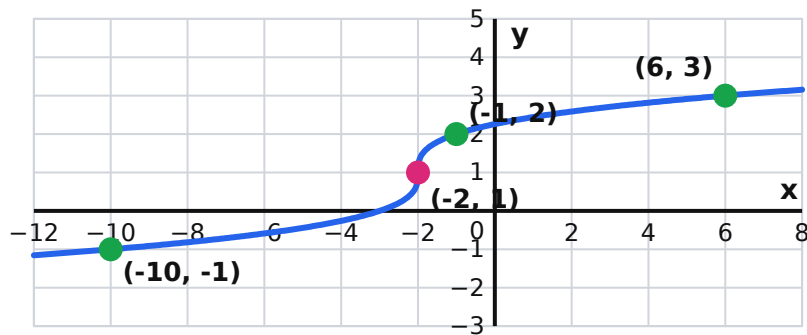
Question 5

What is the domain of $y = \sqrt{x-6} + 1$?

- A. $x \geq 1$
- B. $x \leq 6$
- C. $x \geq 6$
- D. $x \geq -6$

Question 6

Which equation matches the cube root graph?



A cube root curve with center $(-2, 1)$.

- A. $y = \sqrt[3]{x-2}+1$
- B. $y = \sqrt[3]{x+2}+1$
- C. $y = \sqrt[3]{x+2}-1$
- D. $y = \sqrt[3]{x-1}+2$

Question 7

The point $(4, -6)$ is on the graph of $y = f(x)$. Which point is on the graph of $y = f(2x)$?

- A. $(8, -6)$
- B. $(4, -12)$
- C. $(2, -3)$
- D. $(2, -6)$

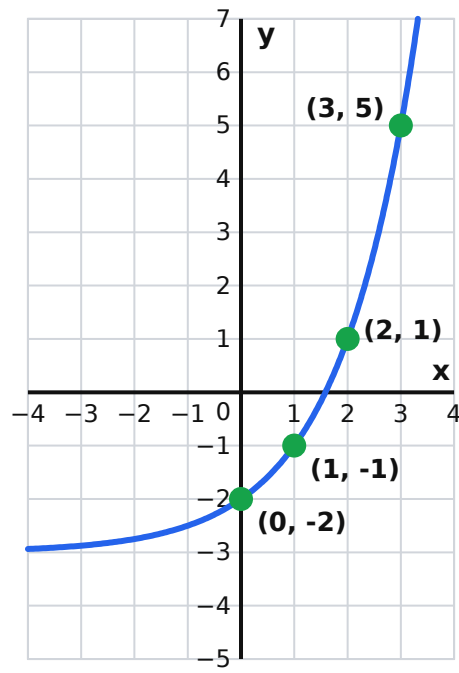
Question 8

Which function is the graph of $y = \sqrt{x}$ reflected over the y-axis?

- A. $y = -\sqrt{x}$
- B. $y = \sqrt{-x}$
- C. $y = -\sqrt{-x}$
- D. $y = \sqrt{x-1}$

Question 9

The graph of $y = 2^x - 3$ is shown. What is its horizontal asymptote?



An exponential graph.

- A. $y = -3$
- B. $y = 3$
- C. $y = 0$
- D. $y = -2$

Question 10

Which expression equals 2^{x+3} ?

- A. $6 \cdot 2^x$
- B. $2^x + 3$
- C. $8 \cdot 2^x$
- D. $3 \cdot 2^x$

Answer key

1. **D** - Replacing x with $x-3$ moves the graph right 3. The minus sign inside tricks many students into moving left.
2. **A** - The $+4$ inside moves the vertex left to $x=-4$, and the -2 outside moves it down 2, so the vertex is $(-4,-2)$.
3. **C** - The vertex $(2,-1)$ gives $(x-2)^2-1$. The point $(3,1)$ is 2 above the vertex after 1 step, so $a=2$; a factor of $\frac{1}{2}$ would make the parabola wider.
4. **B** - $f(-x) = -x^3 + x = -(x^3 - x) = -f(x)$, so f is odd. It is not even because $f(-x)$ is the opposite of $f(x)$, not equal to it.
5. **C** - The radicand must be nonnegative: $x-6 \geq 0$ gives $x \geq 6$. The $+1$ affects the range, not the domain.
6. **B** - The center is $(-2,1)$, so $h=-2$ and $k=1$. Check $(6,3)$: $\sqrt[3]{8}+1=3$. Using $x-2$ puts the center on the wrong side.
7. **D** - Replacing x by $2x$ halves each x-coordinate: $2x=4$ gives $x=2$. The y-coordinate is unchanged.
8. **B** - A reflection over the y-axis replaces x with $-x$. The function $-\sqrt{x}$ is the reflection over the x-axis.
9. **A** - The parent 2^x has asymptote $y=0$, and subtracting 3 moves it down to $y=-3$. The value -2 is the y-intercept, not the asymptote.
10. **C** - $2^{x+3} = 2^x \cdot 2^3 = 8 \cdot 2^x$, so a shift left 3 is a vertical stretch by 8. Adding 3 outside would shift the graph up instead.

Remember:

- Standards F-BF.B.3 and F-IF.C.7b: identify the effect of transformations and graph square root, cube root and other basic functions.
- $f(x)+k$ shifts vertically; $f(x+k)$ shifts horizontally in the opposite direction of the sign.
- $a \cdot f(x)$ stretches or compresses vertically; $f(kx)$ compresses or stretches horizontally by $\frac{1}{|k|}$; a negative factor reflects.
- Even: $f(-x) = f(x)$. Odd: $f(-x) = -f(x)$. Test by substituting $-x$.
- $y = \sqrt{x-h}+k$ starts at (h,k) ; $y = \sqrt[3]{x-h}+k$ is centered at (h,k) .