

Shifting, Stretching and Piecewise Functions

Grade 9 – Algebra 1 math · Test Answer Key · Standards: F-BF.B.3, F-IF.C.7b

Use this answer key to score the test out of 20 points. Each solution lists where the points are earned. Accept equivalent descriptions of a transformation, such as moves right 5 or shifts 5 units to the right.

Standards: F-BF.B.3, F-IF.C.7b · **Level:** Grade 9 Algebra 1

Question 1 Shift a Parabola (2 points)

+5 inside moves the graph 5 units left, and -4 outside moves it 4 units down.

Left 5, down 4; vertex $(-5, -4)$

Scoring: 1 point for the shifts, 1 point for the vertex.

Question 2 Read an Absolute Value Rule (2 points)

Vertex **(3, 6)**. The coefficient is negative, so it **opens down**. $|-1/2| < 1$, so the graph is **wider**.

Scoring: 1 point for the vertex, 1 point for direction and width.

Question 3 Move a Point (2 points)

- $(4, -2 + 3) = \mathbf{(4, 1)}$.
- The shift is 1 unit right: **(5, -2)**.

Scoring: 1 point per part.

Question 4 Evaluate a Piecewise Function (3 points)

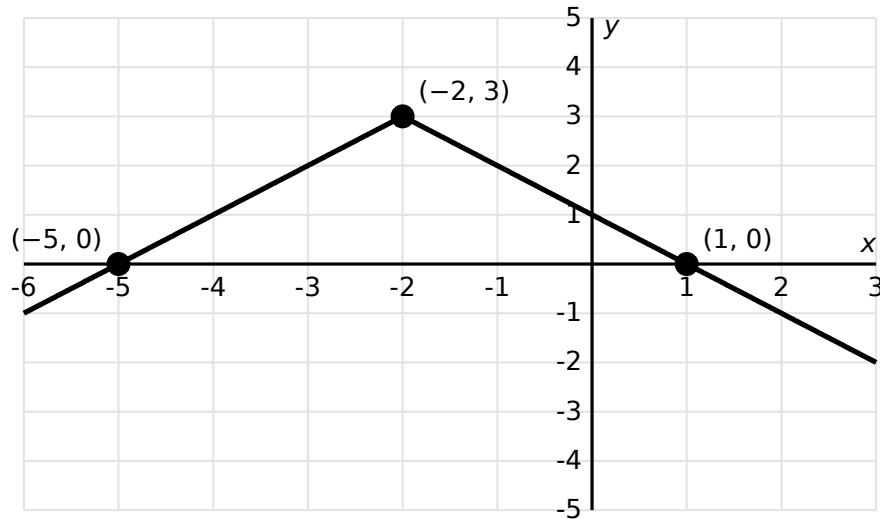
- $-3 < -1$: $2(-3) + 3 = \mathbf{-3}$. 0 is in $[-1, 2]$: $0 - 4 = \mathbf{-4}$.
- 2 is in $[-1, 2]$: $4 - 4 = \mathbf{0}$.
- $5 > 2$: $6 - 5 = \mathbf{1}$.

Scoring: 1 point per part; both values are needed in part (a).

Question 5 Absolute Value Graph (3 points)

- $(-2, 3)$** .

- b. $h = -2$ and $k = 3$. Use $(0, 1)$: $1 = a|2| + 3$, so $a = -1$. $y = -|x + 2| + 3$
 c. $-|x + 2| + 3 = 0$ gives $|x + 2| = 3$, so $x = 1$ and $x = -5$.



Vertex and intercepts.

Scoring: 1 point per part.

Question 6 Shipping Steps (2 points)

- a. At 3 pounds the closed circle is at height 12: **\$12**.
 b. 1.5 lies in the step $1 < w \leq 2$, so **\$9**.

Scoring: 1 point per part.

Question 7 Phone Data Plan (3 points)

- a. $C(g) = 25$ for $0 \leq g \leq 3$; $C(g) = 25 + 8(g - 3)$ for $g > 3$.
 b. $25 + 8(2.5) = 25 + 20 = \mathbf{\$45}$.

Scoring: (a) 1 point per piece. (b) 1 point.

Question 8 Write a Transformed Parabola (3 points)

- a. Right 6: $(x - 6)^2$. Reflect: $-(x - 6)^2$. Up 2: $y = \mathbf{-(x - 6)^2 + 2}$.
 b. Vertex **(6, 2)**. At $x = 8$: $-(2)^2 + 2 = \mathbf{-2}$.

Scoring: (a) 1 point for the horizontal and reflection steps, 1 point for the vertical shift. (b) 1 point.