

Shifting, Stretching and Piecewise Functions

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

Name: _____ Date: _____ Class: _____

This test has 8 questions worth 20 points. Allow 45 minutes and work without notes. A calculator is allowed. Show each step so that partial credit can be awarded for correct reasoning.

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

Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Shift a Parabola (2 points)

Describe how the graph of $g(x) = (x + 5)^2 - 4$ is related to the graph of $f(x) = x^2$, and name the vertex.

Question 2 Read an Absolute Value Rule (2 points)

For $h(x) = -\frac{1}{2}|x - 3| + 6$, state the vertex, whether the graph opens up or down, and whether it is wider or narrower than $y = |x|$.

Question 3 Move a Point (2 points)

The point $(4, -2)$ is on the graph of $y = f(x)$. Give the corresponding point on each graph.

- a. $y = f(x) + 3$ (1 point)
- b. $y = f(x - 1)$ (1 point)

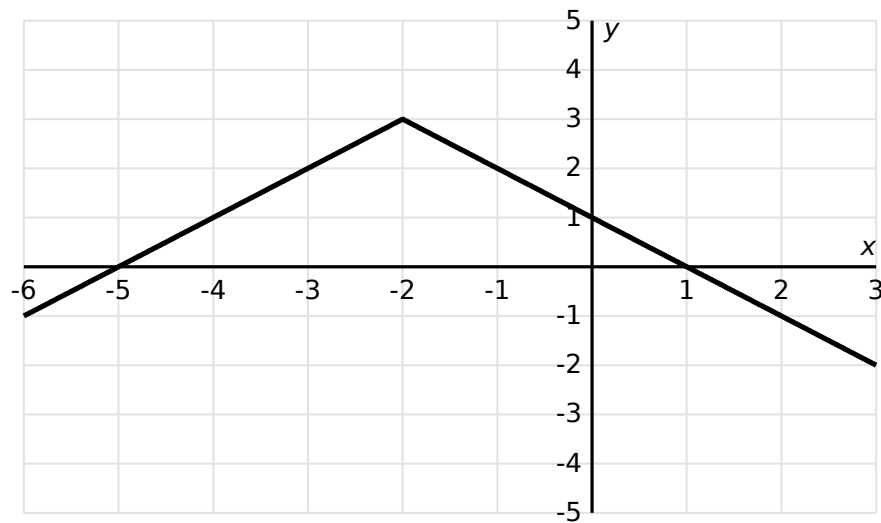
Question 4 Evaluate a Piecewise Function (3 points)

Let $f(x) = 2x + 3$ for $x < -1$; $f(x) = x^2 - 4$ for $-1 \leq x \leq 2$; and $f(x) = 6 - x$ for $x > 2$.

- a. Find $f(-3)$ and $f(0)$. (1 point)
- b. Find $f(2)$. (1 point)
- c. Find $f(5)$. (1 point)

Question 5 Absolute Value Graph (3 points)

The graph shows an absolute value function.

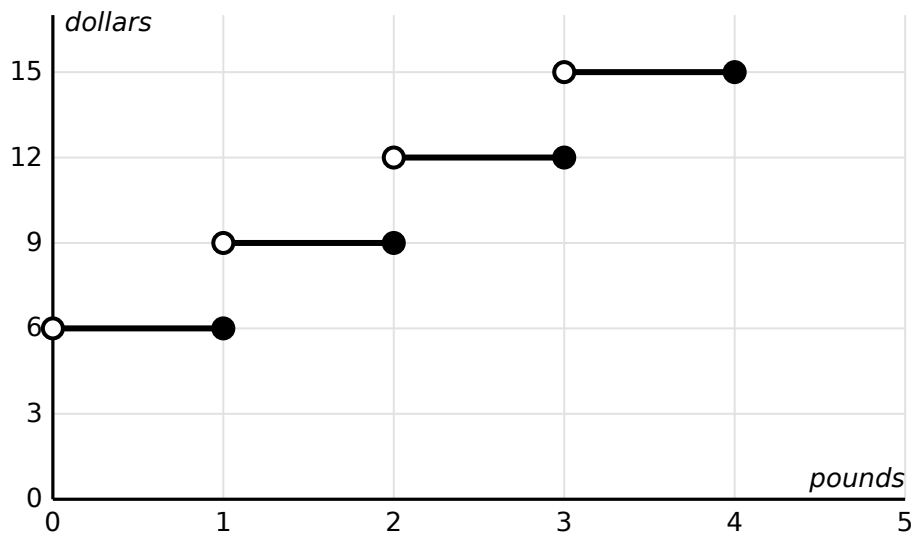


An absolute value graph.

- Name the vertex. (1 point)
- Write an equation of the form $y = a|x - h| + k$. (1 point)
- Find the x-intercepts. (1 point)

Question 6 Shipping Steps (2 points)

The graph shows the cost of shipping a package by weight.



Shipping cost by weight.

- What does it cost to ship a 3-pound package? (1 point)
- What does it cost to ship a 1.5-pound package? (1 point)

Question 7 Phone Data Plan (3 points)

A plan costs \$25 for up to 3 gigabytes (GB). Each GB beyond 3 costs another \$8.

- a. Write the cost $C(g)$ as a piecewise function. (2 points)
- b. Find the cost of using 5.5 GB. (1 point)

Question 8 Write a Transformed Parabola (3 points)

The graph of $y = x^2$ is moved 6 units right, reflected over the x -axis and moved 2 units up.

- a. Write the new equation. (2 points)
- b. Give the vertex and the y -value at $x = 8$. (1 point)