

Understanding Functions and Function Notation

Grade 9 – Algebra 1 math · Test Answer Key · Standards: F-IF.A.1, F-IF.A.2, F-IF.B.5

Use this answer key to score the test. Accept domain and range written as inequalities or in set or interval notation, and give credit for reasons that name a repeated input in the vertical line test.

Standards: F-IF.A.1, F-IF.A.2, F-IF.B.5 · **Level:** Grade 9 Algebra 1

Question 1 Is it a function? (2 points)

- (a) Each x-value appears once, so each has one output (repeated outputs are fine): **function**.
- (b) The input 0 has outputs 1 and 4: **not a function**.

Scoring: 1 point per part with a reason.

Question 2 Evaluate a quadratic (2 points)

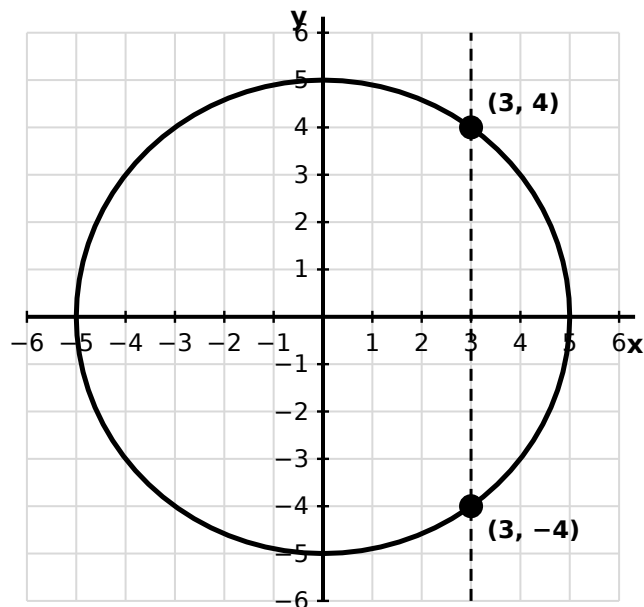
$$f(-3) = 9 + 12 + 7 = 28. \quad f(2) = 4 - 8 + 7 = 3.$$

$$\mathbf{f(-3) = 28; f(2) = 3}$$

Scoring: 1 point for each value.

Question 3 Vertical line test (2 points)

A vertical line such as $x = 3$ crosses the circle at $(3, 4)$ and $(3, -4)$, so the input 3 has two outputs.



The line $x = 3$ crosses twice.

No, it is not a function.

Scoring: 1 point for the answer, 1 point for naming a vertical line or a repeated input.

Question 4 Interpret function values (3 points)

- (a) Six minutes after leaving, the train travels at 48 miles per hour.
- (b) Forty minutes after leaving, the train is stopped.
- (c) Input: minutes. Output: miles per hour.

Statements interpreted with units

Scoring: 1 point per part.

Question 5 Domain and range of a graph (3 points)

- (a) The graph runs from -5 (closed) to 1 (open): $-5 \leq x < 1$.
- (b) Heights run from -2 (closed) to 4 (open): $-2 \leq y < 4$.
- (c) The line is $y = x + 3$, so $f(-2.5) = 0.5$.

Domain $-5 \leq x < 1$; range $-2 \leq y < 4$; $f(-2.5) = 0.5$

Scoring: 1 point per part.

Question 6 Discrete or continuous (2 points)

(a) Tickets are counted in whole numbers 0 to 120, so the domain is discrete.

(b) The outputs are the multiples of 11 from 0 to 1,320: $\{0, 11, 22, \dots, 1,320\}$.

Discrete; range $\{0, 11, \dots, 1,320\}$

Scoring: 1 point per part.

Question 7 Using function notation (3 points)

(a) $f(-2) = 6 + 8 = 14$.

(b) $6 - 4x = -18$, so $-4x = -24$ and $x = 6$.

(c) $f(x + 1) = 6 - 4(x + 1) = 6 - 4x - 4 = 2 - 4x$.

14; $x = 6$; $2 - 4x$

Scoring: 1 point per part.

Question 8 Rental charges (3 points)

(a) $R(3.5) = 25 + 42 = 67$ dollars.

(b) Domain: $0 \leq h \leq 8$. At $h = 0$, $R = 25$; at $h = 8$, $R = 121$. Range: $25 \leq R \leq 121$.

(c) $25 + 12h = 85$, so $12h = 60$ and $h = 5$.

\$67; domain $0 \leq h \leq 8$, range $25 \leq R \leq 121$; $h = 5$

Scoring: 1 point per part.