

Understanding Functions and Their Graphs

Grade 8 math · Test Answer Key · Standards: 8.F.A.1, 8.F.A.2, 8.F.A.3

Use the scoring lines. For graph questions accept any correct pair of points. For explanations, award the point when the one-output idea or the constant rate of change is stated clearly.

Standards: 8.F.A.1, 8.F.A.2, 8.F.A.3 · **Level:** Grade 8

Question 1 Function or not? (2 points)

- The input 6 has two outputs, 13 and 15: not a function.
- Each input appears once; the repeated output 4 is allowed: a function.

(a) not a function (b) function

Scoring: 1 point per part, with a reason.

Question 2 Evaluate (2 points)

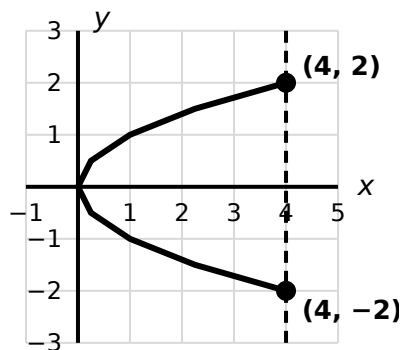
$$f(-2) = 3(4) - 5 = 7. \quad f(4) = 3(16) - 5 = 43.$$

$$f(-2) = 7 \text{ and } f(4) = 43$$

Scoring: 1 point each.

Question 3 Which graph? (3 points)

- Graph A.
- Any vertical line meets Graph A once. A vertical line such as $x = 4$ meets Graph B twice.
- For example $(4, 2)$ and $(4, -2)$.



Graph B with the line $x = 4$.

(a) Graph A (b) Graph B fails the test (c) (4, 2) and (4, -2)

Scoring: 1 point per part.

Question 4 Compare two functions (3 points)

- a. Function 1: 4. Function 2: 2 (the outputs rise by 2).
- b. Function 1: 3. Function 2: 6.
- c. Function 1 gives $4(10) + 3 = 43$. Function 2 gives $2(10) + 6 = 26$.

(a) 4 and 2 (b) 3 and 6 (c) Function 1

Scoring: 1 point per part.

Question 5 Linear or not? (3 points)

- a. The changes are 4, 6 and 8.
- b. The rate of change is not constant, so it is nonlinear.
- c. The outputs rise by 3 and start at 5: $y = 3x + 5$.

(a) 4, 6, 8 (b) nonlinear (c) $y = 3x + 5$

Scoring: 1 point per part.

Question 6 Graph and equation (3 points)

- a. Rate $(11 - 3) \div 4 = 2$; initial value 3.
- b. The equation has rate 2.5, which is more than 2, so it changes faster.
- c. $y = 2x + 3$.

(a) 2 and 3 (b) the equation (c) $y = 2x + 3$

Scoring: 1 point per part.

Question 7 Rising water (2 points)

$d(4) = 5(4) + 8 = 28$. For 43: $5t + 8 = 43$, so $5t = 35$ and $t = 7$.

28 inches; 7 hours

Scoring: 1 point each.

Question 8 Is area linear? (2 points)

The areas are 1, 4 and 9. The change from side 1 to 2 is 3, and from side 2 to 3 is 5. The rate of change is not constant, so the function is nonlinear.

Rates 3 and 5 differ: not linear

Scoring: 1 point for the areas and changes, 1 point for the conclusion.