

Grade 8 · Linear Functions and Modeling · Test Answer Key

Common Core 8.F.B.4, 8.F.B.5 · mathovore.fr

Use this answer key to score the linear functions test out of 20 points. Each solution shows the work and a scoring guide. Give partial credit for correct steps even when the final answer has an arithmetic slip.

Grade 8 Common Core: 8.F.B.4 · 8.F.B.5

Question 1: Rate and initial value (2 points)

(a) The rate of change is -4 gallons per minute (the tank loses 4 gallons each minute).

(b) The initial value is 30 gallons.

Scoring: 1 point for -4 with units, 1 point for 30 gallons.

Question 2: Equation from a table (2 points)

y increases by 4 for each step of 1, so $m = 4$. Then $9 = 4(1) + b$ gives $b = 5$.

Equation: $y = 4x + 5$.

Scoring: 1 point for the rate 4, 1 point for $b = 5$ and the equation.

Question 3: Equation from two points (3 points)

$$m = \frac{11 - (-1)}{4 - (-2)} = \frac{12}{6} = 2.$$

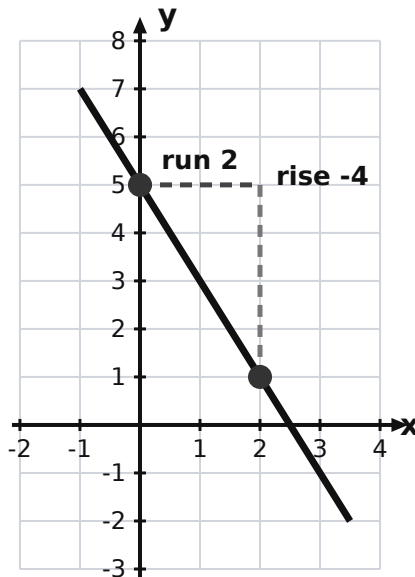
$-1 = 2(-2) + b$ gives $-1 = -4 + b$, so $b = 3$.

Equation: $y = 2x + 3$. Check: $2(4) + 3 = 11$.

Scoring: 1 point for $m = 2$, 1 point for $b = 3$, 1 point for the equation written correctly.

Question 4: Equation from a graph (3 points)

The line crosses the y -axis at 5, so $b = 5$. From $(0, 5)$ to $(2, 1)$ the run is 2 and the rise is -4 , so $m = \frac{-4}{2} = -2$.



Run 2, rise -4.

Equation: $y = -2x + 5$.

Scoring: 1 point for $b = 5$, 1 point for the rate -2, 1 point for the equation.

Question 5: Linear or nonlinear? (2 points)

(a) The changes in y are 3, 3, 3: constant, so P is **linear**.

(b) The changes are 1, 2, 3: not constant, so Q is **nonlinear**.

Scoring: for each table, 1 point for the correct decision supported by the changes.

Question 6: Club savings (2 points)

(a) $y = 12x + 85$.

(b) $12x + 85 = 205$, so $12x = 120$ and $x = 10$. **10 weeks**.

Scoring: 1 point for the function, 1 point for 10 weeks.

Question 7: Describe a graph (2 points)

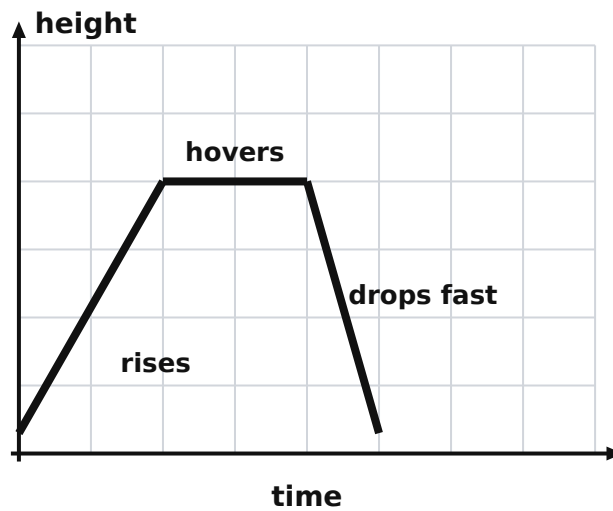
From 0 to 4 seconds the height is increasing (the elevator goes up 12 feet, 3 feet per second). From 4 to 8 seconds it is constant at 12 feet (stopped). From 8 to 12 seconds it is decreasing back to the ground (-3 feet per second).

The whole graph is **not linear** because it is not one straight line.

Scoring: 1 point for the three parts described correctly, 1 point for saying the graph is nonlinear with a reason.

Question 8: Sketch a graph (2 points)

The graph rises in a straight line, then is horizontal, then falls in a steeper straight line to the ground.



Scoring: 1 point for rising then level, 1 point for a descent that is steeper than the rise and ends at the ground.

Question 9: Filling a pool (2 points)

(a) $m = \frac{230-150}{5-3} = \frac{80}{2} = 40$ gallons per minute.

(b) $150 = 40(3) + b$ gives $b = 30$. The function is $y = 40x + 30$, and the initial value is 30 gallons.

Scoring: 1 point for 40 gallons per minute, 1 point for the equation with initial value 30.

Total
20 points