Constructing and interpreting straight-line models

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. Find the line through $(0, 6)$ and $(4, 18)$. [2 marks]

Gradient $= \frac{(18 - 6)}{4} = 3$.

The first point gives intercept 6.

Answer: $y = 3x + 6$.

2. Find the line through $(3, 8)$ and $(7, 20)$. [2 marks]

Gradient $= \frac{12}{4} = 3$.

$8 = 3(3) + b$ gives $b = -1$.

Answer: $y = 3x - 1$.

3. A machine has a setup cost of 250 dollars and costs 7 dollars per item. Model total cost. [2 marks]

Separate fixed cost 250 from variable cost $7n$.

Answer: $C = 250 + 7n$, for non-negative integer n.

4. A tank contains 80 L and loses 5 L/min. Write the rule and physical time domain. [2 marks]

Set $V = 0$ to find emptying time 16 min.

Exclude negative volume.

Answer: $V = 80 - 5t,\ 0 \le t \le 16$.

5. Explain why $d = 12t$ passes through the origin when d is distance travelled and t is elapsed time. [2 marks]

Substitute $t = 0$: $d = 0$.

There is no starting-distance term.

Answer: At elapsed time zero, distance travelled is zero.

6. Are $(0, 2), (1, 5), (2, 10)$ exactly linear? Explain. [2 marks]

Equal x-steps give increases 3 and 5.

A straight line needs a constant increase.

Answer: No.