Dependent and independent variables

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. A tank starts with 200 L and drains at 8 L/min: $V = 200 - 8t$. Name the independent and dependent variables and their units. [2 marks]

Elapsed time is the input; remaining volume is calculated from it.

Answer: Independent t (minutes); dependent V (litres).

2. For the tank model $V = 200 - 8t$, find the volume at 15 minutes. [2 marks]

$V = 200 - 8(15) = 80$ litres.

Answer: 80 L

3. A postage model uses $P = 2 + 0.5m$ for mass m in grams. Interpret 0.5 with units. [2 marks]

The coefficient of the mass has units dollars/gram.

Answer: The price increases by 0.50 dollars per gram.

4. For $R = 18n$ ticket revenue, give the first four permitted inputs if no ticket has yet been sold. [2 marks]

Tickets are counted; inputs are whole numbers rather than arbitrary real values.

Answer: $n = 0, 1, 2, 3$

5. A phone battery model is $B = 100 - 5t$ for $0 \leq t \leq 20$, with t in hours. Explain why t=30 is not allowed. [2 marks]

$B(30) = -50$, which is not a possible remaining percentage.

Answer: It lies outside the stated model interval and predicts a negative battery percentage.

6. A table records shoe size and height for 30 people. Does calling height an output prove that shoe size causes height? [2 marks]

The input-output convention organises the data; it does not establish causation.

Answer: No.