Choosing, checking and explaining proportional models

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. Four equal packets hold 28 stickers. Predict the stickers in 9 packets and state an assumption. [3 marks]

One packet has $\frac{28}{4} = 7$ stickers.

Nine have $9(7) = 63$.

Answer: 63 stickers; packets hold equal numbers.

2. A tap fills 15 L in 3 minutes. Find the time for 40 L at the same rate. [3 marks]

The rate is $\frac{15}{3} = 5$ L per minute.

The time is $\frac{40}{5} = 8$ minutes.

Answer: 8 minutes.

3. A car park charges 4 dollars to enter plus 2 dollars per hour. Is the total cost directly proportional to time? [3 marks]

One hour costs 6 dollars and two hours cost 8 dollars.

The second amount is not twice the first because of the fixed fee.

Answer: No.

4. Distance and fuel pairs are $(100, 8)$, $(200, 16)$ and $(300, 24)$ in km and L. Predict fuel for 250 km. [3 marks]

250 km is 2.5×100 km.

The model predicts $2.5(8) = 20$ L.

Answer: 20 L.

5. A printer makes 120 pages in 4 working minutes. During 10 clock minutes it pauses for 2 minutes. Predict pages at its steady rate. [3 marks]

The rate is $\frac{120}{4} = 30$ pages per working minute.

Working time is $10 - 2 = 8$ minutes.

Output is $30(8) = 240$ pages.

Answer: 240 pages.

6. A gardener predicts 6 small plants need twice the water of 3 large plants. Why are the counts alone insufficient? [3 marks]

Direct proportion to plant count assumes equal water needs per plant.

Their different sizes make that assumption unjustified.

Answer: The plants need not use equal water.