

WA8MNAUN6

Understanding number

Core + Challenge

Interpreting Rate Graphs

I can read and calculate rates from distance–time and other graphs, compare travellers and sketch a graph from a story.

Name: _____ Date: _____ Score: _____ / 58

Key idea

A **distance–time graph** shows how far something is from a starting point as time passes. Time goes on the horizontal axis.

Steeper line = **faster** (greater rate). A **flat** (horizontal) section = stopped. A line going **down** = coming back towards the start.

Rate = change in the vertical quantity ÷ change in time. From (1 h, 20 km) to (3 h, 80 km): $60 \text{ km} \div 2 \text{ h} = 30 \text{ km/h}$.

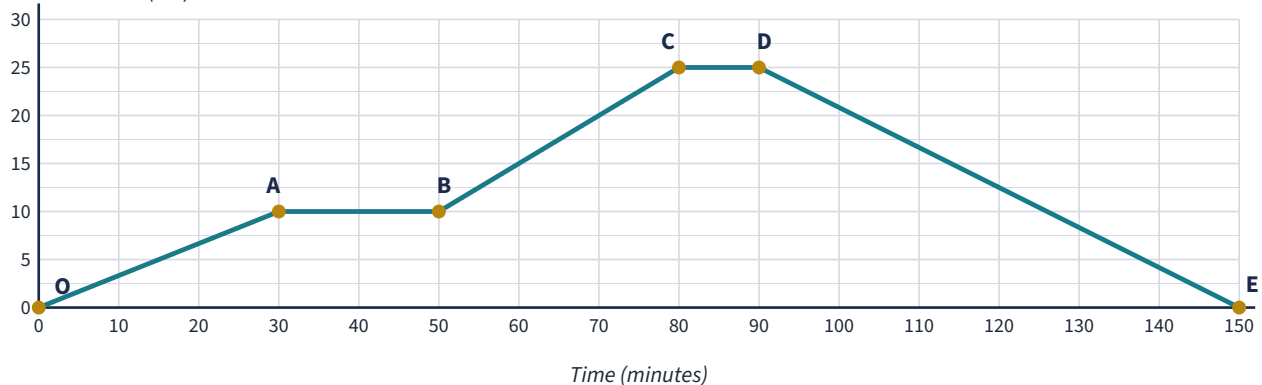
Other rate graphs: water in a tank (L/min), a taxi fare (\$ per km), temperature (°C per hour). The units are always ‘vertical unit per horizontal unit’.

A Fluency *practise the skill*

/ 16 marks

The graph shows Priya’s bike ride from home. Use it for every question. 1 mark each.

Distance from home (km)



- Distance from home after 30 min _____
- Time when Priya first stopped _____
- Length of the first stop (AB) _____
- Speed from O to A, in km/h _____
- Time taken to ride home (DE) _____
- Speed from D to E, in km/h _____
- Total distance ridden _____
- Total time stopped _____

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5. Distance travelled from B to C _____
6. Speed from B to C, in km/h _____
7. Furthest distance from home _____
8. Length of the second stop _____
13. Fastest section _____
14. Section where she rides home _____
15. Average speed for whole ride (km/h) _____
16. Distance from home at 120 min _____

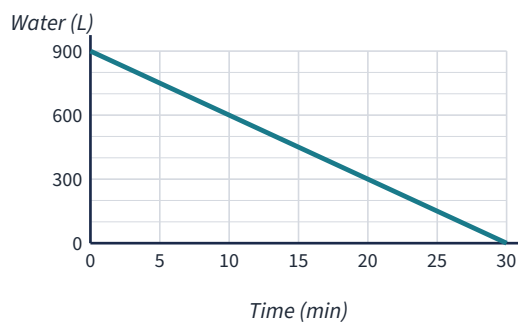
B

Core *apply the skill to problems*

/ 22 marks

- 1 A rainwater tank is drained at a constant rate.

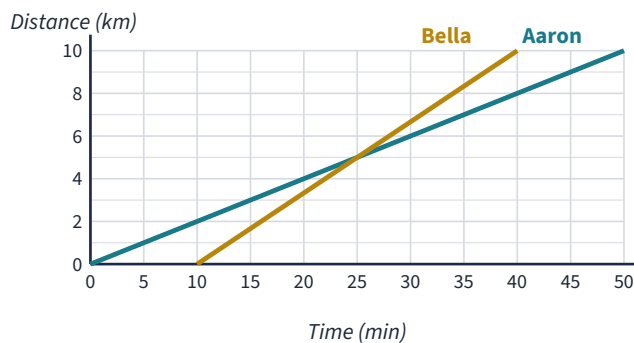
[2 marks]



- (a) At what rate does the water drain, in L/min?
(b) How much water is left after 10 minutes?

- 2 Aaron and Bella travel the same 10 km bike path. Bella starts later.

[3 marks]

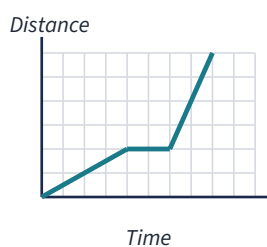


- (a) Find each person's speed in km/h.
(b) Who finishes first, and by how many minutes?

- 3 Mei walks to the bus stop, waits for the bus, then rides the bus to school.

[2 marks]

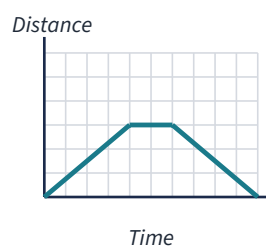
A



B



C

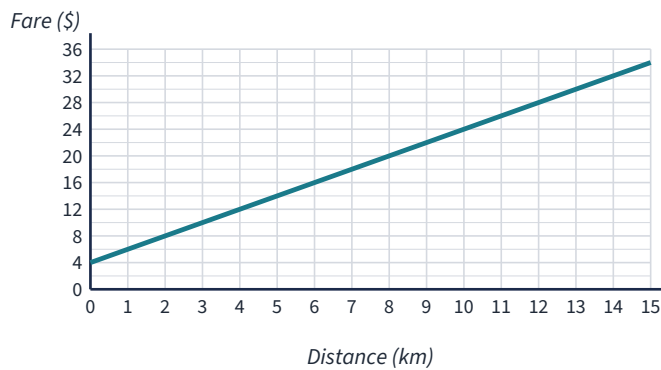


Which graph matches her trip? Explain your choice.

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- 4 The graph shows the fare for a taxi trip.

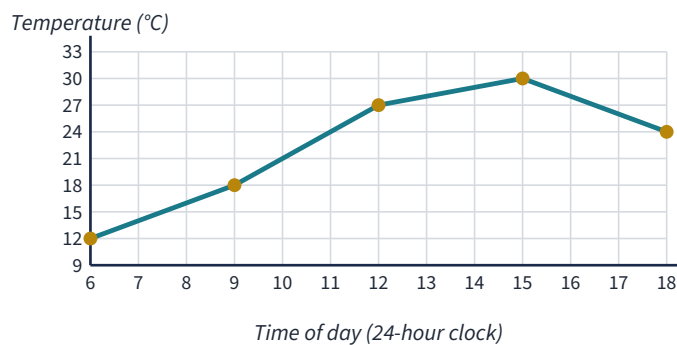
[2 marks]



- (a) What is the fare at 0 km (the flag fall)?
 (b) What is the cost per kilometre?
 (c) Find the fare for a 12 km trip.

- 5 The graph shows the temperature in Perth on a summer day.

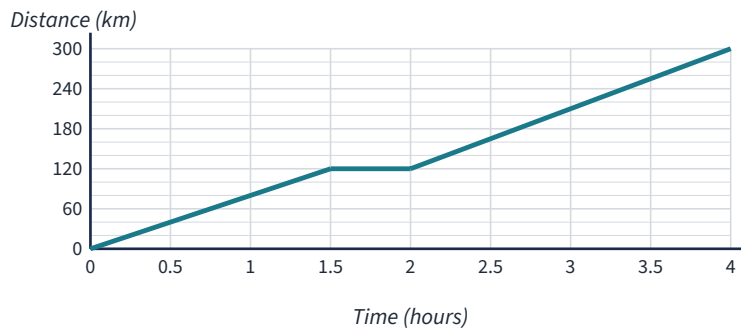
[2 marks]



- (a) Between which two times did the temperature rise fastest? At what rate?
 (b) Find the rate of change from 15:00 to 18:00.

- 6 The graph shows a car trip.

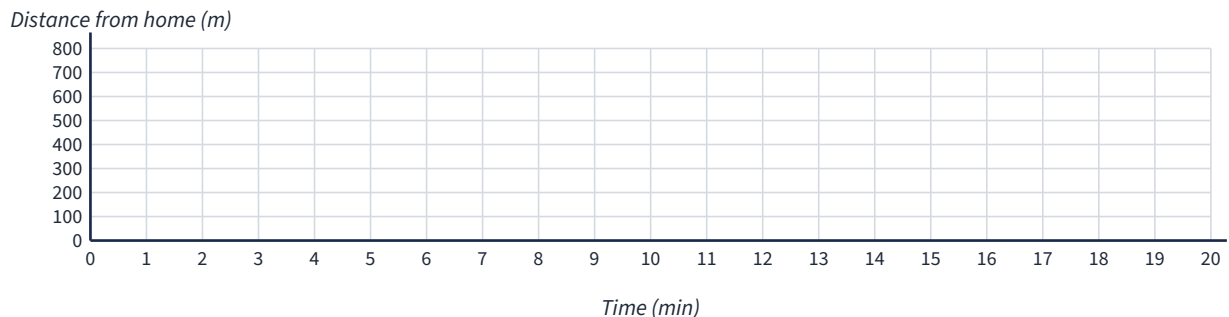
[3 marks]



- (a) Find the speed for each moving section.
 (b) Find the average speed for the whole 4 hours.

- 7 Sam walks 800 m to the shop at a steady speed in 10 minutes. He spends 5 minutes in the shop, then jogs straight home in 5 minutes. Draw his distance–time graph and find his jogging speed in m/min.

[2 marks]

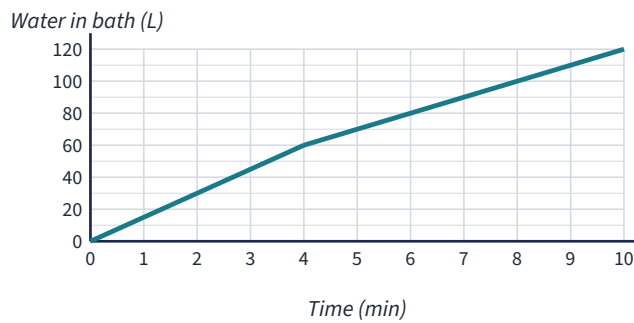


Answer: _____

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- 8 A bath is filled from a tap.

[2 marks]



- (a) Find the rate of filling for the first 4 minutes and for the last 6 minutes.
 (b) What do you think happened at 4 minutes?

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- 9 A distance–time graph for a runner is a straight line through (0 s, 0 m) and (5 s, 40 m). Find the runner’s speed in m/s and in km/h.

[2 marks]

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Answer:

- 10 Water is pumped into a tank. The graph of volume against time is a straight line from (0 min, 2000 L) to (40 min, 12 000 L).

[2 marks]

- (a) At what rate is water pumped in? (b) At what time did the tank hold 7000 L?

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Answer:

C Reasoning *explain, justify and check*

/ 9 marks

- 1 Explain why a distance–time graph can never have a vertical section.

[2 marks]

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- 2 Jack says, ‘On a distance–time graph, a line going downwards means the car is slowing down.’ Explain his mistake.

[2 marks]

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- 3 True or false? ‘On a distance–time graph, the higher line is always the faster traveller.’ Use Core Q2 to explain.

[2 marks]

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- 4 Describe Priya's ride (the Fluency graph) from O to D in words, including speeds. [3 marks]

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D Challenge *multi-step and problem-solving*

/ 11 marks

- 1 In Core Q2, when and where does Bella catch up to Aaron? Show your working. [3 marks]

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Answer:

- 2 Leah drives 180 km from Perth to Bunbury. She averages 90 km/h for the first 90 km, then 60 km/h for the rest. Find her total time and her average speed for the whole trip. [3 marks]

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Answer:

- 3 Towns P and Q are 110 km apart. A car leaves P at 9:00 am, driving to Q at 80 km/h. A truck leaves Q at 9:30 am, driving to P at 60 km/h. When, and how far from P, do they pass? [3 marks]

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Answer:

- 4 A tank contains 200 L of water. More water is added at 25 L/min for 8 minutes, then the tap is off for 4 minutes, then the tank drains at 40 L/min. Sketch the graph and find when the tank is empty. [2 marks]

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Answer:

How did I go?

Fluency ____ / 16 Core ____ / 22 Reasoning ____ / 9 Challenge ____ / 11 **Total ____ / 58**

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