

WA8MNAUN6

Understanding number

Core + Challenge

Interpreting Rate Graphs — Marking Key

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

For tutors and parents. Award method marks for correct working even if the final answer is wrong.

Marks summary

Section A Fluency: 16 Section B Core: 22 Section C Reasoning: 9 Section D Challenge: 11 **Total: 58**

Fluency: 1 mark each; accept an equivalent unsimplified answer for half credit at tutor's discretion.

A Fluency *answers and working*

/ 16 marks

Q	Answer	Working
1	10 km	Read point A
2	30 min	Point A
3	20 min	50 – 30
4	20 km/h	10 km in $\frac{1}{2}$ h
5	15 km	25 – 10
6	30 km/h	15 km in $\frac{1}{2}$ h
7	25 km	Points C and D
8	10 min	90 – 80
9	60 min	150 – 90
10	25 km/h	25 km in 1 h
11	50 km	25 out + 25 back
12	30 min	20 + 10
13	BC	Steepest part of the graph
14	DE	Line goes down
15	20 km/h	50 km ÷ 2.5 h
16	12.5 km	Halfway along DE: 25 – 12.5

Interpreting Rate Graphs · WA8MNAUN6

B

Core answers, working and marks

/ 22 marks

Q	Answer	Working / sample response	Marks
1	(a) 30 L/min (b) 600 L	(a) 900 L in 30 min: $900 \div 30 = 30$ L/min (b) $900 - 10 \times 30 = 600$ L (read from the graph) <i>1 mark each</i>	2
2	(a) Aaron 12 km/h, Bella 20 km/h (b) Bella, by 10 min	(a) Aaron: 10 km in 50 min = $\frac{5}{6}$ h $\rightarrow$ 12 km/h Bella: 10 km in 30 min $\rightarrow$ 20 km/h (b) Bella finishes at 40 min, Aaron at 50 min: 10 min earlier <i>1 mark: Aaron 12 km/h</i> <i>1 mark: Bella 20 km/h</i> <i>1 mark: Bella by 10 min</i>	3
3	Graph A	A: rise (walk), flat (wait), then a steeper rise – the bus is faster than walking. B has a slower last part; C returns to the start. <i>1 mark: A</i> <i>1 mark: steeper for the bus</i>	2
4	(a) \$4 (b) \$2 per km (c) \$28	(a) The line starts at \$4 (b) $(34 - 4) \div 15 = \$2$ per km (c) $4 + 12 \times 2 = \$28$ <i>1 mark: (a) \$4 and (b) \$2 per km</i> <i>1 mark: (c) \$28</i>	2
5	(a) 9:00 to 12:00, 3 °C/h (b) -2 °C/h (falling 2 °C/h)	(a) Rates: 2, 3, 1 °C/h, so fastest 9:00–12:00: $9^\circ\text{C} \div 3\text{ h} = 3^\circ\text{C/h}$ (b) $(24 - 30) \div 3 = -2^\circ\text{C per hour}$ <i>1 mark each</i>	2
6	(a) 80 km/h and 90 km/h (b) 75 km/h	(a) 120 km in 1.5 h = 80 km/h; $(300 - 120) \div 2 = 90$ km/h (b) $300 \div 4 = 75$ km/h (the stop counts) <i>1 mark: 80</i> <i>1 mark: 90</i> <i>1 mark: 75</i>	3
7	Graph through (0, 0), (10, 800), (15, 800), (20, 0); 160 m/min	Straight line up to (10, 800), flat to (15, 800), straight line down to (20, 0) $800 \div 5 = 160$ m/min <i>1 mark: correct graph</i> <i>1 mark: 160 m/min</i>	2
8	(a) 15 L/min, then 10 L/min (b) The tap was turned down	(a) $60 \div 4 = 15$ L/min; $(120 - 60) \div 6 = 10$ L/min (b) The graph becomes less steep, so water flows in more slowly <i>1 mark: both rates</i> <i>1 mark: sensible reason</i>	2
9	8 m/s = 28.8 km/h	$40 \div 5 = 8$ m/s $8 \times 3.6 = 28.8$ km/h <i>1 mark each</i>	2
10	(a) 250 L/min (b) 20 min	(a) $(12\,000 - 2000) \div 40 = 250$ L/min (b) $7000 - 2000 = 5000$ L; $5000 \div 250 = 20$ min <i>1 mark each</i>	2

Interpreting Rate Graphs · WA8MNAUN6

C

Reasoning *sample answers and marking criteria*

/ 9 marks

Q	Answer	Working / sample response	Marks
1	It would mean moving in zero time	A vertical line means the distance changes while no time passes. That would need an infinite speed, which is impossible. <i>1 mark: distance changes with no time</i> <i>1 mark: impossible speed</i>	2
2	Going down = returning	A downward line means the distance from the start is getting smaller – the car is travelling back towards the start. Speed is shown by how steep the line is, not whether it goes up or down. <i>1 mark: returning to the start</i> <i>1 mark: steepness shows speed</i>	2
3	False	Higher means further from the start at that time, not faster. Steeper means faster. At 20 min Aaron's line is higher, but Bella's line is steeper – she is faster. <i>1 mark: false with steepness idea</i> <i>1 mark: example</i>	2
4	Ride, rest, faster ride, rest	Rides 10 km in 30 min at 20 km/h; rests for 20 min Rides another 15 km in 30 min at 30 km/h (faster) Rests for 10 min, 25 km from home <i>1 mark: first section and rest</i> <i>1 mark: BC at 30 km/h</i> <i>1 mark: second rest</i>	3

D

Challenge *solutions and marking criteria*

/ 11 marks

Q	Answer	Working / sample response	Marks
1	At 25 minutes, 5 km from the start	Aaron: $12 \text{ km/h} = 0.2 \text{ km/min}$, so after t min he is $0.2t$ km Bella: $20 \text{ km/h} = \frac{1}{3} \text{ km/min}$, started 10 min late: $\frac{(t-10)}{3}$ km $0.2t = \frac{(t-10)}{3} \rightarrow 0.6t = t - 10 \rightarrow t = 25$; $0.2 \times 25 = 5 \text{ km}$ <i>1 mark: both distance rules</i> <i>1 mark: $t = 25$</i> <i>1 mark: 5 km</i>	3
2	2.5 h; 72 km/h	First 90 km: $90 \div 90 = 1 \text{ h}$ Last 90 km: $90 \div 60 = 1.5 \text{ h}$; total 2.5 h $180 \div 2.5 = 72 \text{ km/h}$ <i>1 mark each</i>	3
3	10:00 am, 80 km from P	t hours after 9:00: car $80t$, truck $60(t - 0.5)$ $80t + 60(t - 0.5) = 110 \rightarrow 140t = 140 \rightarrow t = 1$ 10:00 am; $80 \times 1 = 80 \text{ km from P}$ <i>1 mark: equation or table</i> <i>1 mark: 10:00 am</i> <i>1 mark: 80 km</i>	3

Interpreting Rate Graphs · WA8MNAUN6

Q	Answer	Working / sample response	Marks
4	At 22 minutes	After 8 min: $200 + 25 \times 8 = 400$ L; still 400 L at 12 min $400 \div 40 = 10$ min of draining $\rightarrow$ empty at 22 min <i>1 mark: 400 L</i> <i>1 mark: 22 min</i>	2