

WA8MNAUN6

Understanding number

Core + Challenge

Rates and Unit Rates — Marking Key

I can write rates with units, find unit rates to compare best buys, convert speeds and use speed, distance and time.

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	60 km/h	$240 \div 4$
2	\$4 per kg	$12 \div 3$
3	90 words/min	$450 \div 5$
4	7 L/min	$28 \div 4$
5	\$1.50	$7.50 \div 5$
6	\$1.80	$3.60 \div 2$
7	15 km	6×2.5
8	2.5 h (2 h 30 min)	$150 \div 60$
9	36 km/h	10×3.6
10	25 m/s	$90 \div 3.6$
11	\$180	22.50×8
12	64 beats/min	$96 \div 1.5$
13	4.8 km/h	$15 \text{ min} = 0.25 \text{ h}; 1.2 \div 0.25$
14	300 m/min	5×60
15	28 L	3.5×8
16	24 km	$72 \times \frac{1}{3}$

B

Core answers, working and marks

/ 22 marks

Q	Answer	Working / sample response	Marks
1	5 kg bag, by 30c per kg	5 kg: $15.50 \div 5 = \$3.10$ per kg $3.40 - 3.10 = \$0.30$ per kg cheaper <i>1 mark: \$3.10 per kg</i> <i>1 mark: 5 kg bag by 30c/kg</i>	2
2	90c, 85c, 89c per 100 g; 500 g is best	170 g: $1.53 \div 1.7 = \$0.90$ 500 g: $4.25 \div 5 = \$0.85$ 1 kg: $8.90 \div 10 = \$0.89 \rightarrow$ 500 g tub is the best buy <i>1 mark: two correct unit prices</i> <i>1 mark: all three</i> <i>1 mark: 500 g</i>	3
3	87.5 km/h	48 min = 0.8 h $70 \div 0.8 = 87.5$ km/h <i>1 mark: 0.8 h</i> <i>1 mark: 87.5 km/h</i>	2
4	180 km	2 h 15 min = 2.25 h $80 \times 2.25 = 180$ km <i>1 mark: 2.25 h</i> <i>1 mark: 180 km</i>	2
5	1 h 45 min	$42 \div 24 = 1.75$ h 0.75 h = 45 min <i>1 mark: 1.75 h</i> <i>1 mark: 1 h 45 min</i>	2
6	Yes, by 8 km/h	$30 \times 3.6 = 108$ km/h $108 - 100 = 8$ km/h faster <i>1 mark: 108 km/h</i> <i>1 mark: faster by 8 km/h</i>	2
7	21.6 L	$15 \times 60 \times 24 = 21\,600$ mL 21 600 mL = 21.6 L <i>1 mark: 21 600 mL</i> <i>1 mark: 21.6 L</i>	2
8	\$163.40	$3.5 + 6 = 9.5$ h $9.5 \times 17.20 = \$163.40$ <i>1 mark: 9.5 h</i> <i>1 mark: \$163.40</i>	2
9	X $\approx$ \$0.78/GB, Y = \$0.75/GB; plan Y	X: $35 \div 45 = 0.777\dots \approx \$0.78$ Y: $45 \div 60 = \$0.75 \rightarrow$ Y is better value <i>1 mark: both unit costs</i> <i>1 mark: plan Y</i>	2

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Q	Answer	Working / sample response	Marks
10	92 and 152 beats/min; increase 60	Resting: $23 \times 4 = 92$ beats/min After: $38 \times 4 = 152$ beats/min $152 - 92 = 60$ beats/min <i>1 mark each</i>	3

C Reasoning *sample answers and marking criteria* / 9 marks

Q	Answer	Working / sample response	Marks
1	The 1 kg tub is not the best buy	The 1 kg tub costs \$0.89 per 100 g but the 500 g tub costs only \$0.85 per 100 g. So the biggest pack is not always cheapest per unit – you must compare unit prices. <i>1 mark: uses the unit prices</i> <i>1 mark: clear conclusion</i>	2
2	3600 s in an hour, 1000 m in a km	$1 \text{ m/s} = 3600 \text{ m in one hour (3600 seconds)}$ $3600 \text{ m} = 3.6 \text{ km}$, so $1 \text{ m/s} = 3.6 \text{ km/h}$ <i>1 mark: $\times 3600$</i> <i>1 mark: $\div 1000$ giving 3.6</i>	2
3	12 km/h	She divided time by distance (that gives minutes per km, not km/h). Speed = distance $\div$ time = $5 \div \frac{25}{60} \text{ h}$ $= 5 \times 2.4 = 12 \text{ km/h}$ <i>1 mark: identifies time $\div$ distance</i> <i>1 mark: converts 25 min to hours</i> <i>1 mark: 12 km/h</i>	3
4	True	60 km in 60 minutes $60 \div 60 = 1 \text{ km per minute}$ <i>1 mark: true</i> <i>1 mark: explanation</i>	2

D Challenge *solutions and marking criteria* / 11 marks

Q	Answer	Working / sample response	Marks
1	68.6 km/h	Times: $120 \div 80 = 1.5 \text{ h}$ and $120 \div 60 = 2 \text{ h}$; total 3.5 h Average = $240 \div 3.5 = 68.57 \dots \approx 68.6 \text{ km/h}$ She spends longer at the slower speed, so the average is below 70. <i>1 mark: 3.5 h</i> <i>1 mark: 68.6</i> <i>1 mark: explanation</i>	3
2	24 minutes	A: $1200 \div 40 = 30 \text{ L/min}$; B: $1200 \div 60 = 20 \text{ L/min}$ Together 50 L/min $1200 \div 50 = 24 \text{ min}$ <i>1 mark: both rates</i> <i>1 mark: 50 L/min</i> <i>1 mark: 24 min</i>	3

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Q	Answer	Working / sample response	Marks
3	After 1 h 30 min; 27 km	They close the gap at $18 + 12 = 30$ km/h $45 \div 30 = 1.5$ h = 1 h 30 min $18 \times 1.5 = 27$ km <i>1 mark: 30 km/h</i> <i>1 mark: 1.5 h</i> <i>1 mark: 27 km</i>	3
4	\$6.39	Saving on 50 L: $50 \times 0.16 = \\$8.00$ Extra fuel: $12 \times 7.5 \div 100 = 0.9$ L $\times \\$1.79 = \\$1.611$; $8.00 - 1.611 = 6.389 \approx \\$6.39$ <i>1 mark: \$8.00 and extra-fuel cost</i> <i>1 mark: \$6.39</i>	2