

WA8MNAUN6

Understanding number

Core + Challenge

Rates and Unit Rates

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

Name: _____ Date: _____ Score: _____ / 58

Key idea

A **rate** compares two quantities with **different units**: 180 km in 3 h, \$4.50 per kg, 72 beats per minute.

A **unit rate** is the amount for ONE unit: 180 km in 3 h $\rightarrow 180 \div 3 = \mathbf{60 \text{ km/h}}$. Best buy: compare the price per 100 g (or per L).

Speed = distance $\div$ time **distance** = speed $\times$ time **time** = distance $\div$ speed.

Converting: 1 m/s = 3600 m/h = 3.6 km/h. So m/s $\rightarrow$ km/h: $\times \mathbf{3.6}$; km/h $\rightarrow$ m/s: $\div \mathbf{3.6}$. 20 m/s = 72 km/h.

A

Fluency *practise the skill*

/ 16 marks

Find each rate or amount, with units. 1 mark each.

1. 240 km in 4 h (km/h) _____

9. 10 m/s in km/h _____

2. \$12 for 3 kg (\$ per kg) _____

10. 90 km/h in m/s _____

3. 450 words in 5 min _____

11. Pay: \$22.50 per hour for 8 h _____

4. 28 L in 4 min _____

12. 96 beats in 1.5 min (beats/min) _____

5. \$7.50 for 500 g: price per 100 g _____

13. 1.2 km in 15 min, in km/h _____

6. \$3.60 for 2 L: price per litre _____

14. 5 m/s in m/min _____

7. Distance: 6 km/h for 2.5 h _____

15. 8 L per 100 km: fuel for 350 km _____

8. Time: 150 km at 60 km/h _____

16. 72 km/h for 20 min: distance _____

B

Core *apply the skill to problems*

/ 22 marks

- 1 At Woolworths, 1 kg of rice costs \$3.40 and a 5 kg bag costs \$15.50. Which is the better buy, and by how much per kilogram? [2 marks]

Answer: _____

- 2 Greek yoghurt is sold in three sizes. Find the price per 100 g of each and state the best buy. [3 marks]

Tub size	Price
170 g	\$1.53
500 g	\$4.25
1 kg	\$8.90

Answer: _____

- 3 A Transperth train travels 70 km from Perth to Mandurah in 48 minutes. Find its average speed in km/h. [2 marks]

Answer: _____

- 4 A car travels on the Kwinana Freeway at 80 km/h for 2 hours 15 minutes. How far does it travel? [2 marks]

Answer: _____

- 5 A cyclist rides 42 km at an average speed of 24 km/h. How long does the ride take? Give your answer in hours and minutes. [2 marks]

Answer: _____

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- 6 A cheetah can run at 30 m/s. Is this faster than a car travelling at 100 km/h? By how many km/h? [2 marks]

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Answer: _____

- 7 A dripping tap leaks 15 mL of water every minute. How many litres does it waste in one day? [2 marks]

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Answer: _____

- 8 Chloe earns \$17.20 per hour at Coles. She works 3.5 hours on Thursday and 6 hours on Saturday. How much does she earn in total? [2 marks]

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Answer: _____

- 9 Phone plan X gives 45 GB of data for \$35 a month. Plan Y gives 60 GB for \$45 a month. Find the cost per GB of each plan to the nearest cent. Which is better value? [2 marks]

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Answer: _____

- 10 Liam counts 23 heartbeats in 15 seconds while resting. After a netball drill he counts 38 beats in 15 seconds. Find both heart rates in beats per minute, and the increase. [3 marks]

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Answer: _____

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C**Reasoning** *explain, justify and check*

/ 9 marks

- 1 Tom says, 'The biggest pack is always the best buy.' Use Core Q2 to show that he is wrong. [2 marks]

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- 2 Explain why you multiply by 3.6 to change a speed in m/s into km/h. [2 marks]

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- 3 Ruby runs 5 km in 25 minutes. She writes: 'Speed = $25 \div 5 = 5$ km/h.' Explain her mistakes and find her correct speed in km/h. [3 marks]

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- 4 True or false? 'Travelling at 60 km/h is the same as travelling 1 km every minute.' Explain. [2 marks]

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D**Challenge** *multi-step and problem-solving*

/ 11 marks

- 1 Nina drives 120 km at 80 km/h, then another 120 km at 60 km/h. Find her average speed for the whole trip, correct to 1 decimal place. Explain why it is not 70 km/h. [3 marks]

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Answer: _____

- 2 Tap A alone fills a 1200 L tank in 40 minutes. Tap B alone fills it in 60 minutes. How long does it take with both taps on? [3 marks]

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Answer: _____

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- 3 Two cyclists start 45 km apart and ride towards each other at the same time, at 18 km/h and 12 km/h. When do they meet, and how far has the faster cyclist ridden? [3 marks]

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Answer:

- 4 Petrol costs \$1.95/L at Kai's local station and \$1.79/L at a station that adds a 12 km round trip. His car uses 7.5 L per 100 km. He buys 50 L. How much does he really save by driving to the cheaper station, to the nearest cent? [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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