CALCULATOR ALLOWED | Advanced level questions

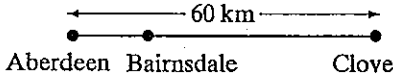
Mini Test 29: Rates and Measurements

20 min

1 Jeremy left home at 8:10 am and drove 240 km at an average speed of 80 kilometres per hour. He then stopped for 50 minutes before setting off again, arriving at his destination at 2:30 pm. The total distance covered was 385 km. What was Jeremy's average speed (in km/h) for the second part of the journey?

A 58 **B** 64 **C** 70 **D** 80

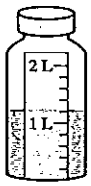
2 The road from Aberdeen to Clovelly passes through Bairnsdale. The distance from Bairnsdale to Clovelly is three times the distance from Aberdeen to Bairnsdale.



If it is 60 km from Aberdeen to Clovelly, how far is it from Bairnsdale to Clovelly?

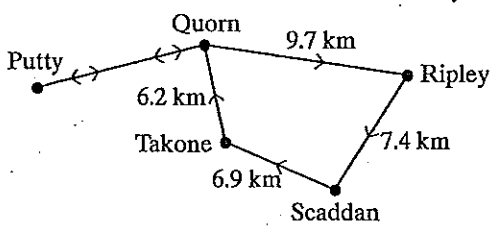
A 36 km **B** 40 km **C** 45 km **D** 54 km

3 This bottle has some oil in it. If Ming uses 750 mL of the oil, how much will be left in the bottle? _____ mL



4 1 litre of water weighs 1 kg. An empty bottle weighs 20 grams. When full, the bottle weighs 770 grams. How many millilitres of water does the bottle hold? _____ mL

5 The diagram shows the route of a 50-km bike race that starts and ends at Putty.



How far is it from Putty to Quorn? _____ km

6 A train travelled 594 km at an average speed of 72 km/hour. If the journey began at 7:45 am, what time did it finish?

A 3:10 pm **B** 4:00 pm
C 4:10 pm **D** 5:00 pm

7 A cricket team needed to score 190 runs from 20 overs. After the first 5 overs the team had scored 49 runs. At what rate (in runs per over) did they need to score the rest of the runs? _____ runs/over

8 1 km and 15 cm is the same as

A 1015 cm. **B** 10 015 cm.
C 100 015 cm. **D** 1 000 015 cm.

9 Selby left at 8:20 am, travelled 285 km, and arrived at 12:05 pm. What was Selby's average speed for the journey? _____ km/h

10 When it is 5:20 am Friday in London it is 3:20 pm Friday in Sydney. When it is 11:45 am Sunday in London it is 6:45 am Sunday in New York. What is the time in New York when it is 10:30 am on Tuesday in Sydney?

A 5:30 am Tuesday **B** 7:30 pm Tuesday
C 5:30 pm Monday **D** 7:30 pm Monday

11 Guido ran 42 km at an average speed of 18 km/hour. How long did he take?

A 2 h 20 min **B** 2 h 33 min
C 3 h 40 min **D** 4 h 29 min

12 1 hectare and 200 square metres is the same as

A 1200 m^2 **B** 10 200 m^2
C 1.2 ha **D** 1.002 ha

13 Jamie's car uses 9 litres of petrol for every 100 km travelled. He buys $63 worth of petrol at $1.25 per litre. How many kilometres will his car travel on this amount of petrol? _____ km

14 A 4-litre container can be filled from a tap in 27 seconds. At that rate, how long will it take to fill a drum that holds 100 litres?

A 6 min 45 s **B** 7 min 15 s
C 11 min 15 s **D** 11 min 25 s

Answers and explanations on pages 126–127

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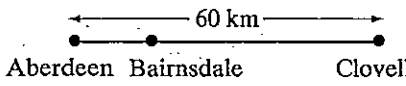
1 A **2** C **3** 450 mL **4** 750 ml **5** 9.9 km **6** B
7 9.4 runs/over **8** C **9** 76 km/h **10** D **11** A
12 B **13** 560 km **14** C

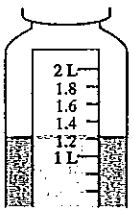
1 Jeremy left home at 8:10 am.
Time to travel the first 240 km
= (240 ÷ 80) hours
= 3 hours
So Jeremy stopped at 11:10 am.
He stopped for 50 minutes.
So he started again at 12 noon.
From 12 noon until 2:30 pm is $2\frac{1}{2}$ hours.
Distance travelled in afternoon
= (385 − 240) km
= 145 km
Speed = $(145 \div 2\frac{1}{2})$ km/h
= 58 km/h

2



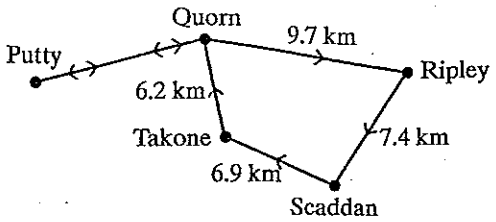
The distance from Aberdeen to Bairnsdale is one part and the distance from Bairnsdale to Clovelly is three parts.
So the distance from Aberdeen to Bairnsdale is $\frac{1}{4}$ of 60 km or 15 km.
Distance from Bairnsdale to Clovelly
= 3 × 15 km
= 45 km

3 On the measuring scale each litre is divided into 5 smaller divisions.
Each division = 1 L ÷ 5
= 1000 mL ÷ 5
= 200 mL
So the bottle held 1200 mL of oil.
Ming removed 750 mL.
Remaining oil = (1200 − 750) mL
= 450 mL



4 1 L = 1000 mL
1 kg = 1000 g
Now 1 L weighs 1 kg.
So 1000 mL weighs 1000 g
and 1 mL weighs 1 g.
Weight of water = (770 − 20) g
= 750 g
Amount of water = 750 mL

5



Total distance shown on map
= (9.7 + 7.4 + 6.9 + 6.2) km
= 30.2 km
Remaining race distance = (50 − 30.2) km
= 19.8 km
This remaining distance is twice the distance from Putty to Quorn.
Distance from Putty to Quorn
= 19.8 km ÷ 2
= 9.9 km

6 Time taken = (594 ÷ 72) h
= 8.25 h
= 8 h 15 min
The journey began at 7:45 am.
15 minutes after that is 8 am.
8 hours after 8 am is 4 pm.
The journey ended at 4 pm.

7 190 runs were required in 20 overs.
After 5 overs, 49 runs were scored.
Remaining runs required = 190 − 49
= 141
Remaining overs = 20 − 5
= 15
Run rate = 141 runs in 15 overs
= 9.4 runs/over
[It is not possible to score 9.4 runs in an over. The number of runs must always be a whole number. If a run rate of 9.4 runs per over was needed, then the batting team would not have enough runs if they scored 9 runs every over, but if they scored 10 runs every over they would win before the last available ball had been bowled.]

8 1 km = 1000 m
1 m = 100 cm
So 1 km = 100000 cm
So 1 km + 15 cm = (100000 + 15) cm
= 100015 cm

9 From 8:20 am until 9:00 am is 40 minutes.
It is another 5 minutes until 9:05 am.
From 9:05 am until 12:05 pm is 3 hours.
Time for journey = 3 h 45 min
= $3\frac{3}{4}$ h
Speed = 285 km ÷ $3\frac{3}{4}$ h
= 76 km/h

10 From 5:20 am until 3:20 pm is 10 hours.
Sydney time is 10 hours ahead of London time.
So when it is 10:30 am on Tuesday in Sydney it will be 12:30 am on Tuesday in London.
From 6:45 am until 11:45 am is 5 hours.
London time is 5 hours ahead of New York time.
So when it is 12:30 am on Tuesday in London it will be 7:30 pm on Monday in New York.
The time in New York will be 7:30 pm on Monday.

11 Time taken $= (42 \div 18)$ h
$= 2.333...$ h
$= 2\frac{1}{3}$ h
$= 2$ h 20 min

12 1 hectare = 10000 square metres.
1 ha + 200 m^2 = 10000 m^2 + 200 m^2
= 10200 m^2

13 Number of litres of petrol
= \$63 ÷ \$1.25
= 50.4
Number of kilometres $= 50.4 \div 9 \times 100$
$= 560$
The car will travel 560 km.

14 Rate = 4 L in 27 seconds
$= (4 \times 25)$ L in (27×25) seconds
= 100 L in 675 seconds
Now 675 s $= (675 \div 60)$ min
= 11.25 min
= 11 min 15 s