5.5 Speed and Density: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A cyclist travels at an average speed of 12 m/s for 25 seconds.
Calculate the distance travelled.

(Total for Question 1 is 2 marks)

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2 A car travels at a constant speed of 60 km/h.

(a) Work out the distance the car travels in 20 minutes. **(1)**

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(b) Work out the average speed for the 150 km in 2.5 hours. **(2)**

.....

(Total for Question 2 is 3 marks)

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3 A lorry travels 240 km in 3 hours.

(a) Work out the average speed. **(2)**

.....

(b) Work out the extra distance covered in 2 hours at the same speed. **(2)**

.....

(Total for Question 3 is 4 marks)

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4 A cheetah runs at a constant speed of 28 m/s. Show that this speed is equivalent to 100.8 km/h.

(Total for Question 4 is 3 marks)

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5 The density of a liquid is given by the formula d = m / V, where m is mass and V is volume.

(a) Rearrange the formula to make V the subject. **(1)**

(b) A liquid has a density of 1.25 g/cm^3. Find the volume of 250 g of the liquid. **(2)**

(Total for Question 5 is 3 marks)

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6 A ship travels from Port A to Port B, a distance of 84 nautical miles, at a constant average speed of 14 knots (nautical miles per hour).
The ship leaves Port A at 09:15. On the way, it stops at a checkpoint for 45 minutes.
The ship must reach Port B by 15:30 the same day.

(a) Work out the clock time at which the ship arrives at Port B. **(3)**

(b) Determine, giving a reason, whether the ship reaches Port B on time. **(1)**

(Total for Question 6 is 4 marks)

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7 A liquid has a density of 0.92 g/cm^3.
Calculate the mass, in kg, of 5 litres of the liquid. (1 litre = 1000 cm^3)

(Total for Question 7 is 3 marks)

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8 The speed limit on a stretch of road is 70 mph. A car travels 21 km in 10 minutes at a constant speed. Given that 5 miles is approximately equal to 8 km, determine whether the car is exceeding the speed limit. You must show your working.

(Total for Question 8 is 5 marks)

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Mark scheme · 5.5 Speed and Density: 30-minute Pack

Question 1

distance = speed x time i.e. 12 x 25 oe	**M1**
300 (m) cao	**A1**

Answer: 300 m

Question 2

(a) distance = 60 x (20/60) = 20 km cao	**B1**

(a) Answer: 20 km

(b) use speed = distance/time, 150/2.5	**M1**
(b) 60 km/h cao	**A1**

(b) Answer: 60 km/h

Question 3

(a) use speed = distance/time, 240/3	**M1**
(a) 80 km/h cao	**A1**

(a) Answer: 80 km/h

(b) distance = speed x time, 80 x 2	**M1**
(b) 160 km cao	**A1**

(b) Answer: 160 km

Question 4

28 x 60 x 60 (= 100800) oe, or 28 x 3.6	**M1**
100800 / 1000 (dep), or equivalent single-step method giving km/h	**M1**
100.8 (km/h) cso	**A1**

Answer: 100.8 km/h (given, shown)

Question 5

(a) V = m / d oe	**B1**

(a) Answer: V = m / d

(b) 250 / 1.25, using their (a) formula (ft)	**M1**
(b) 200 (cm^3) cao	**A1**

(b) Answer: 200 cm^3

Question 6

(a) sailing time = 84 / 14 = 6 (hours) oe	**M1**
(a) total elapsed time = their 6 hours + 45 minutes = 6 hours 45 minutes oe (ft)	**M1**
(a) 16:00 cao (ft their total elapsed time added to 09:15)	**A1**

(a) Answer: 16:00

(b) no oe, with correct comparison, e.g. 16:00 is later than 15:30, so the ship is 30 minutes late (ft their (a))	**B1**

(b) Answer: No; the ship arrives at 16:00, which is 30 minutes after the 15:30 deadline.

Question 7

5 litres = 5000 cm^3 oe	**M1**
0.92 x 5000 oe (ft their volume in cm^3)	**M1**
4.6 kg cao (answer must be in kg)	**A1**

Answer: 4.6 kg

Question 8

10 minutes = 1/6 hour oe	**M1**
21 / (1/6) (= 126) km/h (dep)	**dM1**
126 x 5/8 oe, converting km/h to mph	**M1**
78.75 (mph), allow awrt 78.8	**A1**
correct conclusion ft, e.g. 'Yes, exceeding the limit since 78.75 > 70'	**C1**

Answer: 78.75 mph; yes, the car is exceeding the speed limit.

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