



5.5F Speed and Density: Foundation Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 50 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

- 1** A cyclist travels 12 kilometres in 30 minutes. Work out the cyclist's speed in kilometres per hour (km/h).

(Total for Question 1 is 1 mark)

- 2** A toy car is 0.5 metres long. Its density is 2000 kg/m^3 and its mass is 0.3 kg. State whether these values are consistent, showing a short calculation.

(Total for Question 2 is 1 mark)

- 3** A runner completes a 400 metre lap in 80 seconds. Work out the runner's speed in metres per second (m/s).

(Total for Question 3 is 2 marks)

- 4** A small bag of rice has mass 1.2 kg and volume 0.0015 m^3 . Calculate the density of the rice in kg/m^3 . Give your answer correct to 3 significant figures.

(Total for Question 4 is 2 marks)

- 5** A car travels at a constant speed of 60 km/h.
Part (a): Work out the distance the car travels in 20 minutes.
Part (b): On a later journey the same car travels 150 km in 2.5 hours. Work out its average speed in km/h.

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

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

(Total for Question 5 is 3 marks)

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- 6** A block of wood has mass 0.9 kg and density 600 kg/m³.
Part (a): Calculate the volume of the block in cubic metres (m³).
Part (b): Give the volume in cubic centimetres (cm³).

(a) Calculate the volume in m³. (2)

(b) Give the volume in cm³. (1)

(Total for Question 6 is 3 marks)

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- 7** A lorry travels 240 km in 3 hours.
Part (a): Work out its average speed in km/h.
Part (b): The lorry then continues at the same speed for 2 hours. Work out the extra distance it covers.

(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 7 is 4 marks)

- 8** A metal cube has side length 10 cm. The density of the metal is 7800 kg/m^3 . Calculate the mass of the cube in kilograms. Give your answer correct to 3 significant figures.

(Total for Question 8 is 3 marks)

- 9** A driver covers 90 km in 1 hour 30 minutes.
Part (a): Work out the average speed in km/h.
Part (b): How long, in hours and minutes, would it take to travel 150 km at this average speed?
Part (c): How far would the driver travel in 20 minutes at this average speed?

(a) Work out the average speed in km/h. (2)

(b) How long to travel 150 km at this speed? Give your answer in hours and minutes. (2)

(c) How far in 20 minutes at this speed? (1)

(Total for Question 9 is 5 marks)

10 A liquid has mass 250 g and occupies 200 cm³.

Part (a): Calculate the density of the liquid in kg/m³.

Part (b): Give the density in g/cm³.

Part (c): What mass, in grams, of this liquid would fill 1.5 litres?

(a) Calculate the density in kg/m³. (3)

(b) Give the density in g/cm³. (1)

(c) What mass, in grams, of this liquid would fill 1.5 litres? (2)

(Total for Question 10 is 6 marks)

11 Use the relationship 1 m/s = 3.6 km/h.

Part (a): Convert 7 m/s to km/h. Give your answer to 1 decimal place.

Part (b): Convert 90 km/h to m/s. Give your answer to 2 significant figures.

Part (c): State the rule to convert from m/s to km/h.

(a) Convert 7 m/s to km/h. Give your answer to 1 decimal place. (2)

(b) Convert 90 km/h to m/s. Give your answer to 2 significant figures. (2)

(c) State the rule to convert from m/s to km/h. (1)

(Total for Question 11 is 5 marks)

12 Two small metal blocks are compared.

Block A has mass 0.6 kg and volume 0.0008 m^3 .

Block B has mass 0.9 kg and volume 0.0009 m^3 .

Part (a): Find the density of each block in kg/m^3 .

Part (b): Which block is denser and by how many kg/m^3 ?

(a) Find the density of each block in kg/m^3 . **(3)**

(b) Which block is denser and by how many kg/m^3 ? **(2)**

(Total for Question 12 is 5 marks)

Mark scheme · 5.5F Speed and Density: Foundation Tier Practice

Question 1

- **B1** 24 km/h *cao*
- **Answer: 24 km/h**

Question 2

- **B1** clear statement with supporting calculation: $\text{volume} = 0.3 / 2000 = 0.00015 \text{ m}^3$ and statement that values do not contradict each other *cao*
- **Answer: Volume = mass/density = $0.3 / 2000 = 0.00015 \text{ m}^3$. Values are consistent (no contradiction).**

Question 3

- **M1** use speed = distance/time, $400/80$ or equivalent
- **A1** 5 m/s *cao*
- **Answer: 5 m/s**

Question 4

- **M1** use density = mass/volume, $1.2 / 0.0015$
- **A1** 800 kg/m³ *cao*
- **Answer: 800 kg/m³**

Question 5

- (a) **B1** distance = $60 \times (20/60) = 20 \text{ km}$ *cao*
- (a) **Answer: 20 km**
- (b) **M1** use speed = distance/time, $150/2.5$
- (b) **A1** 60 km/h *cao*
- (b) **Answer: 60 km/h**

Question 6

- (a) **M1** use volume = mass/density, $0.9 / 600$
- (a) **A1** 0.0015 m³ *cao*
- (a) **Answer: 0.0015 m³**
- (b) **B1** 1500 cm³ *cao*
- (b) **Answer: 1500 cm³**

Question 7

- (a) **M1** use speed = distance/time, $240/3$
- (a) **A1** 80 km/h *cao*
- (a) **Answer: 80 km/h**
- (b) **M1** distance = speed $\times$ time, 80×2
- (b) **A1** 160 km *cao*
- (b) **Answer: 160 km**

Question 8

- **M1** convert 10 cm to 0.10 m and find volume = $0.10^3 = 0.001 \text{ m}^3$ or equivalent
- **M1** use mass = density $\times$ volume, 7800×0.001
- **A1** 7.80 kg *cao*
- **Answer: 7.80 kg**

Question 9

- (a) **M1** convert 1 h 30 min to 1.5 h and use speed = distance/time, $90/1.5$
- (a) **A1** 60 km/h **cao**
- **(a) Answer: 60 km/h**
- (b) **M1** use time = distance/speed, $150/60 = 2.5$ hours
- (b) **A1** 2 hours 30 minutes **cao**
- **(b) Answer: 2 hours 30 minutes**
- (c) **B1** distance = $60 \times (20/60) = 20$ km **cao**
- **(c) Answer: 20 km**

Question 10

- (a) **M1** convert mass to kg and volume to m^3 , $250 \text{ g} = 0.25 \text{ kg}$, $200 \text{ cm}^3 = 0.0002 \text{ m}^3$
- (a) **M1** use density = mass/volume, $0.25 / 0.0002$
- (a) **A1** 1250 kg/m^3 **cao**
- **(a) Answer: 1250 kg/m^3**
- (b) **B1** 1.25 g/cm^3 **cao**
- **(b) Answer: 1.25 g/cm^3**
- (c) **M1** convert 1.5 L to 1500 cm^3 and use mass = density x volume in g, 1.25×1500
- (c) **A1** 1875 g **cao**
- **(c) Answer: 1875 g**

Question 11

- (a) **M1** use 7×3.6
- (a) **A1** 25.2 km/h **cao**
- **(a) Answer: 25.2 km/h**
- (b) **M1** use $90 / 3.6$
- (b) **A1** 25 m/s **cao**
- **(b) Answer: 25 m/s**
- (c) **B1** multiply by 3.6 **oe**
- **(c) Answer: Multiply by 3.6**

Question 12

- (a) **M1** use density = mass/volume for block A, $0.6 / 0.0008$
- (a) **M1** use density = mass/volume for block B, $0.9 / 0.0009$
- (a) **A1** give both densities: $A = 750 \text{ kg/m}^3$, $B = 1000 \text{ kg/m}^3$ **cao**
- **(a) Answer: Block A: 750 kg/m^3 ; Block B: 1000 kg/m^3**
- (b) **M1** calculate difference $1000 - 750$
- (b) **A1** Block B is denser by 250 kg/m^3 **cao**
- **(b) Answer: Block B is denser by 250 kg/m^3**