Compound Measures Exam Practice

Q1. A car travels 320 km in 4 hours. Work out the average speed of the car.

$S = \frac{d}{t}$

$S = \frac{320 km}{4 hr}$

Answer: 80 km/hr

(1 mark)

Q2. A woman jogs at a steady 6 km per hour for 45 minutes. Work out the distance she travels.

$d = S \times t$

$d = 0.75 hours \times 6 km$

$d = 4.5 km$

Answer: 4.5 km

(1 mark)

Q3. Copper has a density of 9 grams per cm^3. Work out the volume of a block of copper which has a mass of 3.15 kg.

$V = \frac{M}{V}$

$V = \frac{3150 g}{9 g/cm^3}$

Answer: 350 g

(2 marks)

Q4. A cube of iron, which has side length 6 cm, is made for a display. If the mass of the cube is 1.71 kg, work out the density of the cube, giving your answer in grams per cm^3, to 2 decimal places.

- $Vol = 6^3$
  $= 216\ cm^3$
- $D = \frac{M}{V}$

$D = \frac{1710\ g}{216\ cm^3}$

Answer: $7.92\ g/cm^3$

(3 marks)

Q5. Jo cycles 71.5 km in 3 hours and 15 minutes. Work out her average speed.

$S = \frac{D}{T}$

$S = \frac{71.5\ km}{3.25\ hours}$

$S = 22\ km/h$

Answer: $22 km/hr$

(2 marks)

Q6. Light travels at 300,000 km per second. If the distance from the earth to the planet Jupiter is currently at 870 million km, work out to the nearest minute the time it takes light to travel from Jupiter to the earth.

$T = \frac{D}{S}$

$T = \frac{870,000,000\ km}{300,000\ km/s}$

$= \frac{87000}{3}$

So $T = 2900$ seconds

$\Rightarrow \frac{2900}{60}$ minutes

48.3 minutes

Answer: 48 minutes

(2 marks)

Q7. (i) On Monday, Rod travels from Lees to Ashlington at an average speed of 55 miles per hour. The journey takes him 2 hours and 45 minutes. On Friday, he makes the same journey in 2 hours and 12 minutes. Work out Rod's average speed for his journey on Friday, giving your answer to the nearest mile per hour.

- $D = S \times T$
- $D = 55\text{mph} \times 2.75\text{ hours}$
- $D = 151.25\text{ miles.}$

[12 minutes $= \frac{12}{60}$ hour
$= \frac{1}{5}$ hour
$= 0.2$ hours]

- Friday: $S = \frac{D}{T}$

$S = \frac{151.25\text{ miles}}{2.2\text{ hours}}$
$= 68.75\text{ mph}$

Answer: 69 mph

(4 marks)

(ii) Suppose that on Friday, Rod drives on different roads than he did on Monday, and finds his average speed is higher. What can you conclude about his route on Friday?

The distance was shorter than on Monday.

Answer: _____

(1 mark)

Q8. A box exerts a force of 180 Newtons on a table. The pressure on the table is 55 Newtons/m^2 . Calculate the area of the box that is in contact with the table. You are given that: $P = \frac{F}{A}$, where P = Pressure (Newtons/m^2),
F = Force (Newtons)
A = area (m^2)

- $55\text{ N/m}^2 = \frac{180\text{ N}}{A}$

$\Rightarrow A = \frac{180\text{ N}}{55\text{ N/m}^2}$
$= 3.27\text{m}^2$

Answer: 3.27m^2

(2 marks)

Q9. Two metals, A and B, are to be melted down and mixed to metal C. Metal A has a density of 2.5 grams per cm^3. 180 grams of Metal A is melted down with some of Metal B to make Metal C. Metal C has a mass of 577.5 g and a density of 1.65 grams per cm^3.
Find the density of Metal B, giving your answer correct to 2 d.p.

	M	D	V
A	180 g	2.5 g/cm³	72 cm³ ①
B	397.5 g ④	1.43 g/cm³ ⑤	278 cm³ ③
C	577.5 g	1.65 g/cm³	350 cm³ ②

The order of the calculations performed is shown by the numbers ①, ②, ③, ④ and ⑤ in the table.

Answer: 1.43 g/cm³

(4 marks)

Q10. Paul sets off from Arlington to Bardley, which is a distance of 95 miles, at 9.00 am. He drives for the first 40 minutes at an average speed of 36 miles per hour, and then stops off at a café for a break for half an hour. What average speed must he travel at for the rest of the journey, if he is to arrive at Bardley for 11.20 am? Give your answer to the nearest mile per hour.

- 1st 40 minutes $D = S \times T$

$= 36 \times \frac{2}{3}$

$= 24$ miles

- $95 - 24 = 71$ miles left, has to cover it between 10.10 am and 11.20 am

$\Rightarrow$ time left is 1 hour 10 mins, $1\frac{1}{6}$ hours

- Speed $= \frac{D}{T}$

$= \frac{71}{1\frac{1}{6}}$

$= \frac{71}{\frac{7}{6}}$

$= 60.86$ mph

Answer: 61 mph

(4 marks)

Q11. Object A is travelling at 160 metres per second. Object B is travelling at 550 km per hour. Determine which of these objects is travelling the slowest, showing all your steps of working.

(A) . 160m/s = 570600 m/hour (×3600)

• 570,600 m/hour ≒ 570.6 km/hour (÷1000)

(B) is 550 km/hour, and is slower.

Answer: (B)

(3 marks)

Q12. In a building site, a mini-crane is required to lift a concrete block in the shape of a cuboid. The maximum load the crane can lift is 2200 kg. The cuboid measures 2 metres by 40 cm by 1 metre, and the density of the block is $2.8 g/cm^3$.
Work out if the crane can lift the concrete block, explaining all your reasoning carefully.

- Volume cuboid = 200 cm × 40 cm × 100 cm
  = 800,000 cm^3
- $M = D \times V$
  = $2.8 g/cm^3 \times 800\,000\ cm^3$
  = 2240000 g
- M = 2240 kg (÷1000)

This is more than 2200kg, so the crane can't safely lift the block

Answer: No.

(4 marks)

Q13. A race-track is 1 mile in length. To qualify for a race, drivers need to average 60 mph over two laps of this race-track. Nigel completes his first lap at an average speed of 45mph.
At what average speed will he need to complete his second lap in order to qualify?

• 1st lap: $T = \frac{D}{S}$

$T = \frac{1 \text{ mile}}{45 \text{ mph}}$

$T = \frac{1}{45}$ hour

• Need $S = 60$ mph over 2 laps

$\Rightarrow$ using $S = \frac{D}{T}$,

$60 = \frac{2}{T}$

$\Rightarrow$ Total time $= \frac{2}{60}$ hour $= \frac{1}{30}$ hour

$\Rightarrow$ 2nd lap time: $\frac{1}{30} - \frac{1}{45}$

$= \frac{1}{90}$ hour

$\Rightarrow$ Speed 2nd lap $= \frac{1}{\frac{1}{90}}$

$= 90$ mph

Answer: 90 mph

(4 marks)