22

1   Pedro drove from Toulouse to Montpellier in 2 hours 42 minutes.
He drove at an average speed of 90 km/hour.

Janine drove from Toulouse to Montpellier along the same route as Pedro.
The journey took her 3 hours.

Work out Janine's average speed for the journey.

distance = speed × time

speed = $\dfrac{distance}{time}$

time taken = 2 hours 42 minutes

Speed = 90 km/hour

distance from Toulouse to Montpellier:

90 km/h × 2 hour + $\dfrac{42 \text{ minutes}}{60}$ ← convert minutes to hours

= 90 × 2.7 ①

= 243 km ①

Janine's average speed:

$\dfrac{243 \text{ km}}{3 \text{ hours } ①}$ = 81 km/h ①

81 .... km/hour

(Total for Question 1 is 4 marks)

2 A rocket travelled 100 km at an average speed of 28 440 km/h.

Work out how long it took the rocket to travel the 100 km.
Give your answer in seconds, correct to the nearest second.

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

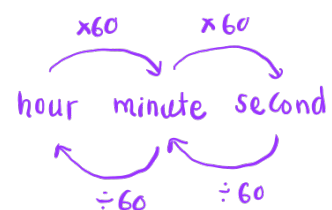$$\text{time} = \frac{\text{distance}}{\text{speed}}$$

$$= \frac{100 \text{ km}}{28\,440 \text{ km/h}} \quad ①$$

$$= 0.0035 \text{ h} \times \frac{3600 \text{ s}}{1 \text{ h}} \quad ①$$

convert
✓ h to s

$$= 12.6 \text{ s}$$

$$≈ 13 \text{ s (nearest second)} \quad ①$$

$$\text{hour} \xrightarrow{\times 60} \text{minute} \xrightarrow{\times 60} \text{second}$$

$$\text{hour} \xleftarrow{\div 60} \text{minute} \xleftarrow{\div 60} \text{second}$$

................................13.............................. seconds

(Total for Question 2 is 3 marks)

3 A plane takes 3 hours 36 minutes to fly from the Cayman Islands to New York.
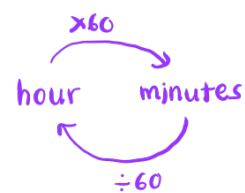The plane flies a distance of 2470 km.

Work out the average speed of the plane in km/h.
Give your answer correct to the nearest whole number.

Speed = $\frac{distance}{time}$

36 minutes $\times$ $\frac{1\ hour}{60\ minutes}$ = 0.6 hour ①

hour $\overset{\times 60}{\underset{\div 60}{\rightleftarrows}}$ minutes

Speed = $\frac{2470\ km}{3.6\ h}$ ①

= 686 km/h ①

686 .... km/h

(Total for Question 3 is 3 marks)

4 A plane flew from Madrid to Dubai.

The distance the plane flew was 5658 km.
The flight time was 8 hours 12 minutes.

Work out the average speed of the plane.

$$Speed = \frac{distance}{time}$$

Convert 12 minutes to hours :
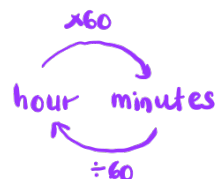
$$\frac{12}{60} = 0.2 \text{ hours}$$

∴ Flight time is 8.2 hours ①

$$Speed = \frac{5658 \text{ km}}{8.2 \text{ h}} \quad ①$$

$$= 690 \text{ km/h} \quad ①$$

690 .... km/h
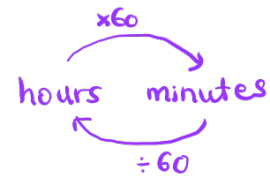
(Total for Question 4 is 3 marks)

5 A train journey from Paris to Amsterdam took 3 hours 24 minutes.
The total distance the train travelled was 433.5 km.

Work out the average speed of the train.
Give your answer in kilometres per hour.

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

Convert 24 minutes to hours :

$$\frac{24}{60} = 0.4 \text{ hours}$$

time taken = 3 + 0.4 = 3.4 hours ①

$$\text{Speed} = \frac{433.5 \text{ km}}{3.4 \text{ hours}} \text{ ①}$$

= 127.5 km/h ①

.......................127.5....................... km/h

(Total for Question 5 is 3 marks)

6 A train takes 6 hours 39 minutes to travel from New Delhi to Kanpur.
The train travels a distance of 429 km.

Work out the average speed of the train.
Give your answer in km/h correct to one decimal place.

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

1 hour = 60 minutes

$$\text{time} = 6 + \frac{39}{60} \text{ hours}$$

$$= 6 + 0.65 \text{ hours}$$

$$= 6.65 \text{ hours} \quad ①$$

$$\text{speed} = \frac{429 \text{ km}}{6.65 \text{ hours}} \quad ①$$

$$= 64.5 \text{ km/h} \quad (1dp)$$

64.5 ① .... km/h

(**Total for Question 6 is 3 marks**)

7 Kaidan and Sonja went on two different car journeys.

$Speed = \dfrac{distance}{time}$

For Kaidan's journey

distance = 80 km correct to the nearest 5 km
time = 2.7 hours correct to 1 decimal place

For Sonja's journey

distance = 33 km correct to 2 significant figures
time = 1 hour correct to the nearest 0.1 hour

Kaidan says,

"My average speed could have been greater than Sonja's average speed."

By considering bounds, show that Kaidan is correct.
Show your working clearly.

Finding upper bound of Kaidan's speed :

$distance_{UB} = 82.5$ km ①

$time_{LB} = 2.65$ hours

$Speed_{UB} = \dfrac{82.5 \text{ km}}{2.65 \text{ h}}$

$= 31.13$ kmh⁻¹ ①

Finding lower bound of Sonja's speed :

$distance_{LB} = 32.5$ km

$time_{UB} = 1.05$ h

$Speed_{LB} = \dfrac{32.5 \text{ km}}{1.05 \text{ h}}$

$= 30.95$ kmh⁻¹ ①

①

$Speed_{UB}$ of Kaidan $= 31.13$ kmh⁻¹ $>$ $speed_{LB}$ of Sonja $= 30.95$ kmh⁻¹

(shown)

(Total for Question 7 is 4 marks)

8 An aeroplane travelled from New York City to Los Angeles.

The aeroplane travelled a distance of 3980 kilometres in 5 hours 24 minutes.

Work out the average speed of the aeroplane.
Give your answer in kilometres per hour correct to the nearest whole number.

$$5 \text{ hrs} \cdot \left(\frac{24}{60}\right) \text{ hrs} = 5.4 \text{ hrs}$$

$$\text{Speed} = \frac{3980 \text{ km}}{5.4 \text{ hr}}$$

$$= 737 \text{ km/h}$$

737 .... kilometres per hour

(Total for Question 8 is 3 marks)

9   Milly went on a car journey.
She travelled from Anesey to Breigh to Clando and then to Duckbridge.

For Anesey to Breigh, Milly drove the 245 km in 2.5 hours.
For Breigh to Clando, Milly drove the 220 km at an average speed of 80 km/h
For Clando to Duckbridge, Milly drove at an average speed of 72 km/h in 50 minutes.

Work out Milly's average speed, in km/h, for the journey from Anesey to Duckbridge.
Give your answer correct to one decimal place.

Breigh to Clando: $\dfrac{220 \text{ km}}{80 \text{ km/h}}$ = 2.75 h ①

Clando to Duckbridge: 72 km/h × $\dfrac{50}{60}$ h

= 60 km ①

Total: $\dfrac{245 + 220 + 60}{2.5 + 2.75 + \frac{50}{60}}$ ① = $\dfrac{525}{73/12}$

= 86.3 ①

........................**86.3**........................ km/h

(Total for Question 9 is 4 marks)

10 Change a speed of 90 kilometres per hour to a speed in metres per second.
Show your working clearly.

$$90 \frac{km}{h} \times \frac{1000 \, m}{1 \, km} \times \frac{1 \, h}{3600 \, s}$$

$$= \frac{90 \times 1000}{3600}$$

$$= \frac{90\,000}{3\,600}$$

$$= 25$$

25
.... m/s

(Total for Question 10 is 3 marks)

11 Anjali travels on the Eurostar train from Paris to Amsterdam.

The distance the train travels between Paris and Amsterdam is 515 km.
The time taken by the train to travel between Paris and Amsterdam is
3 hours 18 minutes.

Work out the average speed of the train.
Give your answer in km/h correct to the nearest whole number.

$$\frac{18 \text{ minutes}}{60} = 0.3 \text{ hours}$$

Time taken = 3.3 hours ①

$$\text{speed} = \frac{515 \text{ km}}{3.3 \text{ hours}} ① = 156 \text{ km/h} ①$$

156 .... km/h

(Total for Question 11 is 3 marks)