1 A water tank is empty.
Anil needs to fill the tank with 2400 litres of water.

Company **A** supplies water at a rate of 8 litres in 1 minute 40 seconds.
Company **B** supplies water at a rate of 2.2 gallons per minute.

1 gallon = 4.54 litres

Company **A** would take more time to fill the tank than Company **B** would take to fill the tank.

How much more time?
Give your answer in minutes correct to the nearest minute.

Rate of water supply per litre

Company A = 1 minute 40 second ÷ 8 litres

$= \frac{5}{24}$ minute per litre

Company B : 1 minute ÷ (2.2 × 4.54 ℓ)

$= \frac{250}{2497}$ minute per litre (1)

Time taken to fill the tank

Company A : $\frac{5}{24}$ minute per litre × 2400 litre

= 500 minutes (1)

Company B : $\frac{250}{2497}$ minute per litre × 2400 litre

= 240.28 minutes (1)

260 minutes

(Total for Question 1 is 4 marks)

Company A - Company B

= 500 - 240.28

= 259.71 minute (1)

≈ 260 minute

2 Change 40 centimetres into millimetres.

1 cm = 10 mm

40 cm = 40 x 10 mm
= 400 mm (1)

400 ..... millimetres

(Total for Question 2 is 1 mark)

3 Callum says,

"300 cm^2 is the same as 3 m^2 because there are 100 cm in 1 m so you divide by 100"

Callum's method is wrong.

(b) Explain why.

There are $10,000 cm^2$ in $1 m^2$ (1)

$1 m^2 = 1 m \times 1 m = 100 cm \times 100 cm = 10,000 cm^2$

(1)

(Total for Question 3 is 1 mark)

4 In Spain, Sam pays 27 euros for 18 litres of petrol.
In Wales, Leo pays £40.80 for 8 gallons of the same type of petrol.

1 euro = £0.85
4.5 litres = 1 gallon

Sam thinks that petrol is cheaper in Spain than in Wales.

Is Sam correct?
You must show how you get your answer.

convert Sam's 18 litres into gallons:

4.5 litres : 1 gallon ↓ ×4
18 litres : 4 gallons

scale factor: $\frac{18}{4.5} = 4$

so Sam pays for 4 gallons (1)

convert Sam's 27 euros into pounds:

1 euro : £0.85 ↓ ×27
27 euro : £22.95

scale factor: 27

so Sam pays £22.95 for 4 gallons (1)

Sam in Spain:

£22.95 : 4 gallons ↓ ÷4
£5.74 (2dp) : 1 gallon
(1)

Leo in Wales:

£40.80 : 8 gallons ↓ ÷8
£5.10 : 1 gallon

NO, Sam is incorrect as 1 gallon costs £5.74 in spain but £5.10 in wales, which is cheaper. (1)

(Total for Question 4 is 4 marks)

5 Change 30 metres per second to kilometres per hour.

$\frac{30 \text{ metres}}{1 \text{ second}} \div 1000 = \frac{0.03 \text{ km}}{1 \text{ second}}$ (1)

Convert to km

$\frac{0.03 \text{ km}}{1 \text{ second}} \times 3600 = 0.03 \times 3600$

$= 108 \text{ km/h}$ (1)

Convert to hour

÷1000

m → km

×1000

1 hour = 60 minutes

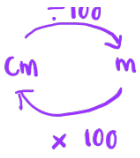
1 hour = 60 min × 60 secs

= 3600 secs

108 ..... kilometres per hour

(Total for Question 5 is 2 marks)

6 (a) Change 8000 cm^3 to m^3

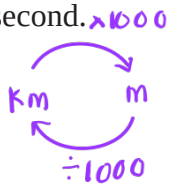


$\frac{8000\ cm^3}{(\frac{100\ cm}{1\ m})^3} = \frac{8000\ cm^3}{\frac{1000000\ cm^3}{1\ m^3}} = 8 \times 10^{-3}\ m^3$

8×10^{-3} (1) m^3

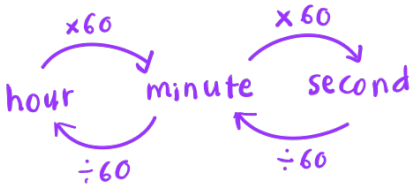
(1)

(b) Change a speed of 180 km per hour to metres per second.



$180\ \frac{km}{h} \times \frac{1000\ m}{1\ km}$ (1)

$= 180\ 000\ \frac{m}{h} \times \frac{1\ h}{60\ min} \times \frac{1\ min}{60\ s}$



$= \frac{180000\ m}{60 \times 60\ s}$

$= \frac{180\ 000\ m}{3600\ s}$ (1) $= 50\ m/s$ (1)

50 metres per second

(3)

(Total for Question 6 is 4 marks)

7 Ethan buys a box of 24 cans of lemonade for £7
There are 330 m*l* of lemonade in each can.

(b) Work out the cost of 100 m*l* of lemonade.
Give your answer correct to the nearest penny.

Finding price of each can :

$\frac{£7}{24} = £0.2916\ldots$ (per can) (1)

∴ 330 ml of lemonade (1 can) costs £0.2916 ...

100 ml of lemonade costs :

$\frac{100}{330} \times £0.2916\ldots = £0.08838\ldots$ (1)

Convert to penny :

$0.08838 \times 100 = 8.838\ldots$

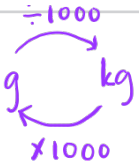
= 9 (nearest penny) (1)

9 ..... p

(3)

(Total for Question 7 is 3 marks)

8 Change 4000 grams into kilograms.



4000g ÷ 1000 = 4kg

4 (1)

..... kilograms

(Total for Question 8 is 1 mark)

9 120 boxes cost £6
270 bags cost £10

A bag is cheaper than a box.

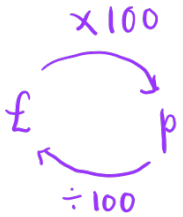
How much cheaper?
Give your answer in pence correct to 1 decimal place.

$6 \div 120 = £0.05$ per box (1)

$10 \div 270 = £0.037$ per bag (1)

$£0.05 - £0.037 = £0.013$ (1)

$£0.013 \times 100 = 1.3$ pence



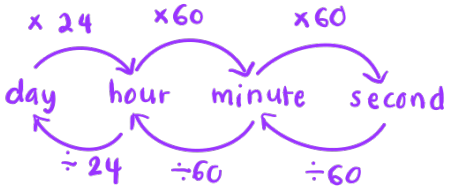
1.3 (1)

.....p

(Total for Question 9 is 4 marks)

10 Lava flows from a volcano at a constant rate of $11.9\,m^3/s$

How many days does it take for $67\,205\,600\,m^3$ of lava to flow from the volcano?
Give your answer correct to the nearest day.



Finding total time it takes in seconds :

$$\frac{67\,205\,600\ m^3}{11.9\ \frac{m^3}{s}} = 5647529.412\ s$$ (1)

Converting time from seconds to days :

$$= 5647529.412\ s \times \frac{1\ day}{(24 \times 60 \times 60)\ s}$$

$$= \frac{5647529.412}{86400}$$ (1)

$= 65.3$ days

$= 65$ days (nearest day) (1)

65 days

(Total for Question 10 is 3 marks)