Surname	Centre Number	Candidate Number
Other Names		0

GCSE – NEW

3310U30-1

S17-3310U30-1

MATHEMATICS – NUMERACY
UNIT 1: NON-CALCULATOR
INTERMEDIATE TIER

THURSDAY, 25 MAY 2017 – MORNING

1 hour 45 minutes

ADDITIONAL MATERIALS

The use of a calculator is not permitted in this examination.

A ruler, a protractor and a pair of compasses may be required.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

If you run out of space, use the continuation page at the back of the booklet, taking care to number the question(s) correctly.

Take π as 3·14.

INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

In question **3**, the assessment will take into account the quality of your linguistic and mathematical organisation, communication and accuracy in writing.

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**3**	
3.	**10**	
4.	**11**	
5.	**9**	
6.	**3**	
7.	**6**	
8.	**7**	
9.	**7**	
10.	**6**	
11.	**6**	
12.	**8**	
Total	**80**	

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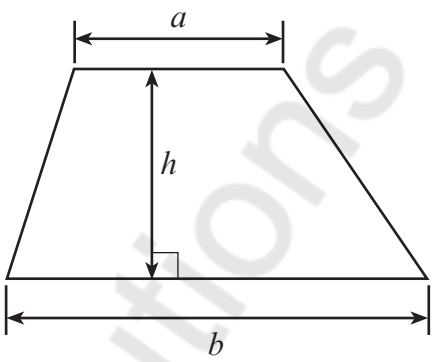
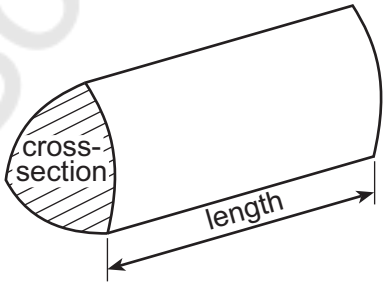
Formula List – Intermediate Tier

Area of trapezium $= \frac{1}{2}(a + b)h$



Volume of prism = area of cross-section × length



Examiner only

1. Siân wrote the following:

'For the last 7 days I have recorded the number of cars parked in my local car park at 10 a.m. each day. This is what I found.

- The car park always had some cars parked in it.
- The greatest number of cars was 11.
- The range was 8 cars.
- The median was 9 cars.
- The mode was 10 cars.
- On one day, there were 6 cars in the car park.
- On another day, there were 7 cars in the car park.'

Gareth asked,
'What was the mean number of cars in the car park at 10 a.m. for these 7 days?'

Complete Siân's reply to Gareth's question.
You must list the 7 numbers Siân recorded and show all your working.

'The mean number of cars in the car park at 10 a.m. for these 7 days was

8 cars.' [4]

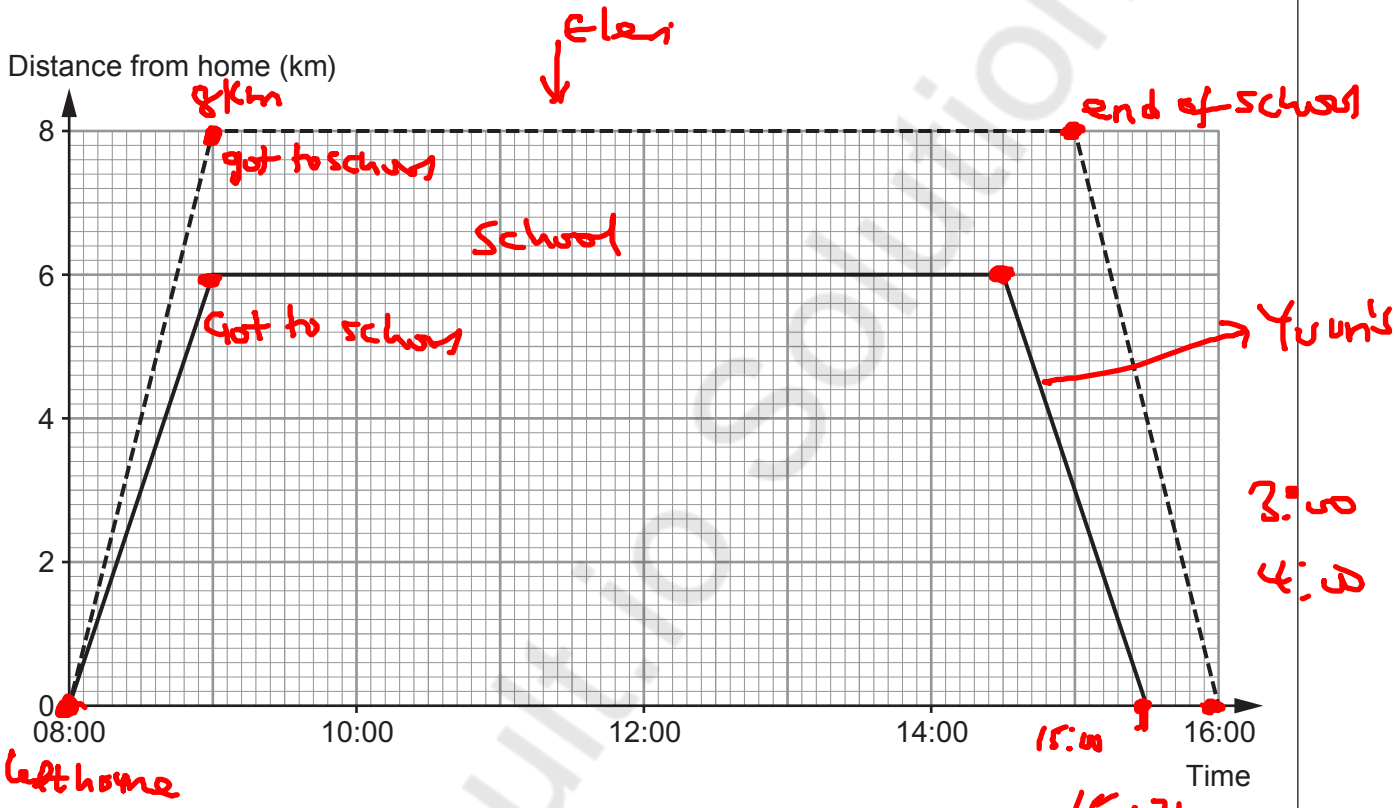
Examiner only

2. Eleri and Yvon are sisters.
They both live at *Cwm Uchel*.
They do not go to the same school. *
The graph represents each of their journeys to school and back.

Key:

represents Eleri's journeys

represents Yvon's journeys



(a) At what time did Yvon arrive home from school?
Circle your answer. [1]

14:45 15:15 15:30 15:45 16:00

Examiner only

(b) Eleri cycles along a straight road to school and back.
How far does she cycle when going to school and back in one day?
Circle your answer. [1]

6 km 8 km 9 km 12 km 16 km

8km + 8km = 16Km

(c) Martha looks at the graph and says,

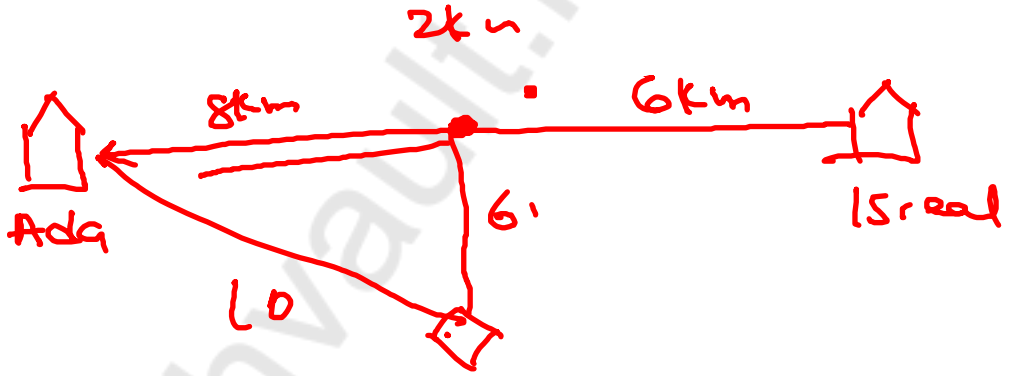
'The school Eleri attends is 2 km from Yvon's school.'

Is this true?

Certainly true ☐ Certainly false ☐ Can't tell ☑

Give a reason for your answer. [1]

The distance given is the distance from home not distance from School.



$2.5 \times 4.4 = \frac{5}{2} \times \frac{44}{10_2} = \frac{44}{4} = 11$

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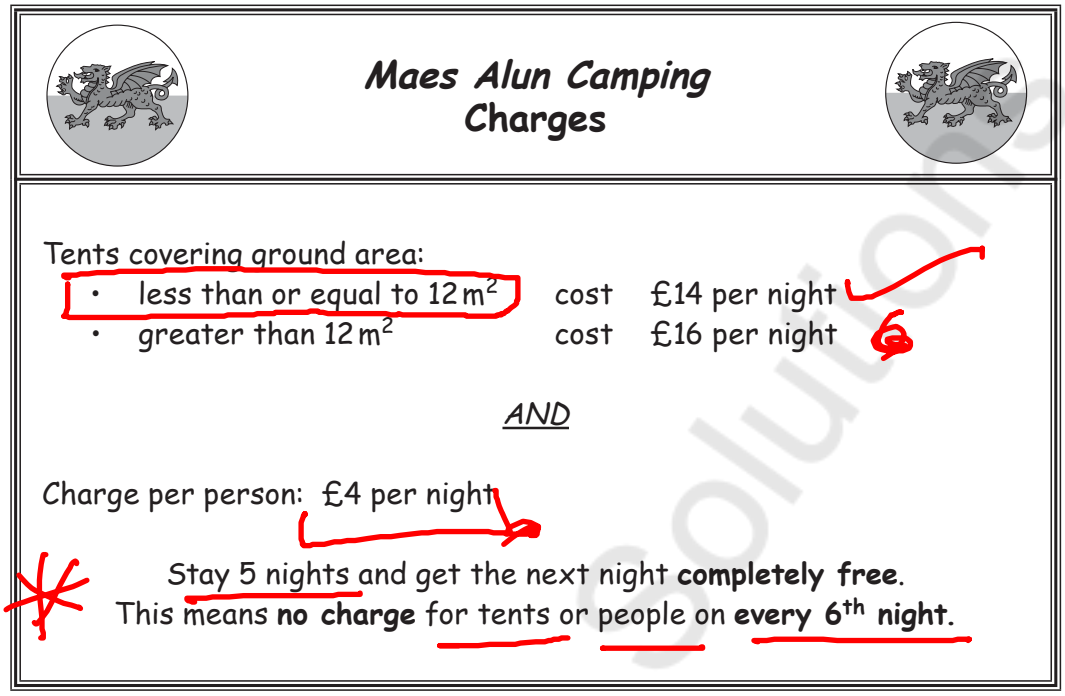
3. *In this question, you will be assessed on the quality of your organisation, communication and accuracy in writing.*



Maes Alun Camping
Charges

Tents covering ground area:

- less than or equal to 12 m^2 cost £14 per night
- greater than 12 m^2 cost £16 per night

AND

Charge per person: £4 per night

Stay 5 nights and get the next night **completely free**.
This means **no charge** for tents or people on **every 6th night**.

Rhodri and Lars are planning a camping holiday, staying at *Maes Alun Camping*.
They are going to

- take only one tent between them,
- take a tent covering a rectangular ground area, measuring 2·5 metres by 4·4 metres,
- both stay for a total of 12 nights.

Their holiday is just 8 weeks away.
They **each** plan to save £15 per week from now until their holiday in 8 weeks' time.

Will the amount they save be enough to pay for their holiday?
You must show all your working.

[8 + 2 OCW]

Tent covering less than $12m^2$ → £14 per night *
Tent covering more than $12m^2$ → £16 per night
Charge per person → £4 per night
Charge on 6th night is free
Total people = 2
Tent = 1 Dimension of Tent: L = 2.5m B = 4.4m
Area of Tent = L × B = 2.5 × 4.4
Area of Tent = $11m^2$ < $12m^2$
So, They will pay £14 per night for Tent

Since they are staying 12 nights. They will be charge for 10 days since every 6th night is free.

Examiner only

15 × 8 = 120

Total weeks before Holiday = 8 weeks

They both plan to save = £15 per week

Rhodri savings = 15 × 8 = £120

Lara savings = 15 × 8 = £120

Total Savings = £240 //

Cost of 10 days holiday

(i) Tent = £14 per night

So, for 10 days : Tent Cost = 14 × 10 = £140

(ii) Each person = £4 per night

Rhodri charge for 10 days = £4 × 10 = £40

Lara charge for 10 days = £4 × 10 = £40

140 + 80 = 220

Total charge = £80

Total Holiday Cost = Cost of Tent + Cost of Pers

= £140 + £80

= £220

Since their savings (£240) is more than the holiday cost (£220), then their savings will be enough to pay for their Holiday and have an extra of £20.

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4. Lazar wants to send a package to Germany.
He looks at pricing charts for three different companies, *ParcelMax*, *DirectGo* and *Pack2save*.

ParcelMax
Total cost =
Sum of the 3 dimensions in cm × £0.60

DirectGo
Total cost =
Volume measured in cm^3 × £0.01

Pack2save
Total cost =
Total area of all 6 faces measured in cm^2 × £0.02

Lazar's parcel is a cuboid measuring 10 cm by 20 cm by 30 cm.

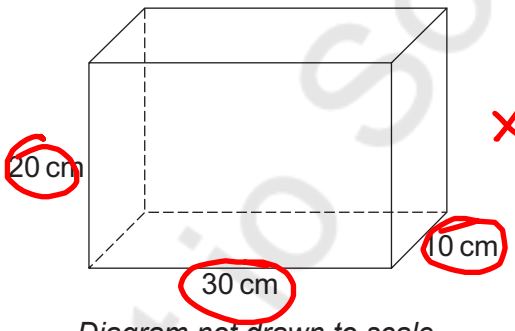


Diagram not drawn to scale

$V = L \times W \times H$

$L = 30cm$
$W = 10cm$
$H = 20cm$

(a) Find the cost of sending the parcel for each of the three different companies.
Give each of your answers in pounds (£).

(i) *ParcelMax* [2]

ParcelMax = Sum of all 3 dimension × £0.60
= 30 + 10 + 20 × £0.60
= 60 × £0.60
= £36

(ii) *DirectGo* [3]

DirectGo = Volume of package × £0.01
DirectGo = L × W × H × £0.01
DirectGo = 30 × 10 × 20 × £0.01
= £60

Examiner only

L = 30 W = 10 H = 20

(iii) *Pack2save* [4]

Pack2Save = Total Surface Area × £0·02

TSA [rectangular prism] = 2[LW + LH + WH]

TSA = 2[30×10 + 30×20 + 10×20]

TSA = 2[300 + 600 + 200]

TSA = 2[1100]

2200 × 2/100

TSA = 2200 cm²

Pack2Save = 2200 × £0·02

Pack2 Save = £44

(b) What is the **percentage saving** that Lazar will make by choosing the cheapest option rather than the most expensive option? [2]

% saving = Save / Actual value × 100

£60 − £36 = £24

Cheapest option = £36 Expensive option = £60

Save = 60 − 36 = £24

% saving = 24/60 × 100 = 40%

Examiner only

5.

Bryn share: $\frac{2}{15} \times$ 1200 = £160

Sophie share: $\frac{6}{15} \times$ 1200 = £480

(a) Jasmine entered herself, Sophie and Bryn as a group in a talent contest.
Bryn only had a minor part.

Bryn, Sophie and Jasmine won the contest.
They shared the prize money in the ratio 2 : 6 : 7, with Bryn getting the smallest share.
Jasmine won £560, the largest share.

(i) How much money did Bryn and Sophie each win? [4]

Sharing ratio: 2 : 6 : 7

Jasmine Largest share = £560

Total money shared = x

Jasmine share = $\frac{7}{15} \times x$

$560 = \frac{7}{15} \times x$ | $560 \times 15 = 7x$

$x = \frac{560 \times 15}{7}$

$x =$ £1200

Bryn receives £ 160.

Sophie receives £ 480.

(ii) Jasmine gave 15% of her winnings to charity.
How much did Jasmine have left? [2]

Charity is 15% of Jasmine share

Charity = $\frac{15}{100} \times 560 = \frac{3 \times 28}{1}$

Charity = £84

Jasmine have £560 − £84

= £476

Examiner only

(b) The talent contest is held once a year.
Every year, the cost of putting on the talent contest increases by 10% of the previous year's cost.
In summer 2014 the cost was £6600.

Calculate the cost of putting on the summer 2017 talent contest.
You must show all your working. [3]

% increase per year → 10%

In 2014: Cost = £6600

2014 → 6600

2015 → 10% increase = 10% of 6600

$\frac{10}{100} \times 6600 = £660$

Cost 2015: 6600 + 660 = £7260 ✓

2016: → 10% increase = 10% of 7260

$\frac{10}{100} \times 7260 = £726$ ✓

Cost 2016: 7260 + 726 = £7986

So, In 2017 → 10% increase = 10% of 7986

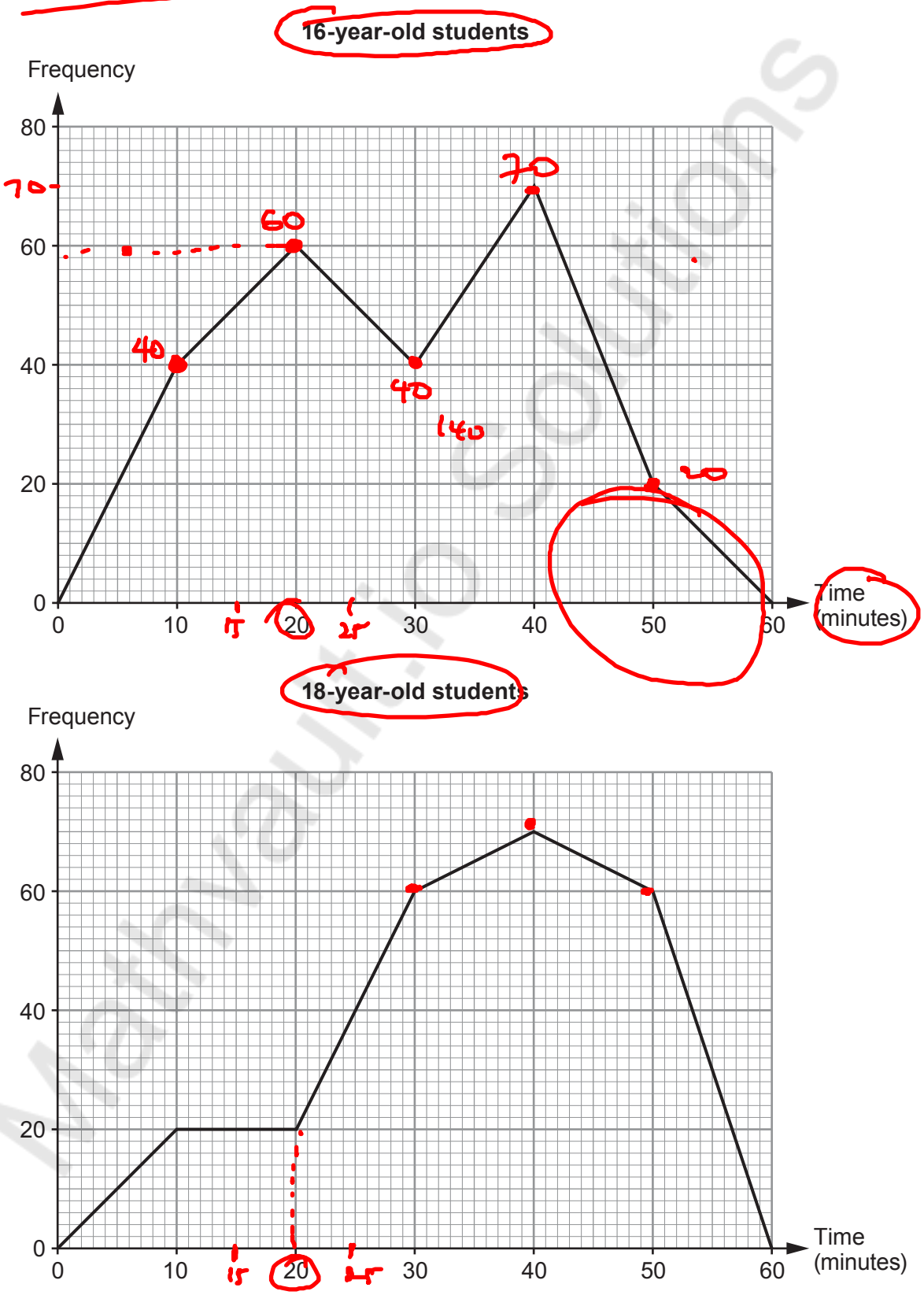
$\frac{10}{100} \times 7986 = £798.6$

Cost in 2017 = £7986 + £798.6

= £8784.60

Examiner only

6. A survey was carried out to find how much time a group of 16-year-old students and a group of 18-year-old students spent using social media.
The frequency polygons below, which use equal time intervals, illustrate the results.



Examiner only

(a) How many 16-year-old students took part in the survey?
Circle your answer. [1]

60 70 210 230 2300

230

(b) How many more 16-year-old students than 18-year-old students spent between 15 minutes and 25 minutes using social media?
Circle your answer. [1]

20 40 60 100 250

16 years [15 min – 25 min] = 60 people 60 − 20

18 years [15 min – 25 min] = 20 people = 40

(c) Wesley says,

'The 16-year-old students generally spent about the same time using social media as the 18-year-old students.'

Using the frequency polygons, how would you explain to Wesley that his statement is not true? [1]

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The graph of the 18 years leans forward the greater time that means the 18 years spent more time on Social media.

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7. Kari is making a jigsaw puzzle.
She has designed the pattern on a piece of paper.
Kari plans to make each piece of the jigsaw a different colour.

Part of her plan is shown below.

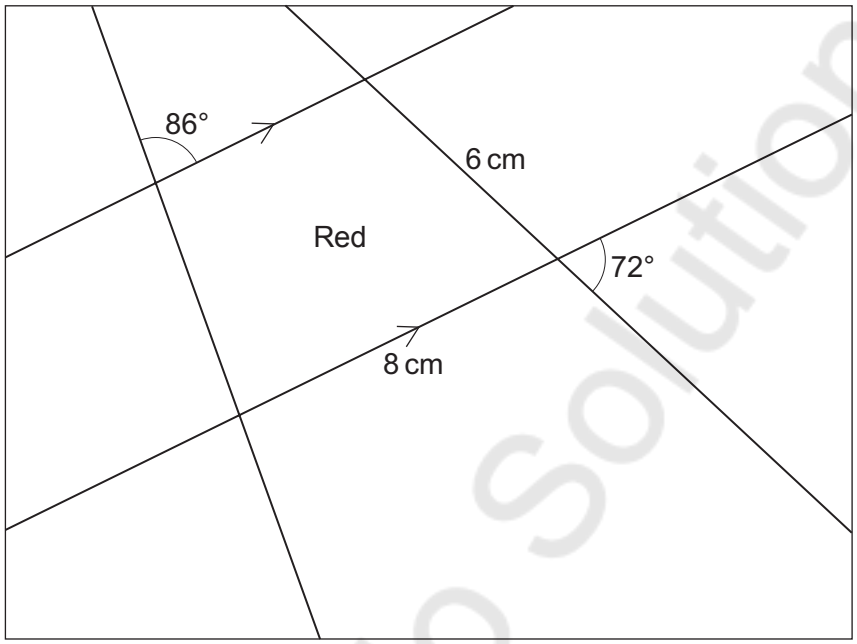


Diagram not drawn to scale

Kari now sketches a diagram of the red piece of the jigsaw, which is shown below.
She shows some extended lines and indicates all the angles she needs to find.

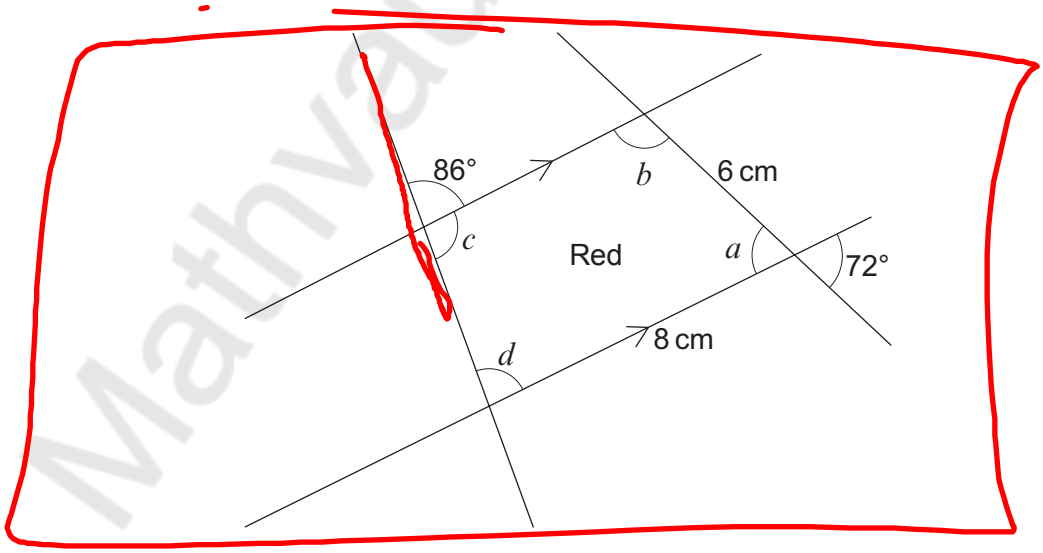


Diagram not drawn to scale

Examiner only

Find the 4 missing angles in the red piece of the jigsaw.
Draw the red piece of Kari's jigsaw accurately.
One side has been drawn for you. [6]

$a = 72°$ [vertical opposite angle]

$c + 86 = 180$ [sum of angle on a straight line is 180]

$c = 180 - 86 = 94°$

$d = 86°$ [Corresponding angle]

$a =$ 72 °, $b =$ 108 °, $c =$ 94 °, $d =$ 86 °

$a + b = 180$ [sum of interior angle on a transversal line]

$b = 180 - a = 180 - 72 = 108°$

Space for drawing the red piece of jigsaw:

8 cm

Examiner only

8. Bethan builds a rectangular sheep pen.

2·2
× 18
17 6
22
39·6

(a) The perimeter fence of the sheep pen is 18 m long.
It costs her £1.10 for every 0·5 metres of fencing used to make the sheep pen.

(i) Calculate the cost of the fencing used to make this sheep pen. [2]

Perimeter = 18m
Cost → £1·10 / 0·5m × 2
Cost → £2·20 per 1m
Cost of 18m perimeter = 2·2 × 18
= £39·60

Cost is £ 39·60

(ii) The length of Bethan's sheep pen is two times its width.
Find the length and width of this sheep pen.
You must show your working. [2]

L = 2x width width = x
Length = 2x
Perimeter = 2 [L + w]
18 = 2 [2x + x]
18 = 2 × 3x 18 = 6x

Length is 6 metres
Width is 3 metres

$x = \frac{18}{6} = 3m$

width = x = 3m
Lenght = 2x = 6m

Examiner only

(b) Bethan decides to build a new sheep pen.
The perimeter fence of the new sheep pen is 16 m long.
The length of the new sheep pen is 3 metres longer than the width.

Form an equation and solve it to find the dimensions of this new sheep pen. [3]

Perimeter = 16 m

Let the width = x

The length = $x + 3$

Perimeter = $2[L + W]$

$16 = 2[x + 3 + x]$

$16 = 2(2x + 3)$

$16 = 4x + 6$ —— (1)

$-6 \quad -6$

Length is 5.5 metres

Width is 2.5 metres

$\frac{10}{4} = \frac{4x}{4}$ $\quad x = \frac{10}{4} = \frac{5}{2} = 2.5\text{m}$

width = 2.5m

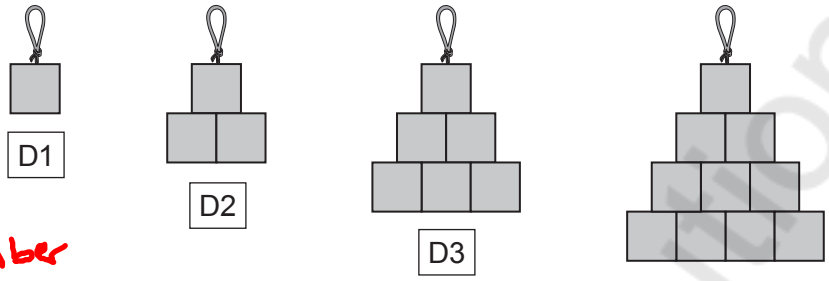
length = $2.5 + 3 = 5.5\text{m}$

Examiner only

9. Ollie and Josef both have jobs in a workshop that makes decorations.

They make decorations using small squares of stained glass.

(a) Ollie has made the following decorations.



Triangular number

1 +2 3 +3 6 +4 10 +5

D1 D2 D3 D4

He labels the first decoration D1.
He labels the next 3 decorations in order, D2, D3 and D4.

He continues to make decorations and labels following this pattern.

(i) After making decoration D5, Ollie notices he only has 10 small squares of stained glass left.
How many **more** squares of stained glass will Ollie need to make decoration D6?
[2]

D1 D2 D3 D4 D5 D6 10 square left

1 +2 3 +3 6 +4 10 +5 15 +6 21

So, he needs 21 squares for D6 but has 10.

He will need extra 21 − 10 = 11 squares

(ii) Ollie uses a rule to work out how many squares he needs for each decoration.
He states that to make decoration D10 he would need 55 squares.
Is Ollie correct?
You must show your working.
[1]

D1 D2 D3 D4 D5 D6 D7 D8 D9 D10

1 3 6 10 15 21 28 36 45 55

+6 +7 +8 +9 +10

D10 requires 55 squares

So, Ollie is Correct.

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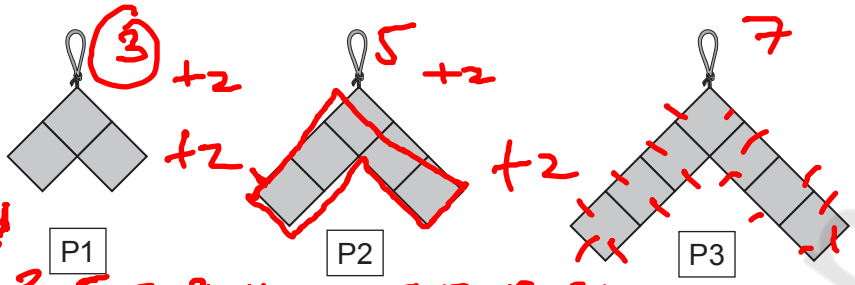
(b) Josef has made the following three decorations using small squares of stained glass.



Josef labels these patterns P1, P2 and P3 in order.

Josef continues to make decorations following the pattern he has started.

(i) How many **more** squares would he need to make pattern P22 than to make pattern P18? [1]

$P_{18} = U_{18} = 3 + (18-1) \times 2 = 3 + 17 \times 2 = 37$

$P_{22} = U_{22} = 3 + (22-1) \times 2 = 3 + 21 \times 2 = 45$

Difference $= 45 - 37 = 8$

(ii) Josef has 22 squares.

Josef states,

'I think I can make one complete decoration using **all** 22 squares, with none left over.'

Is Josef correct?

Yes ☐ No ☒

Give a reason for your answer. [1]

$3 + 5 + 7 = 15$

$3 + 5 + 7 + 9 = 24$

So, he needs extra 2 to make a complete decoration.

(iii) Each small square of stained glass measures 0·5 cm by 0·5 cm.
The perimeter of one of Josef's decorations is 10 cm.
Complete the label that Josef would use for this decoration. [2]

P .....

Dimension of glass $= 0.5$ cm by 0.5 cm

$P = 10$ cm

Perimeter of a glass $= 4 \times 0.5 = 2$ cm

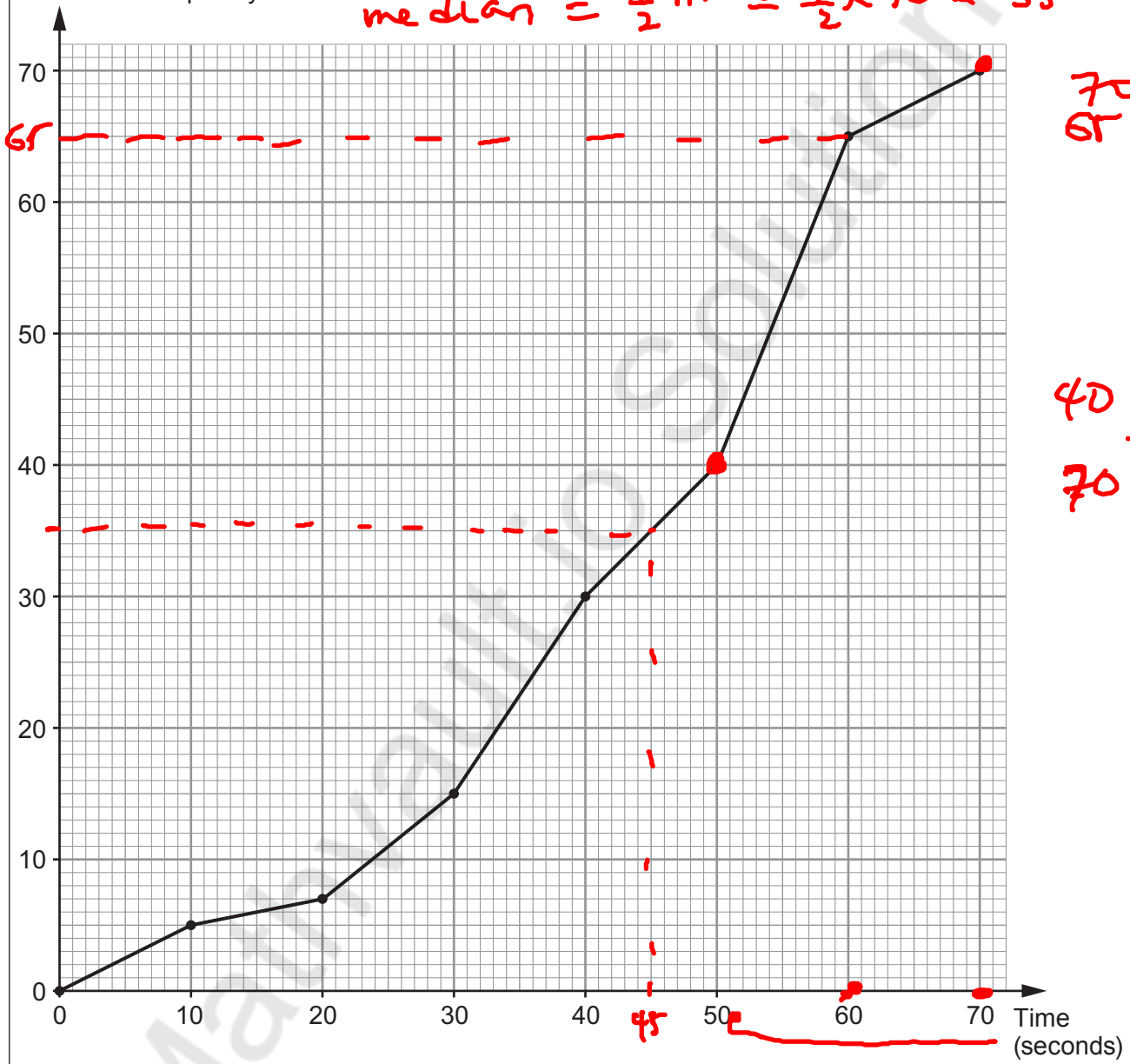
Number of squares is $10 \div 0.5 = 20$ squares

P4

P4

Examiner only

10. *Cambria Airlines* has planes that can carry up to 70 passengers.
For safety, the crew practise the emergency exit procedures with a group of 70 passengers.
Every 10 seconds the safety officer records the total number of passengers who have left the plane.
He has displayed the results in the cumulative frequency diagram shown below.



(a) Estimate the median time taken by the passengers to leave the plane. [1]

45 ..... seconds

Examiner only

(b) How many passengers took more than 50 seconds to leave the plane?
Circle your answer. [1]

10 20 30 40 50

(c) *Cambria Airlines* has a policy that states the following.

'In the event of an emergency exit procedure, at least 90% of the 70 passengers must have left the plane within 1 minute.'

Did the practice emergency exit procedure meet the requirements of the airline's policy?
You must show all your working. [4]

90% of 70 = $\frac{90}{100} \times 70$ = 63 passengers

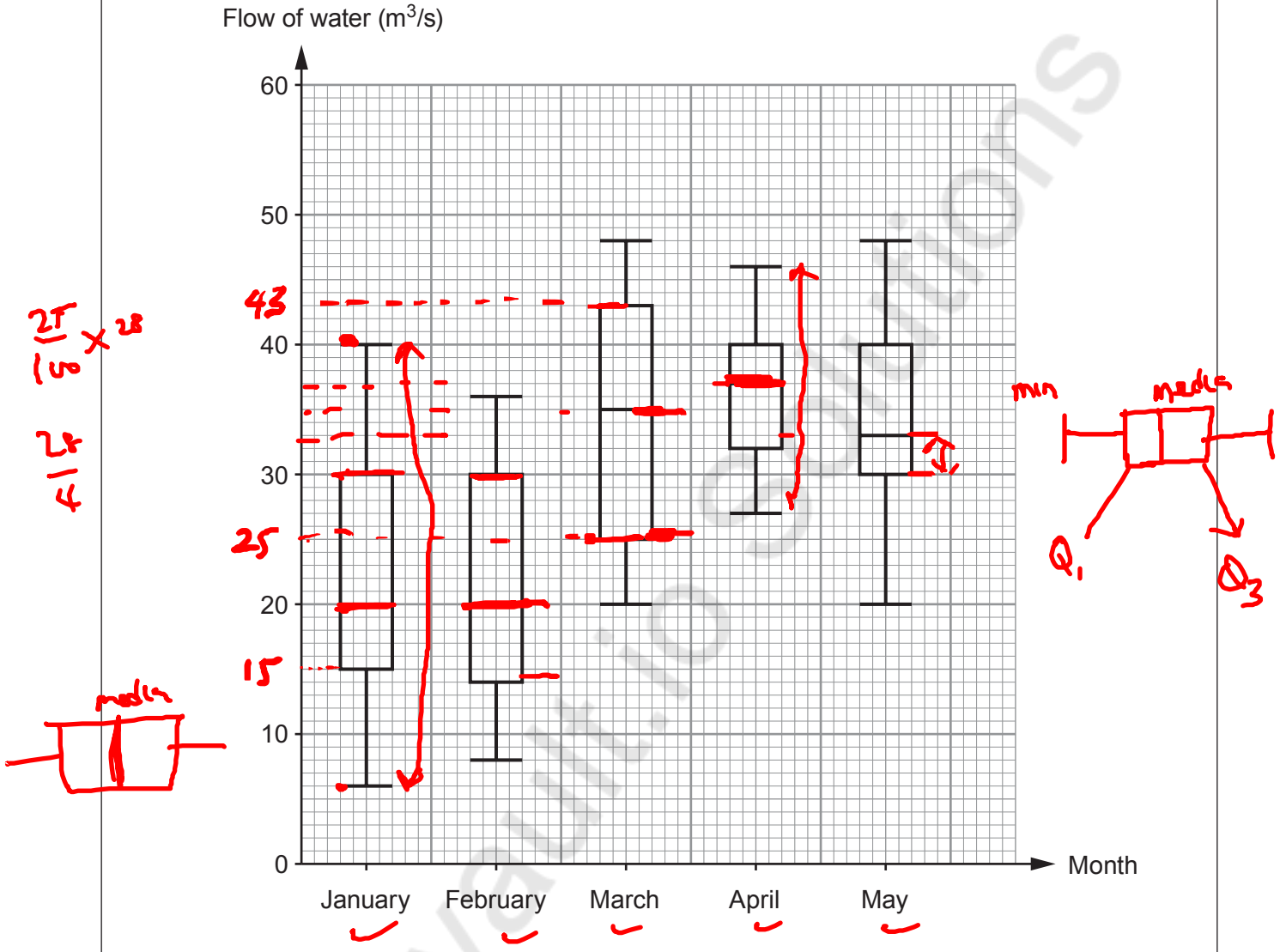
From the graph only 5 people was not able to meet the exit procedure so, the practice meets the requirement

Requirement → 63 passengers

Practice → 65 passengers

Examiner only

11. The following box and whisker plots show the flow of water through a drain, measured in m^3/s. The flow of water was measured at 11 a.m. each day for the first 5 months of the year.



(a) In which of the five months was the median flow of water the greatest? [1]

median : January = 20
February = 20
March = 35
April = 37
May = 33

The median is greatest in April (37)

Examiner only

(b) In which of the five months was the range of the flow of water the greatest? [1]

Range = max value − min value

So, the range is greatest in January

(c) Iona is writing some statements for a report on the flow of water through the drain. Complete each of the statements given below.

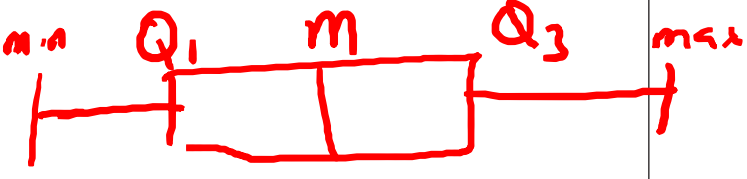
(i) 'Both the upper quartiles and medians in the months of January and February were the same.' [1]

(ii) '25% of the results in March show the flow of water was greater than 25 m^3/s.' Lower Quartile [1]

(d) Circle either TRUE or FALSE for each of the following statements. [2]

25% of the results in January show the flow of water was less than 6 m^3/s.	TRUE	FALSE
The units, m^3/s, measure the volume of water passing through the drain each second.	TRUE	FALSE
The mean flow of water in April was **certainly** greater than 36 m^3/s.	TRUE	FALSE
The month with the greatest difference between the lower quartile and the median was May.	TRUE	FALSE

$\frac{m^3}{s}$ V/s



Examiner only

12. *(a)* A standard piece of A4 paper is usually 0·08 mm thick.
What is 0·08 mm written in **metres** in standard form?
Circle your answer. [1]

8×10^{4} 8×10^{-4} 8×10^{-3} 8×10^{3} 8×10^{-5}

$\frac{a^m}{a^n} = a^{m-n}$

1 m = 1000 mm

0·08 mm = $\frac{0.08}{1000}$ m = $\frac{8 \times 10^{-2}}{10^3}$ = 8×10^{-5} m

(b) A piece of card is 1 mm thick.
A stack of these pieces of card is 3×10^{-2} metres high.

(i) Calculate how many pieces of card there are in the stack. [2]

Thickness = 1 mm = $\frac{1}{1000}$ m

Thickness = 10^{-3} m

Pieces = $\frac{3 \times 10^{-2}}{10^{-3}} = 3 \times 10^{-2+3}$

$= 3 \times 10$

$= 30$

(ii) What assumption have you made in answering *(b)*(i)? [1]

Assumption: No gap between the stacks.

Examiner only

(c) In 2012 it was recorded that

- the total mass of the paper used for printing newspapers, in the world, was $2{\cdot}88 \times 10^7$ **tonnes**,
- the world population was approximately $7{\cdot}2 \times 10^9$ people.

Use this information to calculate the mass of paper per person used to print newspapers in 2012.
Give your answer in **kg per person**. [4]

Total mass $= 2{\cdot}88 \times 10^7$ Tonnes

total population $= 7{\cdot}2 \times 10^9$ people

Convert Tonne to kg

1 tonne $= 1000$ kg

mass paper / person $= \dfrac{2{\cdot}88 \times 10^7 \text{ Tonnes}}{7{\cdot}2 \times 10^9 \text{ people}}$

$= \dfrac{2{\cdot}88 \times 10^7 \times 10^3 \text{ kg}}{7{\cdot}2 \times 10^9 \text{ people}}$

$= \dfrac{2{\cdot}88 \times 10^{10}}{7{\cdot}2 \times 10^9} = \dfrac{2{\cdot}88 \times 10}{7{\cdot}2}$

10^{10-9}

10^1

$\dfrac{28{\cdot}8 \times 10}{7{\cdot}2 \times 10}$

Mass of paper: 4 kg per person

END OF PAPER

288 144 72 36 4

72 36 18 9 1

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