Write your name here

Surname	Other names

Edexcel GCSE

Centre Number	Candidate Number

Applications of Mathematics

Unit 1: Applications 1

For Approved Pilot Centres ONLY

Higher Tier

Mock Exam Paper **Time: 1 hour 45 minutes**	Paper Reference **5AM1H/01**

You must have:
Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser, calculator. Tracing paper may be used.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – there may be more space than you need.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
  – use this as a guide as to how much time to spend on each question.
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – you should take particular care on these questions with your spelling, punctuation and grammar, as well as the clarity of expression.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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W 3 9 7 9 5 A 0 1 2 4

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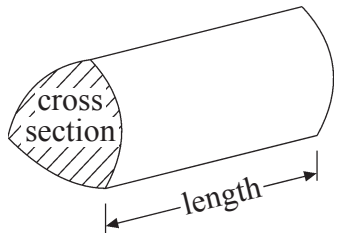
GCSE Mathematics 2AM01

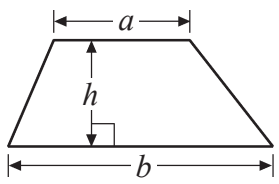
Formulae – Higher Tier

You must not write on this formulae page.
Anything you write on this formulae page will gain NO credit.

Volume of a prism = area of cross section × length

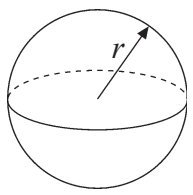


Area of trapezium $= \frac{1}{2}(a+b)h$



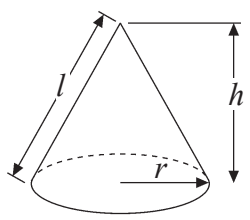
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

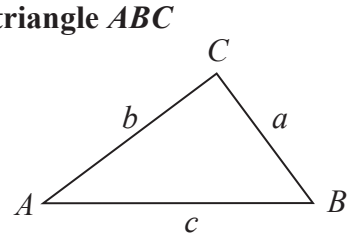


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle *ABC*



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

1 Naomi wants to find out how often people go to the cinema.

She uses this question on a questionnaire.

How many times do you go to the cinema?

☐ Not very often ☐ Sometimes ☐ A lot

(a) Write down **two** things wrong with this question.

1 .....

.....

2 .....

.....

(2)

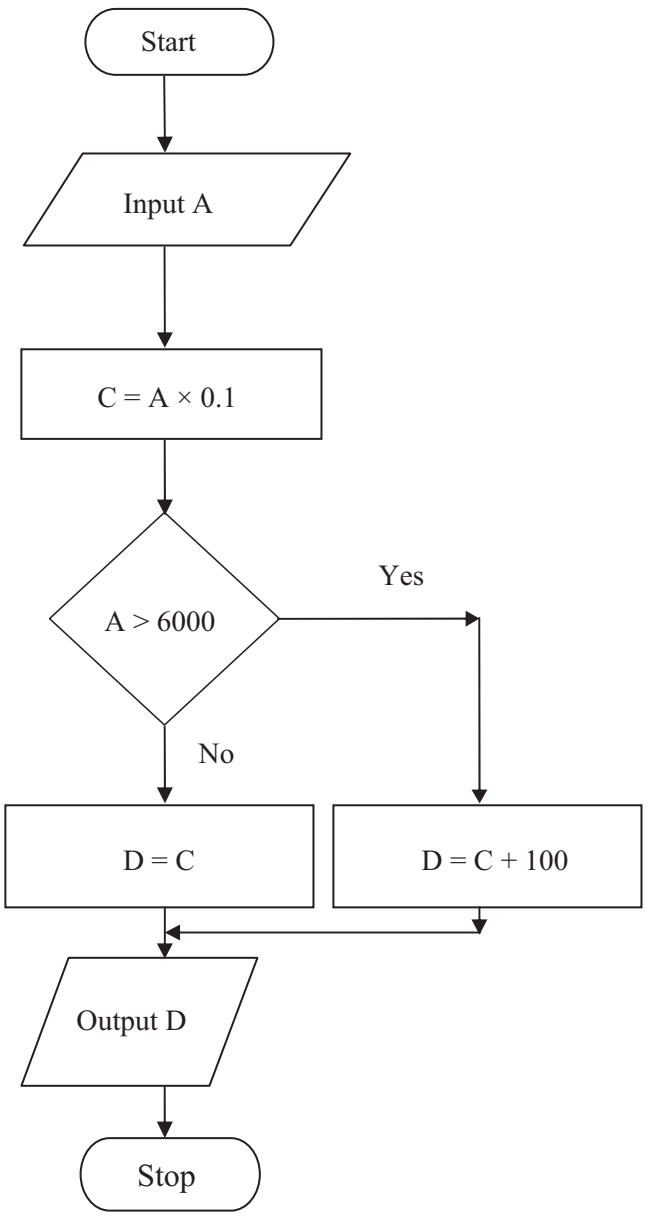
(b) Design a better question for Naomi to use on her questionnaire to find out how often people go to the cinema.

(2)

(Total for Question 1 is 4 marks)

2 Jake is the manager of a shop.
He pays his salesmen a commission (£C) of 10% on the value of their sales (£A)
Jake may also pay them a bonus.

Jake uses this flowchart to work out a salesman's pay (£D).



(a) Calculate the pay when

(i) A = 5000

£ .....

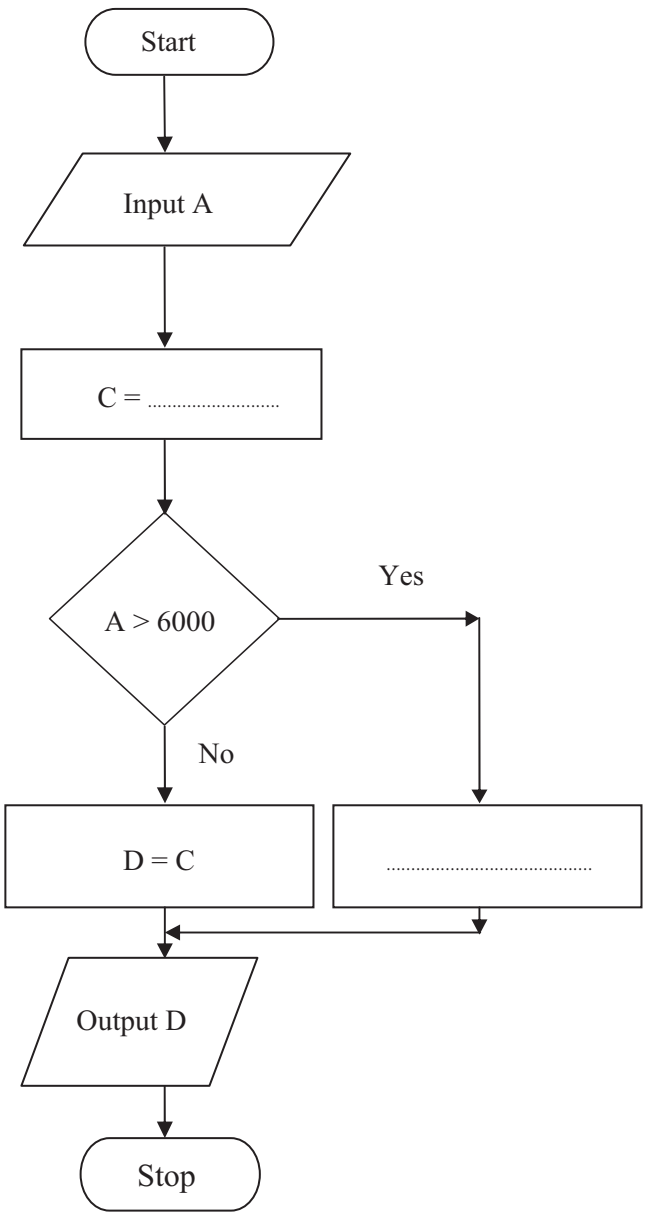
(ii) A = 7000

£ .....

(2)

Jake decides to change what he pays his salesmen.
He now pays salesmen a commission of 15%.
The bonus is now half the original bonus.

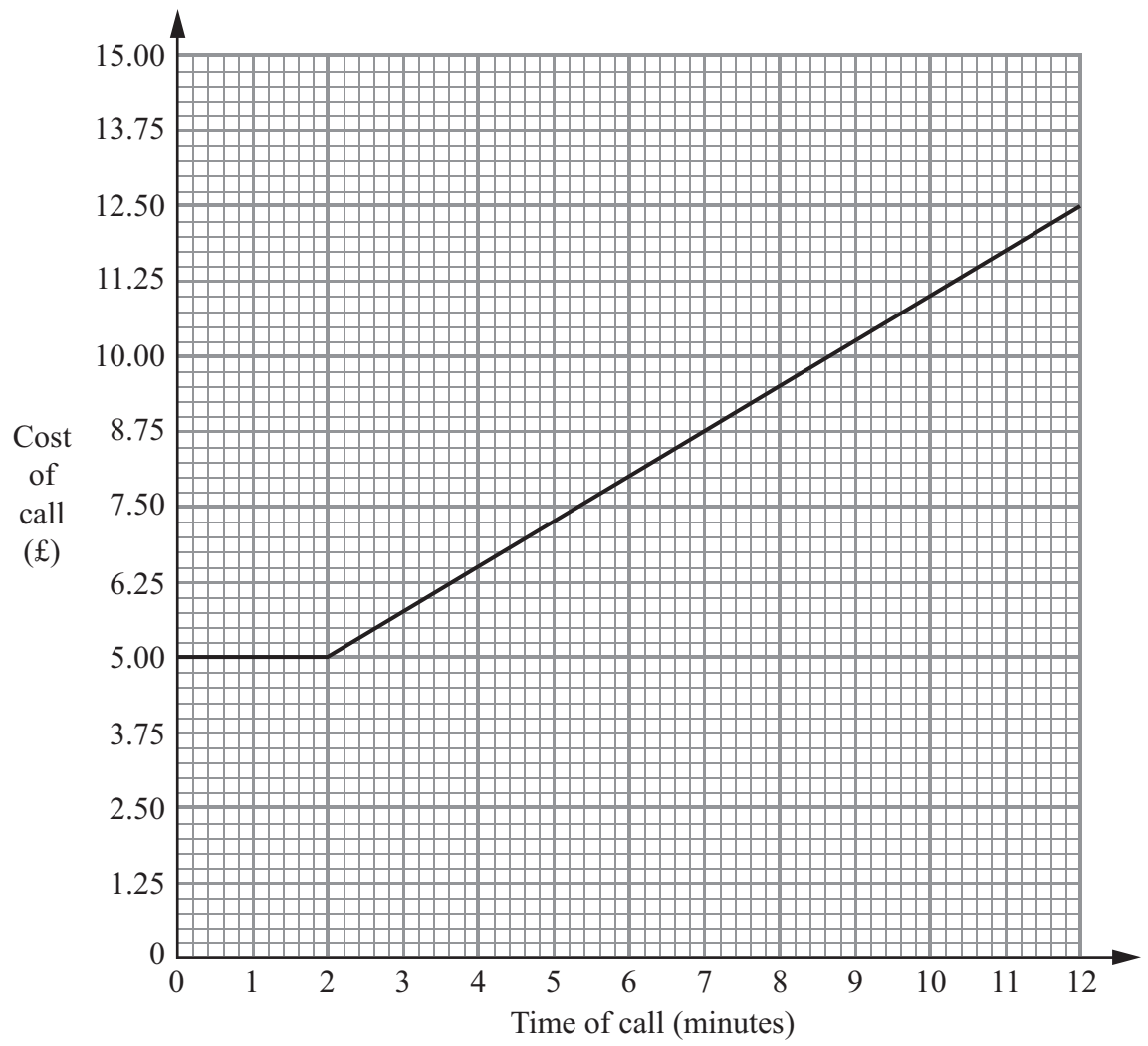
(b) Complete the new flowchart.



(3)

(Total for Question 2 is 5 marks)

3 The graph shows some information about the cost of making a call using a CN satellite phone.



(a) Find the cost for making a call lasting 6 minutes.

£ .....

(1)

(b) (i) Find the gradient of the graph from 2 minutes to 12 minutes.

.....

(ii) For calls lasting more than 2 minutes, what is the cost of each additional minute the phone is used?

.....

(3)

The CommG is a different satellite phone.
The cost of using the CommG phone is 2p for every second.

(c) On the grid, draw a graph to represent this cost, for 0 minutes to 12 minutes.

(2)

The CN phone is cheaper than the CommG phone for calls over a certain length of time.

(d) What length of time?

..... minutes

(2)

(Total for Question 3 is 8 marks)

***4** Julie went on holiday to Miami.
The price of a hat in Miami was $25.20

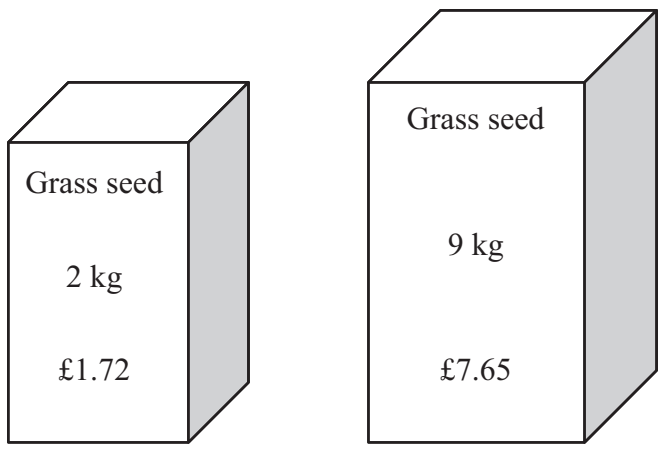
Julie then went to Paris.
She finds the same hat on sale in Paris for €19.80

The exchange rates were £1 = $1.40 and £1 = €1.08

In which of the two places was the hat the cheapest?
Show working to explain your answer.

(Total for Question 4 is 3 marks)

***5** Grass seed is sold in two sizes of box.



Small box Large box

A small box contains 2 kg of grass seed and costs £1.72
A large box contains 9 kg of grass seed and costs £7.65

Which size of box gives the better value for money?
Explain your answer.
You must show all your working.

(Total for Question 5 is 3 marks)

6 Fiona is organising a barbecue at a summer fair.
She needs buns and burgers.

Buns are sold in packs. There are 40 buns in each pack.
Burgers are sold in packs. There are 24 burgers in each pack.
Fiona buys exactly the same number of buns as burgers.

What is the least number of packs of buns and least number of packs of burgers she buys?

..... packs of buns

..... packs of burgers

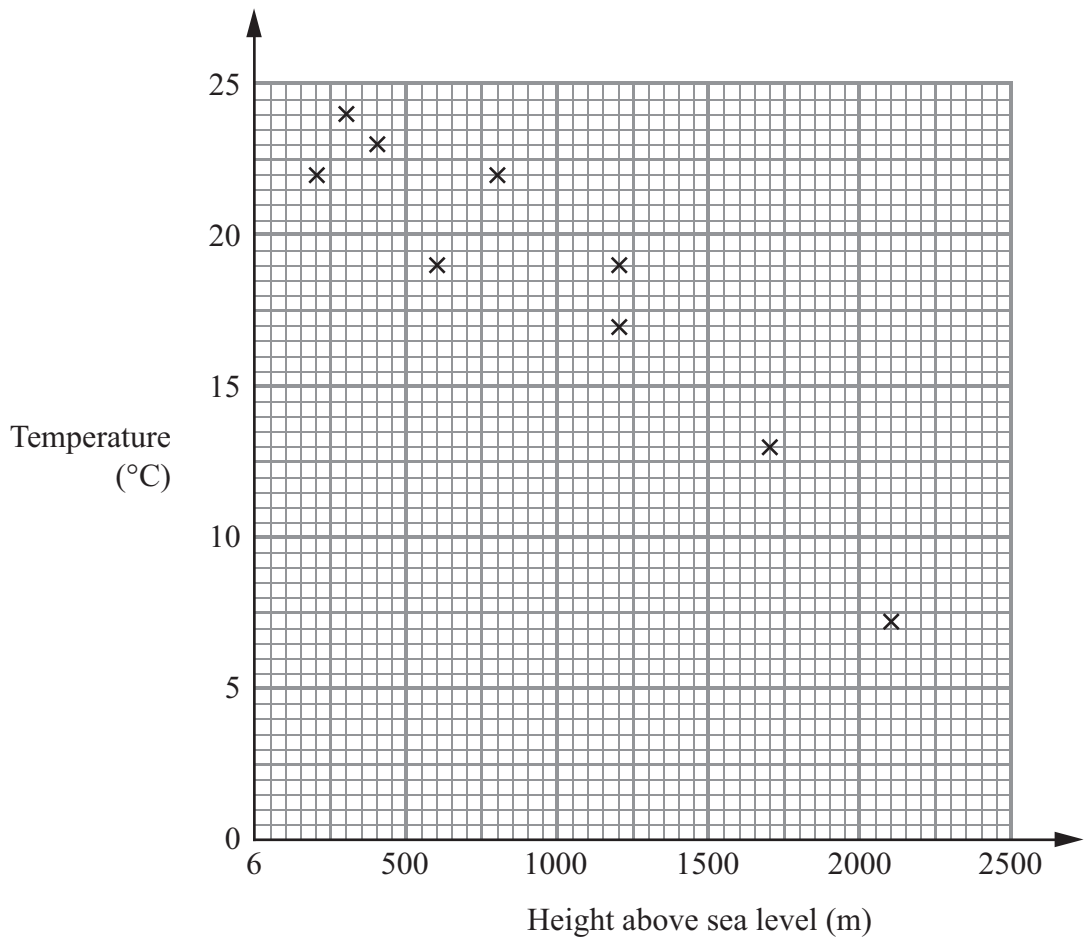
(Total for Question 6 is 3 marks)

7 In Great Britain Fred drives his car 70 miles.
In Spain Pablo drives his car 120 kilometres.

Who drives the furthest?
You must show your working to explain your answer.

(Total for Question 7 is 3 marks)

8 The scatter graph shows information from some weather balloons released from a field. For a particular time, it shows the height above sea level (m) of each weather balloon and the temperature (°C) recorded for that height.



The table shows this information for two more weather balloons.

Height of weather balloon above sea level (m)	1000	500
Temperature (°C)	20	22

(a) Plot this information on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

.....

(1)

(c) Draw a line of best fit on the scatter graph.

(1)

Another weather balloon is 1800 metres above sea level.

(d) Estimate the temperature at this height.

..... °C

(1)

(Total for Question 8 is 4 marks)

9 Sabah uses a spreadsheet to record the exam marks of a group of students.
The exam has two papers:

Paper 1 is out of 15 marks.
Paper 2 is out of 20 marks.

The final mark for the exam is worked out by

Adding the mark on Paper 2 to double the mark on Paper 1

The final mark is out of 50
Sabah wants to use the spreadsheet to calculate the final marks.

	A	B	C	D	E
1	Name	Paper 1	Paper 2	Final mark	Percentage
2					

(i) Write down a formula for cell D2

.....

Sabah also wants to change the final marks to a percentage.

(ii) Write down a formula for cell E2

.....

(Total for Question 9 is 3 marks)

10 A metal plate *ABCD* is in the shape of a square of side of length 17 cm.
A metal worker cuts four triangles out of the metal plate.
This leaves a square metal mat, *PQRS*.

The diagram shows the metal plate and the metal mat.

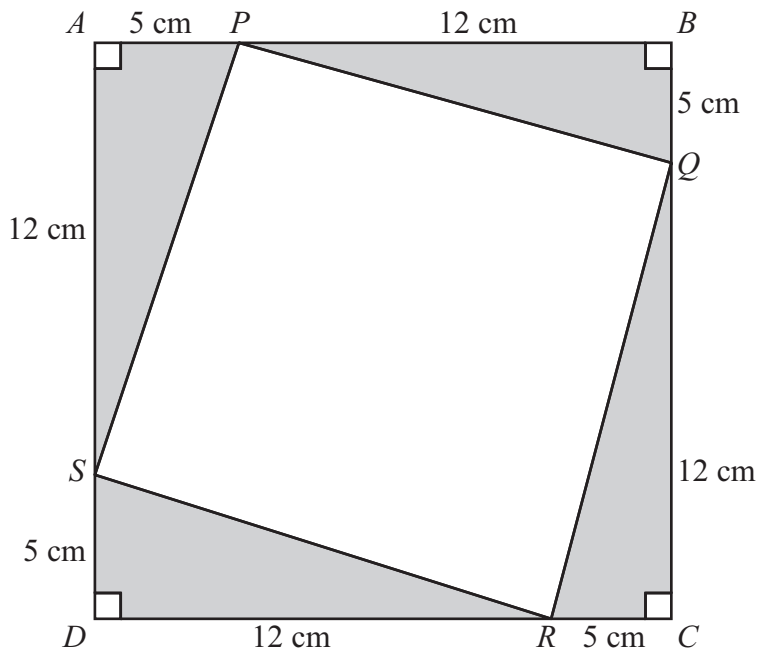


Diagram **NOT** accurately drawn

Work out the area of the metal mat *PQRS*.

.....

(Total for Question 10 is 6 marks)

11 There are three age groups of athletes at an athletics event.
The table shows the number of athletes in each age group.

16-18 years	19-24 years	25+ years
240	500	400

Darren wants to do a survey of these athletes.
He uses a sample of exactly 100 athletes stratified by age group.

(a) Work out the number of athletes in each age group that should be in his stratified sample.

16-18 years .....

19-24 years .....

25+ years .....

(3)

The table shows some information about the heights (h cm) of the 100 athletes in the sample.

Height (h cm)	Frequency		
$120 < h \leqslant 130$	8		
$130 < h \leqslant 140$	16		
$140 < h \leqslant 150$	25		
$150 < h \leqslant 160$	30		
$160 < h \leqslant 170$	21		

(b) Work out an estimate for the mean height of the athletes in the sample.

..... cm

(4)

(Total for Question 11 is 7 marks)

12 The diagram below shows a 6-sided shape.
All the corners are right angles.
All measurements are given in centimetres.

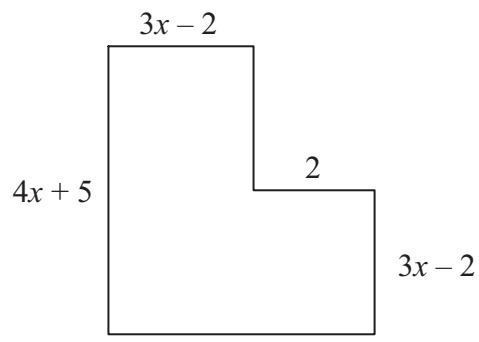


Diagram **NOT** accurately drawn

The perimeter of this shape is 87 cm.

(i) Find the value of x.

$x =$ .....

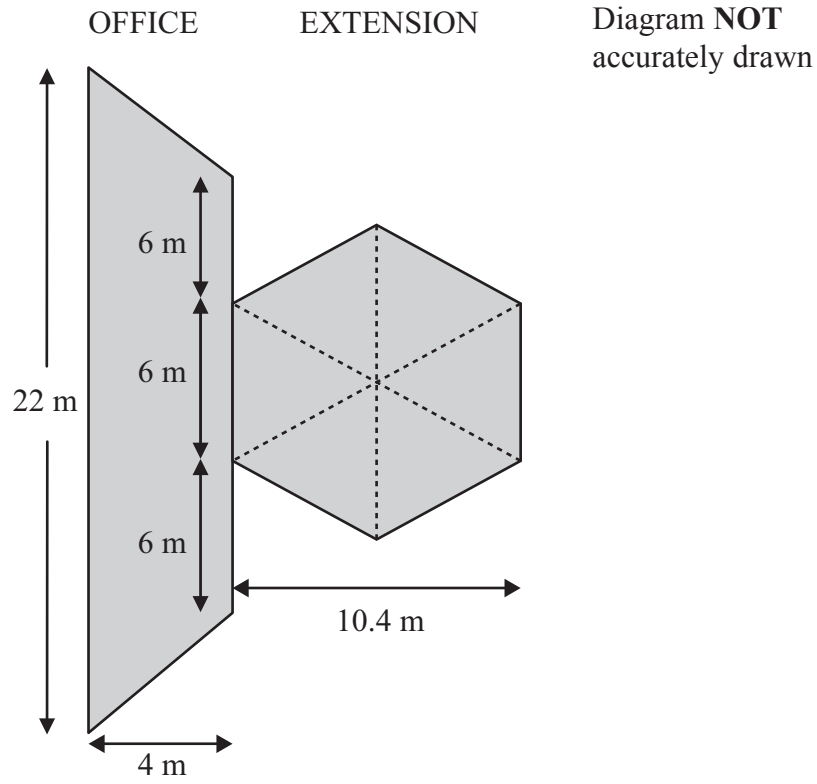
(ii) Hence work out the length of the longest side of the shape.

..... cm

(Total for Question 12 is 6 marks)

13 Safwaan is having an extension built onto his office building.

The diagram shows the floor of the office and the extension.



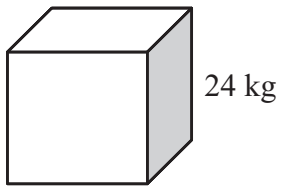
The extension is in the shape of a hexagon made from six equilateral triangles.
The extension is built onto an office which is in the shape of a trapezium.

Work out the total floor area of the office and the extension.

..... m^2

(Total for Question 13 is 5 marks)

14 Fred is a van driver.
He delivers three types of boxes for his company.
Some boxes are small, some are medium, and some are large.



Each medium box weighs 24 kg.
Fred uses a trolley to take the boxes to his van.

The trolley can carry a maximum weight of 100 kg.
On Monday he has to load his van with 45 medium boxes.

(a) How many trips to his van does Fred have to make with his trolley?

.....

(3)

All the small boxes have the same weight.
All the large boxes have the same weight.

On Tuesday, Fred delivers 2 small boxes and 5 large boxes.
The total weight of the boxes is 214.5 kg.

On Wednesday, Fred delivers 7 small boxes and 3 large boxes.
The total weight of the boxes is 236 kg.

(b) Find the weight of each small box and the weight of each large box.

small box ..... kg

large box ..... kg

(5)

(Total for Question 14 is 8 marks)

15 In a sale, normal prices are reduced by 15%.
Andrew bought a saddle for his horse in the sale.
The sale price of the saddle was £238

(a) Calculate the normal price of the saddle.

£ .....

(3)

Andrew won a prize of £4500 in a riding competition.
He invested the money for 2 years.
He was paid 4% per annum compound interest.

(b) Work out the value of Andrew's investment after 2 years.

£.....

(3)

Andrew has a horse box which has a value of £12 000
The value of the horse box will depreciate by 20% each year.

In order to find its value after 2 years, the value can be multiplied by a single decimal number.

(c) What is this number?

.....

(2)

(Total for Question 15 is 8 marks)

16 Michelle runs a bakery.
She bakes buns and rolls.

The total number of buns and rolls she bakes in any one day is not more than 800
She will need at least 100 buns.
She will need at least 200 rolls.
The number of rolls she bakes each day is never more than three times the number of buns she bakes that day.

Let x be the number of buns baked in a day.
Let y be the number of rolls baked in a day.

One inequality is $y \leqslant 3x$

(a) For each condition, write down an inequality in x and/or y.

.....

(3)

(b) On the grid, draw straight lines and use shading to represent these inequalities.

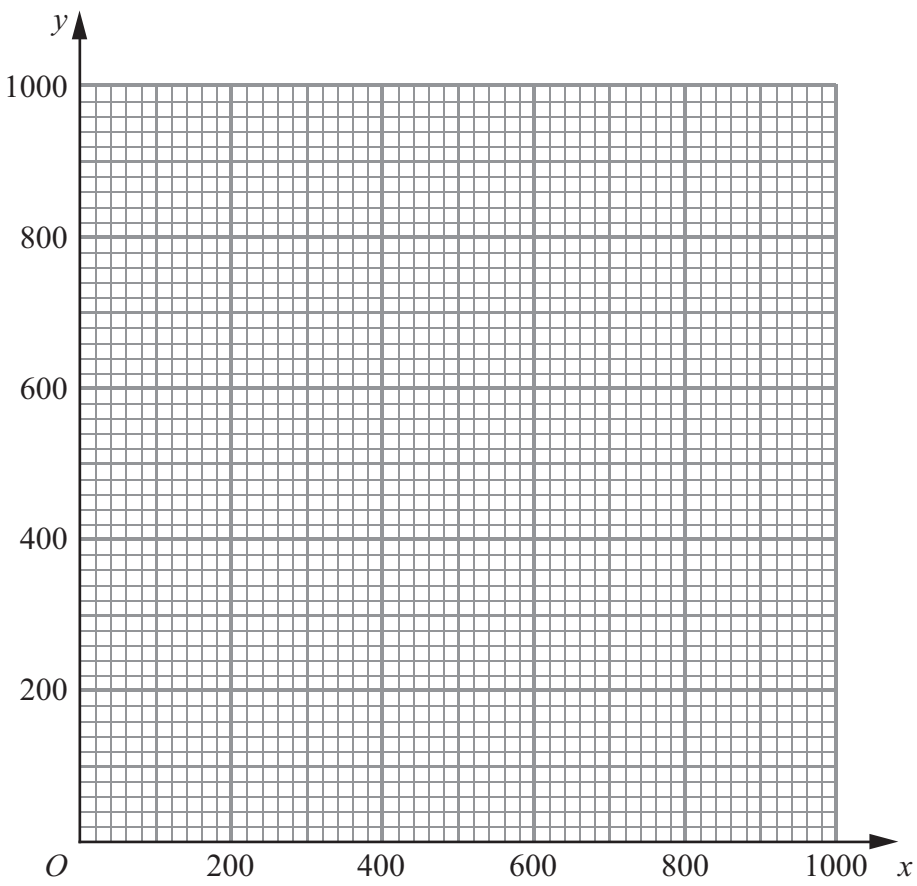
(4)

Michelle makes a profit of 15p on each bun she sells.
She makes a profit of 10p on each roll she sells.

(c) Work out the greatest profit that Michelle can make in a day.

£ .....

(4)



(Total for Question 16 is 11 marks)

17 The table and histogram show information about the lengths of time it took 165 adults to connect to the internet.

Time (t seconds)	Frequency
$0 < t \leqslant 10$	20
$10 < t \leqslant 15$	
$15 < t \leqslant 17.5$	30
$17.5 < t \leqslant 20$	40
$20 < t \leqslant 25$	
$25 < t \leqslant 40$	

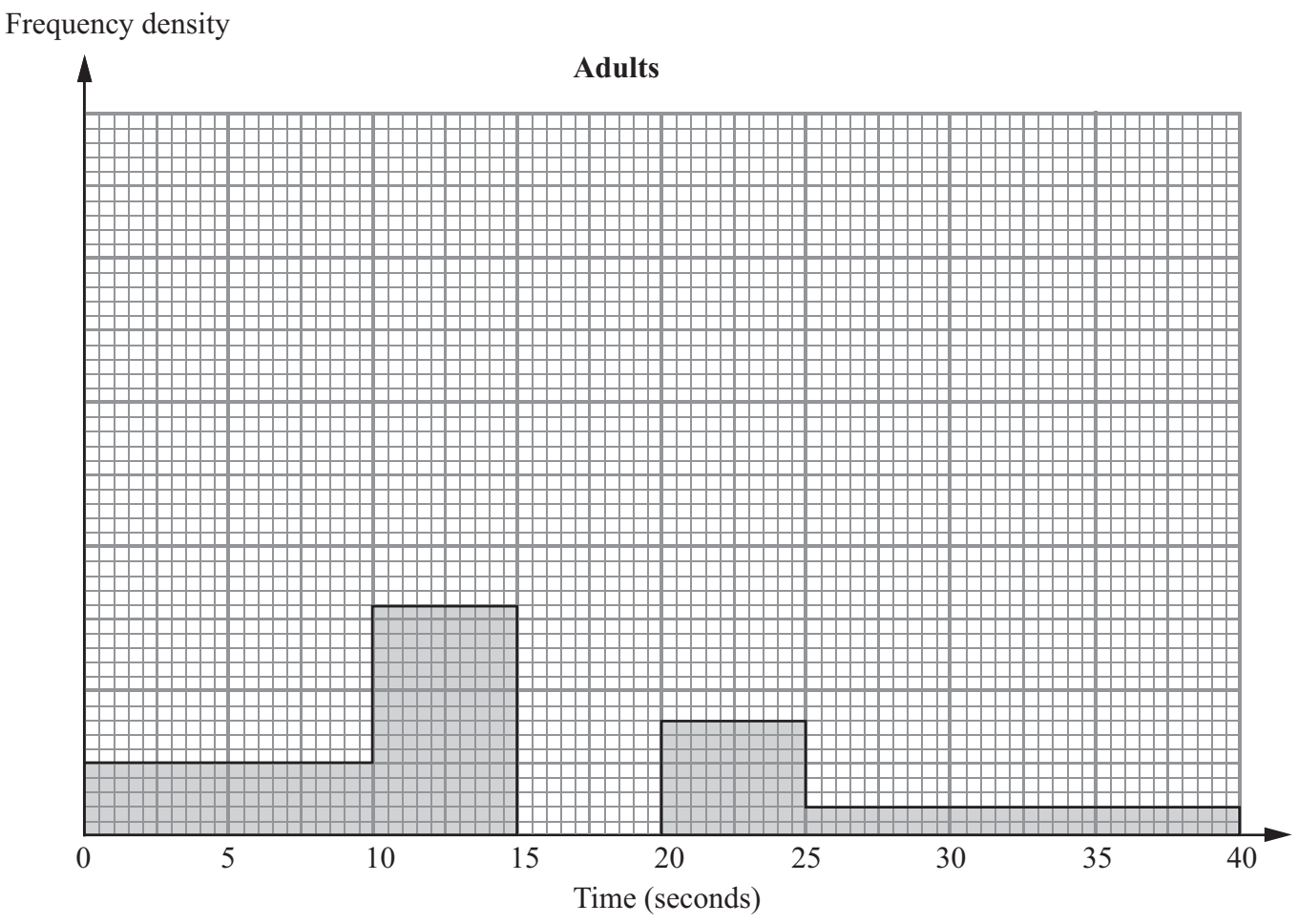
None of the adults took more than 40 seconds to connect to the internet.

(a) Use the table to complete the histogram.

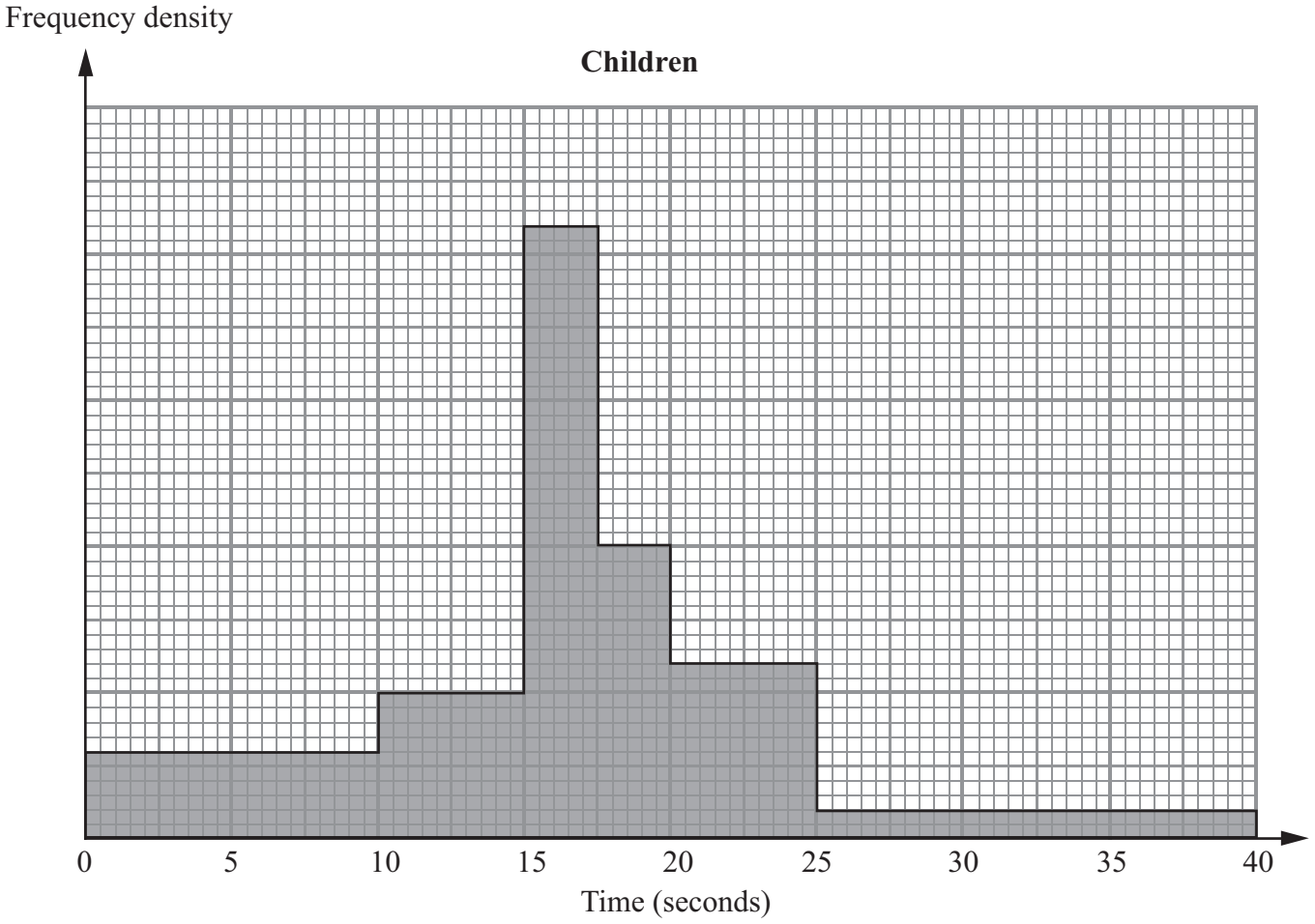
(2)

(b) Use the histogram to complete the table.

(2)



The histogram below shows information about the length of time it took some children to connect to the internet.



None of the children took more than 40 seconds to connect to the internet.

110 children took up to 12.5 seconds to connect to the internet.

(c) Work out an estimate for the number of children who took more than 21 seconds to connect to the internet.

.....

(3)

(Total for Question 17 is 7 marks)

18 The diagram shows two solid cones which are paperweights.

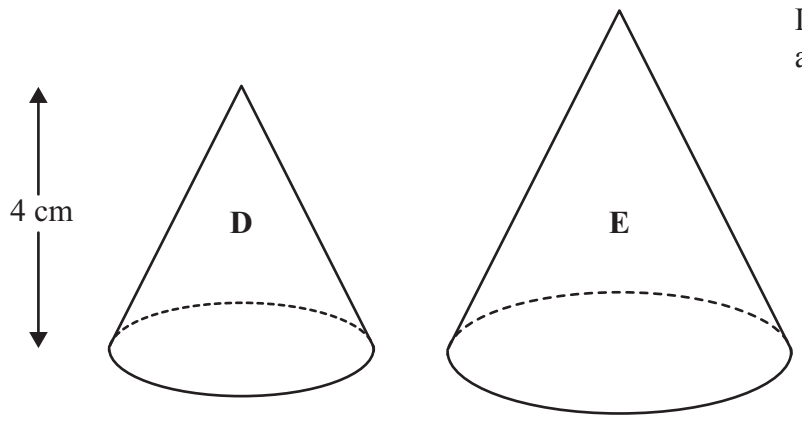


Diagram **NOT** accurately drawn

The cones are mathematically similar.
Cone **D** has a total surface area of 24 cm^2.
Cone **E** has a total surface area of 96 cm^2.
The height of cone **D** is 4 cm.

(a) Work out the height of cone **E**.

..... cm
(3)

Cone **D** has a weight of 1.2 kg.
Both cones are made of the same material.

(b) Work out the weight of cone **E**.

..... kg
(3)

(Total for Question 18 is 6 marks)

TOTAL FOR PAPER IS 100 MARKS

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