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

Monday 11 June 2012 – Afternoon
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.

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 ▶

P40655A

6/6/7/3/

P 4 0 6 5 5 A 0 1 2 4

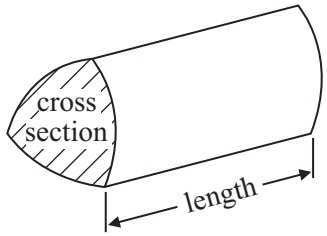
PEARSON

GCSE Mathematics 2AM01

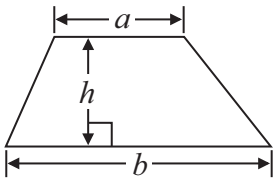
Formulae: Higher Tier

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

Volume of prism = area of cross section × length

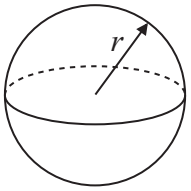


Area of trapezium = $\frac{1}{2}(a + b)h$



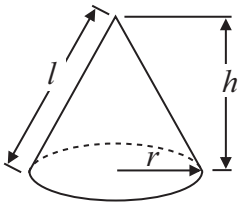
Volume of sphere = $\frac{4}{3}\pi r^3$

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

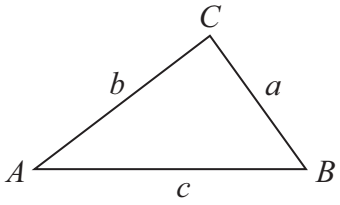


Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



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 An internet bookshop uses this advert.

> **Each day every 3rd customer gets a mystery prize.**
>
> **Each day every 20th customer gets free postage and packaging.**

On Tuesday the internet bookshop had 150 customers.

(a) How many of the 150 customers got a mystery prize?

.....

(2)

(b) How many of the 150 customers got free postage and packaging?

.....

(2)

(c) How many of the 150 customers got both a mystery prize **and** free postage and packaging?

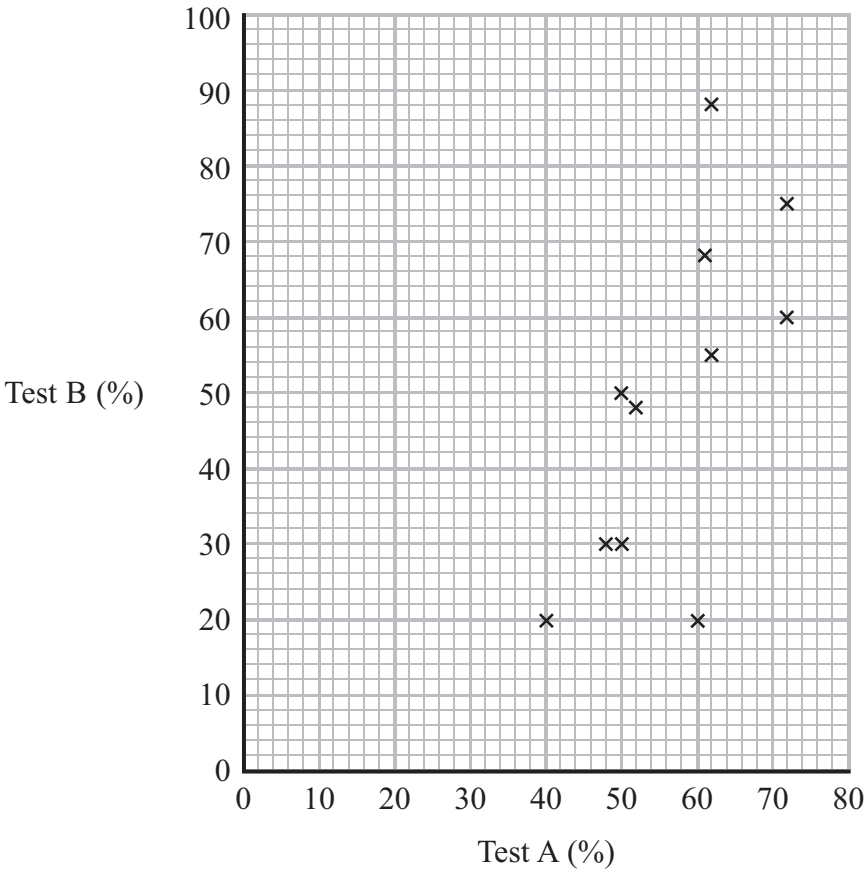
.....

(2)

(Total for Question 1 is 6 marks)

2 A teacher gives her class two tests.
She records the marks for each test as a percentage.

The scatter graph shows this information.



The teacher has the marks for one more pupil.

This pupil got 76% in test A.
The pupil got 92% in test B.

(a) Show this information on the scatter graph.

(1)

(b) Describe the relationship between the percentage marks in test A and the percentage marks in test B.

.....

.....

(1)

One student missed test B.
This student got 65% in test A.

(c) Estimate this student's percentage for test B.

.....%

(2)

(Total for Question 2 is 4 marks)

***3** Alan, Ben and Clara are playing a game with cards.

Alan has p cards.
Ben has twice as many cards as Alan.
Clara has 3 cards less than Ben.

They have a total of 17 cards.

Work out how many cards each person has.

(Total for Question 3 is 5 marks)

4 Sui Lin buys items needed for winter sports.
She then sells these items.

Sui Lin sets up a spreadsheet as shown below.
Here is an extract of the spreadsheet.

	A	B	C	D
1	**Item**	**Buys (£)**	**Sells (£)**	**Profit or Loss (£)**
2	Skis	50	55	
3	Snowboard	200	180	
4	Shovel	45	55	
5	Poles	10	8	
6	Bindings			
7	**Total**			

Sui Lin buys bindings for £90
She sells the bindings for £102

(a) Put this information in the spreadsheet.

(2)

(b) Write down the formulas to go into each of the cells D2 and B7

D2.....

B7.....

(3)

(c) Use the information in the table to work out Sui Lin's percentage profit when she sold the shovel.

.....%

(2)

(Total for Question 4 is 7 marks)

5 This is a list of ingredients for making macaroni cheese for 4 people.

Ingredients for **4** people

100 m*l* milk
200 g cheese
175 g dried macaroni
40 g butter
50 g plain flour

Work out the amount of each ingredient needed to make macaroni cheese for **10** people.

.....m*l* milk

.....g cheese

.....g dried macaroni

.....g butter

.....g plain flour

(Total for Question 5 is 3 marks)

6 Susan records the times, in minutes, 40 patients wait to see the doctor.

Information about these times is shown in the table.

Time (t minutes)	Frequency
$0 < t \leqslant 6$	12
$6 < t \leqslant 12$	15
$12 < t \leqslant 18$	8
$18 < t \leqslant 24$	3
$24 < t \leqslant 30$	2

Calculate an estimate for the mean time each patient waits.

..... minutes

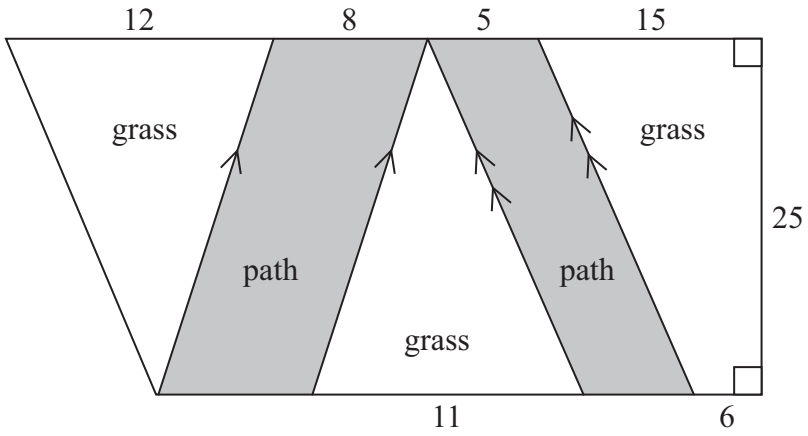
(Total for Question 6 is 4 marks)

*7 David is planning his garden.

There will be two paths in the garden.
The rest of the garden will be grass.

The diagram shows David's plan for his garden.

Diagram **NOT** accurately drawn

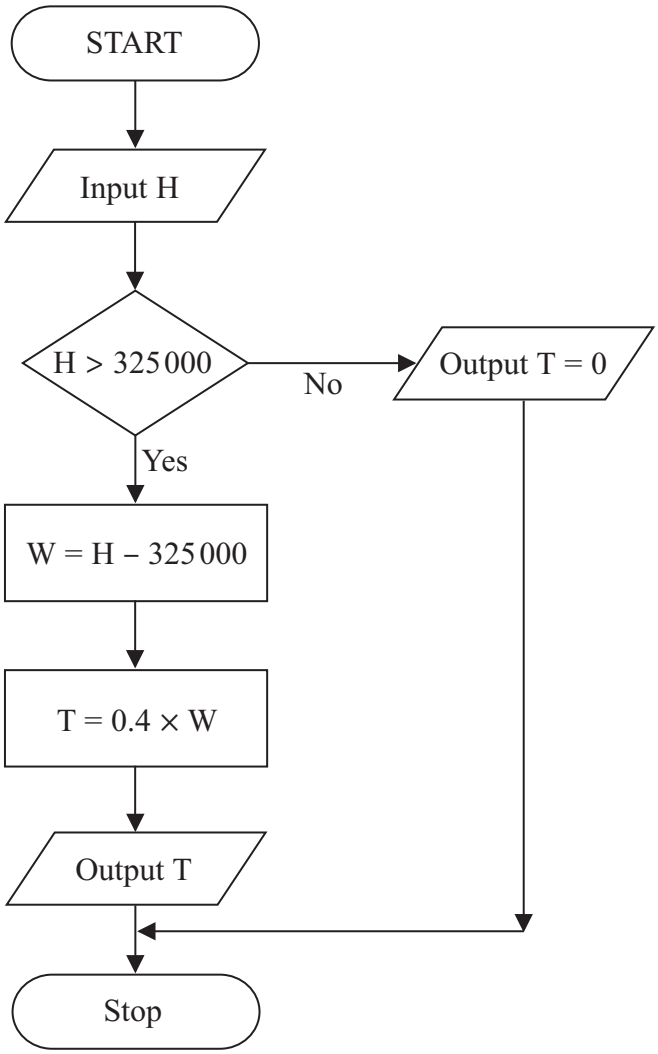


All measurements on the diagram are given in feet.

Work out the total area of the grass.

(Total for Question 7 is 4 marks)

8 Here is a flowchart to calculate tax on inheritance.



An inheritance, £H, is £100 000

(a) Use the flowchart to calculate the tax, £T.

T = ...

(1)

An inheritance is £400 000

(b) Calculate the tax.

T = ...

(3)

(Total for Question 8 is 4 marks)

***9** Here are three oil cans.

Diagrams **NOT** accurately drawn

A **B** **C**

Given that 8 pints = 1 gallon,
put the cans in order of capacity.

(Total for Question 9 is 4 marks)

10 Angie is making a top for a table.

The diagram shows the top of the table.

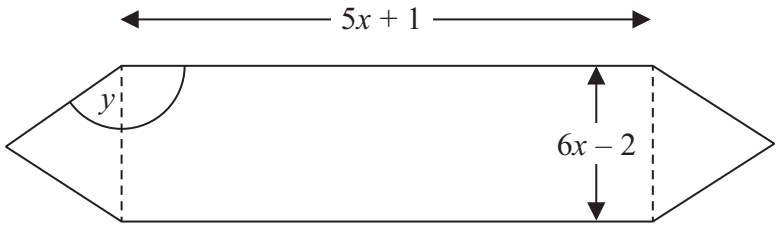


Diagram **NOT** accurately drawn

The top is made from a rectangle and two equilateral triangles.
All lengths are given in metres.

(a) Write down the size of the angle y.

.....°

(1)

The top of the table has a perimeter of 11 m.

(b) (i) Calculate the value of x.

.....

(ii) Find the length of the shortest side of the top of the table.

.....m

(6)

(Total for Question 10 is 7 marks)

11 A council is planning to have a skating rink built.

The council uses this question on a questionnaire.

How often would you use a skating rink?

A lot	Occasionally	Not a lot
☐	☐	☐

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

1 .....

.....

2 .....

.....

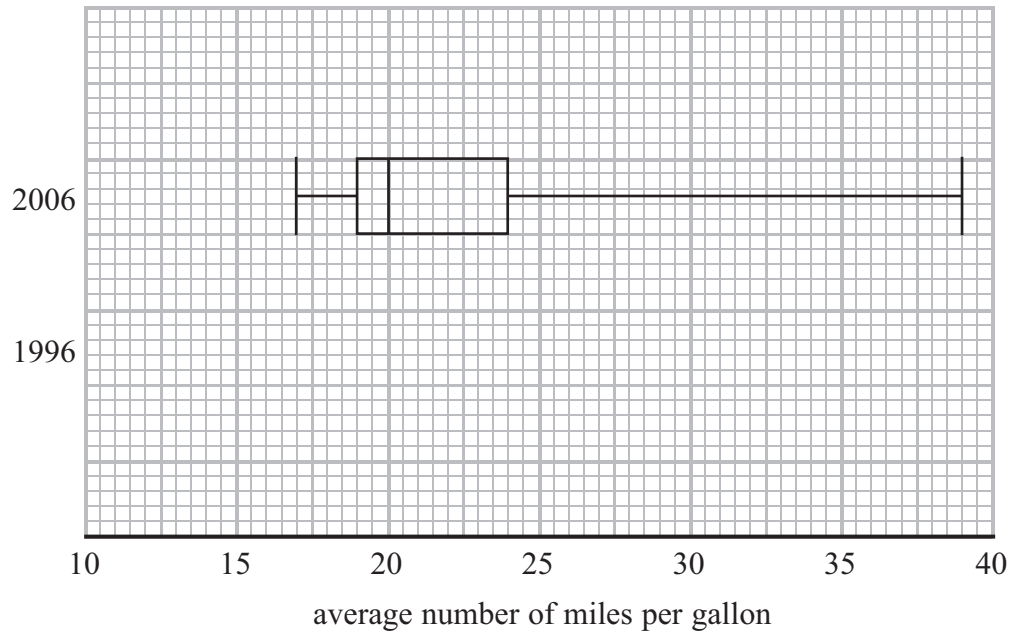
(2)

(b) Design a question for the questionnaire to find out how much people would pay to use the skating rink.

(2)

(Total for Question 11 is 4 marks)

12 The box plot shows information, from 2006, about the distribution of the average miles per gallon (mpg) from a random sample of cars.



(a) Write down the median for the sample of cars in 2006

.....mpg

(1)

(b) Work out the interquartile range for the sample of cars in 2006

.....mpg

(2)

The table below shows information, from 1996, about the distribution of the average number of miles per gallon (mpg) from a random sample of cars.

	Smallest	**Lower quartile**	**Median**	**Upper quartile**	**Largest**
Average number of miles per gallon	15	17	18	22	30

(c) On the grid above, draw a box plot to show the information in the table.

(3)

(d) Compare these two distributions.

.....

.....

.....

.....

.....

.....

(2)

(Total for Question 12 is 8 marks)

13 Wall insulation reduces annual heating costs by 15%.
After he insulated the walls of his home, Gordon's annual heating cost was £765

If he had not insulated the walls of his home, work out what Gordon's annual heating cost would have been.

£.....

(Total for Question 13 is 3 marks)

14 Here is the tip of an arrow.
It is in the shape of an arrowhead.

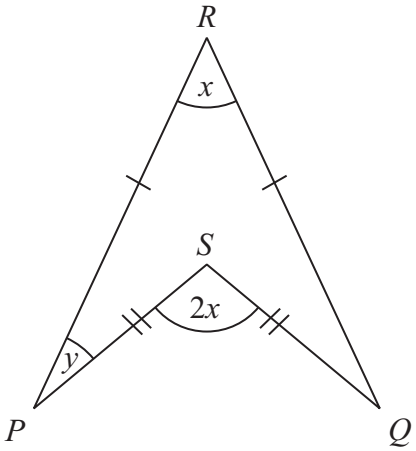


Diagram **NOT** accurately drawn

$PR = QR$
$PS = QS$
Angle $PRQ = x$
Angle $PSQ = 2x$
Angle $RPS = y$

(a) Find y in terms of x.
You must show all your working.

(3)

(b) Given also that the line PS bisects the angle RPQ, find the value of x in this arrowhead.

.....

(3)

(Total for Question 14 is 6 marks)

15 One day Sadie and Gohil both buy petrol and oil from the same petrol station.

Sadie buys 30 litres of petrol and 4 litres of oil.
Sadie pays a total £46.00

Gohil buys 24 litres of petrol and 8 litres of oil.
Gohil pays a total of £45.20

Find the cost of one litre of petrol and the cost of one litre of oil.

Petrol £.....

Oil £.....

(Total for Question 15 is 5 marks)

16 Sam invests £5000 at 2.8% per annum compound interest for 4 years.

(a) Work out the value of Sam's investment at the end of 4 years.

£.....

(3)

Andy invests £12 000 in a variable rate compound interest account.

The interest is

2% for the first year
3.5% for the second year
5% for the third year

(b) (i) Work out the value of Andy's investment at the end of 3 years.

£.....

(ii) Work out the annual equivalent rate, AER, for Andy's investment over these 3 years.
Give your answer correct to 2 decimal places.
You must show your working.

.....%

(5)

(Total for Question 16 is 8 marks)

17 Here are two solid dark chocolate spheres.
The two spheres are mathematically similar.

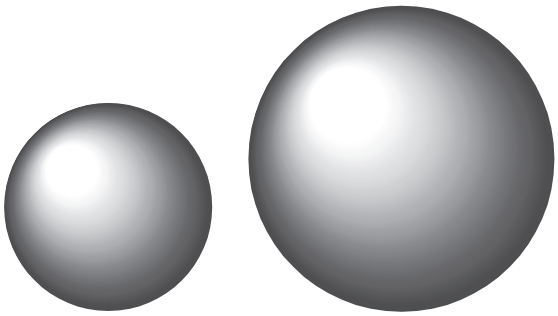


Diagram **NOT** accurately drawn

Twice as much dark chocolate is used to make the large sphere than is used to make the small sphere.

Calculate the scale factor for the radius of the small sphere to the radius of the large sphere.

.....

(Total for Question 17 is 2 marks)

18 For a Young Enterprise scheme some students are making hats and scarves.

Each week the students can make

up to 300 hats
up to 350 scarves
no more than a total of 500 hats and scarves.

Let x be the number of hats the students make per week.
Let y be the number of scarves the students make per week.

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

.....

(3)

(b) On the grid opposite, show by shading, the region that satisfies these inequalities.

(3)

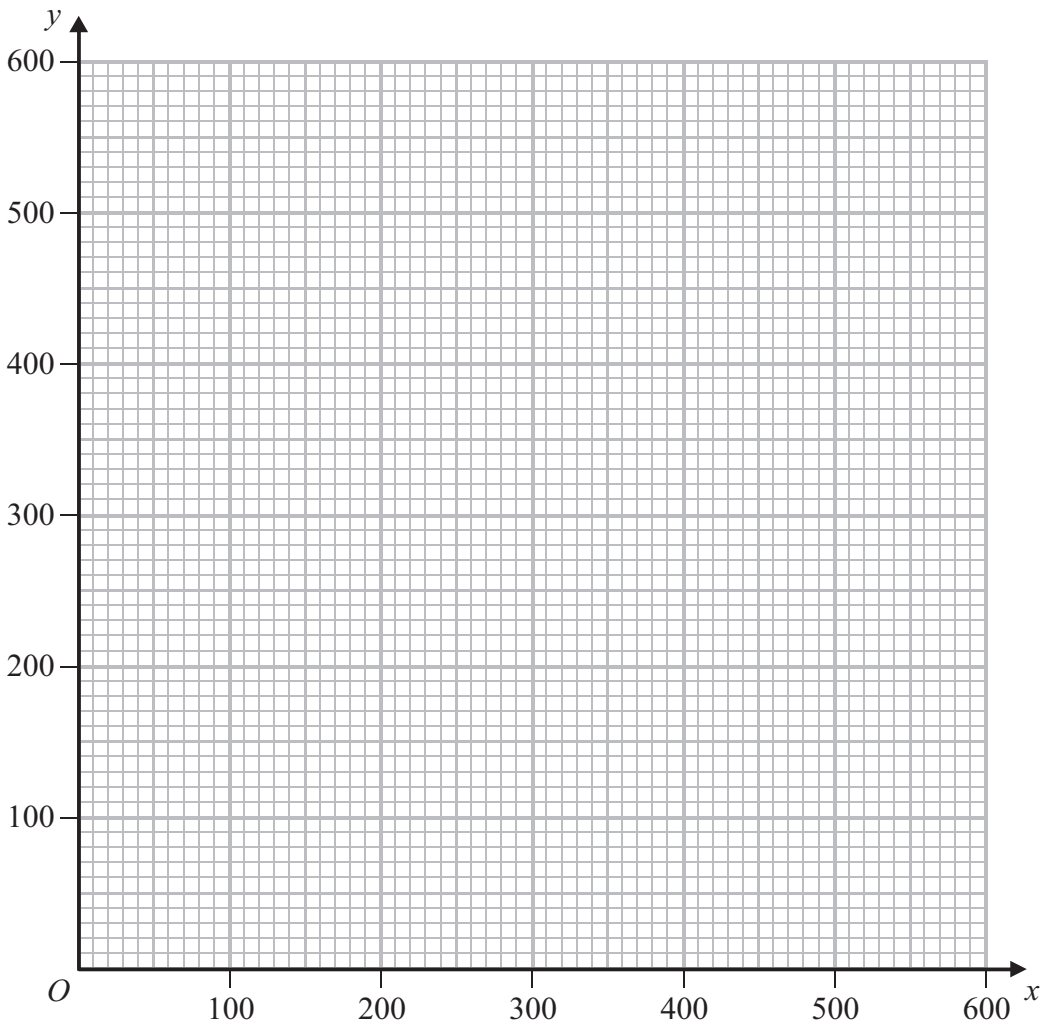
The students make a profit of

£1.50 on each hat sold
£1 on each scarf sold.

(c) Work out the greatest total profit the students can make in a week.
You must show your working.

£.....

(4)



(Total for Question 18 is 10 marks)

19 The table and histogram show information about the haemoglobin levels in the blood of some hospital patients.

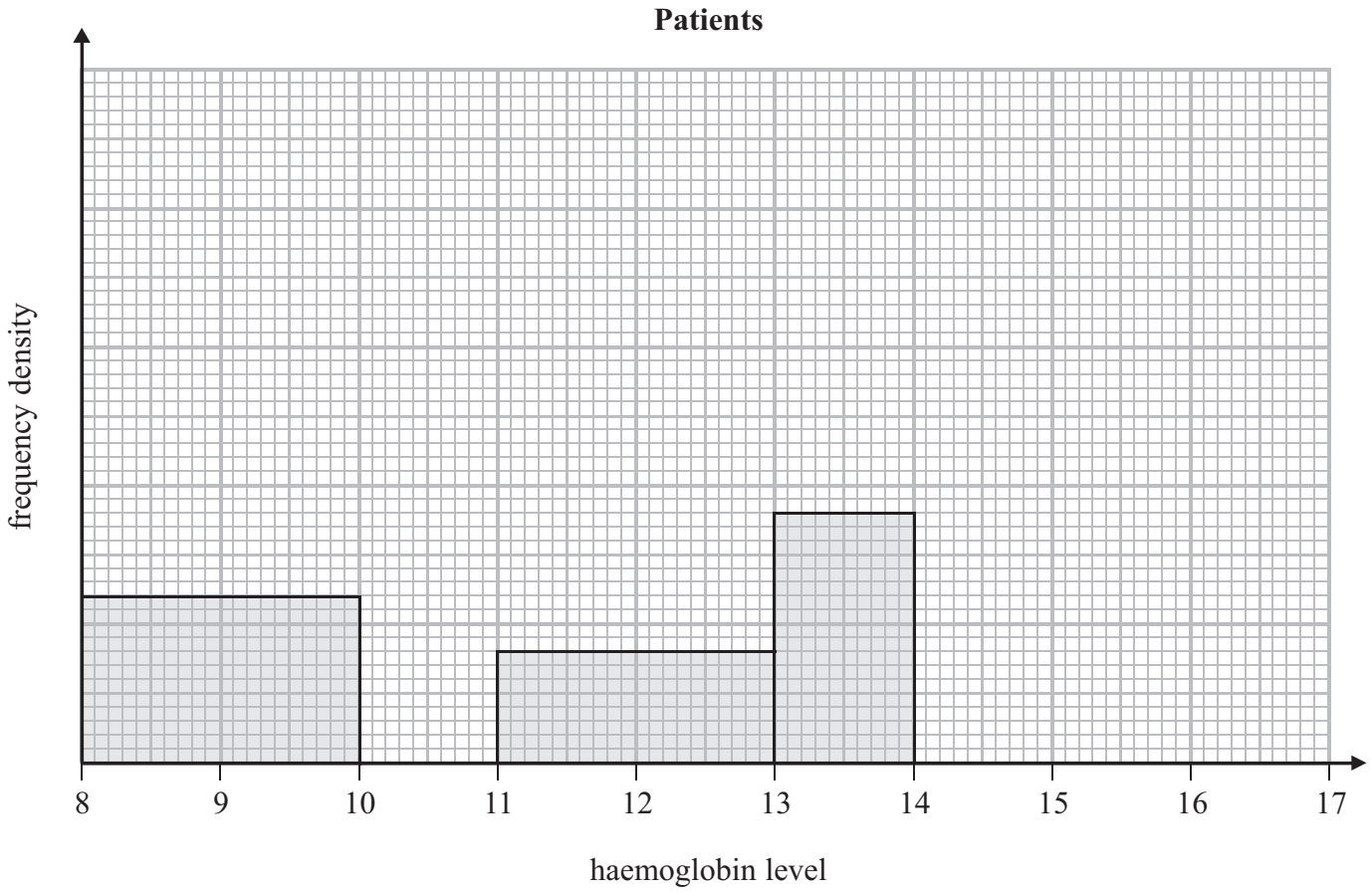
haemoglobin level	frequency
$8 < h \leqslant 10$	12
$10 < h \leqslant 11$	9
$11 < h \leqslant 13$	
$13 < h \leqslant 14$	
$14 < h \leqslant 17$	6

(a) Use the table to complete the histogram.

(2)

(b) Use the histogram to complete the table.

(2)



(Total for Question 19 is 4 marks)

20 The table shows the number of people working in the three departments of a large company.

Department	Number of people
hardware	253
clothing	247
electrical	280

The owner of the company wants to know if people like working for the company. She takes a sample of all the people stratified by department.

There are 40 people from the clothing department in the sample.

Work out the number of people from the electrical department in the sample.

.....

(Total for Question 20 is 2 marks)

TOTAL FOR PAPER IS 100 MARKS

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