Write your name here

Surname		Other names

Centre Number

Candidate Number

Edexcel GCSE

Applications of Mathematics
Unit 1: Applications 1
For Approved Pilot Centres ONLY

Higher Tier

Tuesday 11 June 2013 – Morning	Paper Reference
Time: 1 hour 45 minutes	**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 ▶

P42061A0124

PEARSON

Volume of prism = area of cross section × length
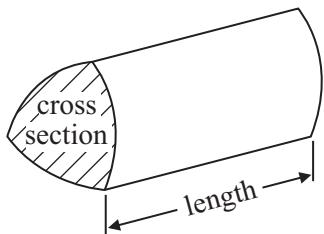
Area of trapezium = $\frac{1}{2}$ $(a + b)h$
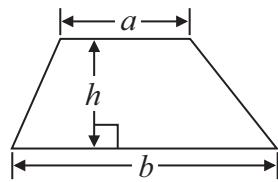
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$
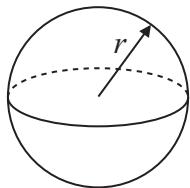
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$
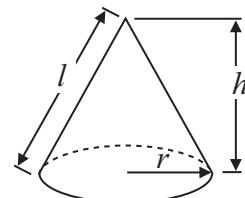
In any triangle *ABC*
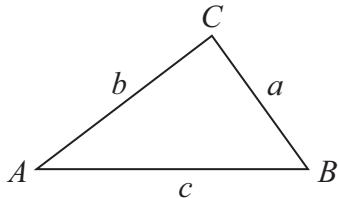
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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

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

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   Mabintou buys 9 plates for £12.15

Work out the cost of 5 of these plates.

£..

(Total for Question 1 is 2 marks)

2   Liz books a holiday.

The normal price of the holiday is £860
Liz gets a discount of 12.5% off the normal price.

How much is the discount?

£..

(Total for Question 2 is 2 marks)

3 Graham is going to carry out a survey on holidays.
He wants to find out how often people go on holiday.

(a) Design a question that Graham could use in his questionnaire.

Graham is going to stand outside a travel agents.
He is only going to give his questionnaire to the first 10 women
coming out of the travel agents.

This may **not** be a good sample for Graham's survey.

(b) Give **two** reasons why.

Reason 1 ....

....

....

Reason 2 ....

....

....

(2)

(Total for Question 3 is 4 marks)

*4   Peter wants to change £300 into dollars ($).
     He goes to the post office to change his money.

     The post office only has $20 notes.

     The exchange rate is £1 = $1.58

     Peter wants to change as much of his £300 as possible.

     How many $20 notes will Peter get?

     (Total for Question 4 is 4 marks)

5   The width of a kitchen cupboard is 57 cm correct to the nearest centimetre.

     (a) Write down the **least** possible width of the cupboard.

     .... cm
     (1)

     (b) Write down the **greatest** possible width of the cupboard.

     .... cm
     (1)

     (Total for Question 5 is 2 marks)

6 A machine drills holes in a flat piece of metal.

The diagram shows the positions of the centres of two holes given as coordinates.

y

× A (3, 7)

B (9, 4) ×

Diagram **NOT** accurately drawn

O   x
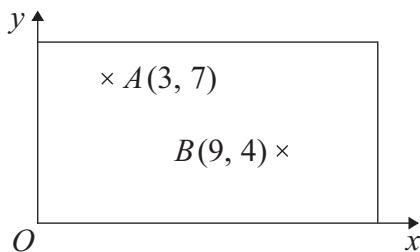
Hole *A* is at (3, 7).
Hole *B* is at (9, 4).

The machine is going to drill a hole at the midpoint of the line *AB*.

Work out the coordinates of the midpoint of the line *AB*.

(......................, ...)

(Total for Question 6 is 2 marks)

---

7 There are 240 passengers in an aeroplane.

$\frac{1}{5}$ of the passengers are in First class.

$\frac{3}{8}$ of the passengers are in Business class.

The rest of the passengers are in Economy class.

How many passengers are in Economy class?

....

(Total for Question 7 is 3 marks)

8 Mr Shah uses a spreadsheet to record the cost of 1 kg of bananas in his shop.
He also uses the spreadsheet to record the number of kilograms of bananas he sells.

The spreadsheet shows this information for 4 weeks.

	A	B	C	D
1		cost of 1 kg of bananas in pence	number of kg of bananas sold	
2	week 1	63	53	
3	week 2	67	72	
4	week 3	65	84	
5	week 4	68	69	
6				

Mr Shah also wants the spreadsheet to show

in cell C6, the total number of kilograms of bananas he sold in the 4 weeks
in cell D2, the total cost of all the bananas he sold in week 1

Write down,

(i) a formula for cell C6

C6 ....

(ii) a formula for cell D2

D2 ....

(Total for Question 8 is 3 marks)

9 Kalinda pays on Tariff A for the number of units of electricity she uses.

Kalinda can use this graph to find out how much she pays each month.
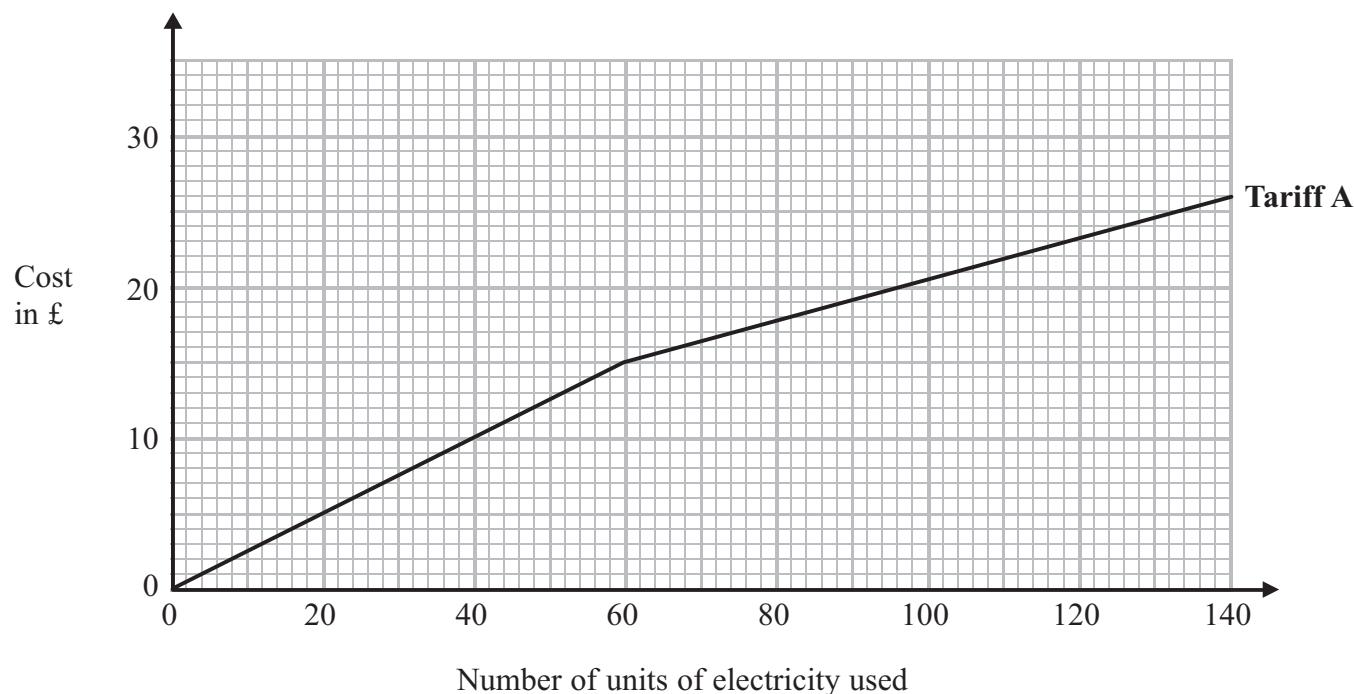
(a) How much does Kalinda pay for each unit of electricity she uses
up to a total of 60 units?

.... p

(2)

Kalinda could change to Tariff B.
Here is the monthly charge for Tariff B.

| 20p per unit of electricity used |

On average, Kalinda uses 90 units of electricity each month.
Kalinda wants to pay the least amount of money for the units of electricity she uses.

*(b) Should Kalinda change to Tariff B?
You must show all your working.

(3)

(Total for Question 9 is 5 marks)

10 A C5 envelope and a C1 envelope are mathematically similar.

9 inches

6.4 inches

C5 envelope

36 inches
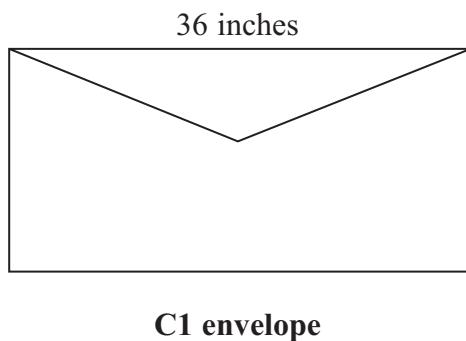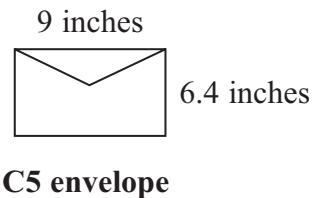
Diagram **NOT** accurately drawn

C1 envelope

A C5 envelope has a length of 9 inches and a width of 6.4 inches.
A C1 envelope has a length of 36 inches.

(a) Work out the width of a C1 envelope.

.... inches

(2)

A C3 envelope is mathematically similar to a C5 envelope.
A C3 envelope has a length of 18 inches and a width of 12.8 inches.

Debbie says,
"The area of the front of a C3 envelope is two times the area of the front of a C5 envelope."

(b) Is Debbie right?
You must explain your answer.

(2)

(Total for Question 10 is 4 marks)

**11** Richard is going to cover a bathroom wall with tiles.

Diagram **NOT** accurately drawn

wall

2.4 m

tile 30 cm

30 cm

1.8 m
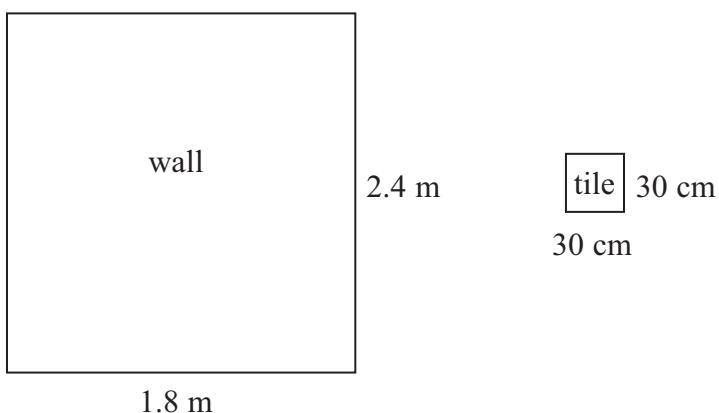
The wall is in the shape of a rectangle.
The wall is 1.8 m long and 2.4 m high.

The tiles are squares with sides of 30 cm.

There are 14 tiles in a box.

How many boxes of tiles does Richard need?
You must show all your working.

....

(Total for Question 11 is 5 marks)

Turn over ▶

12 Becky, Chris and Dan are playing a game with marbles.

Becky has some marbles.
Chris has three times as many marbles as Becky.
Dan has four marbles more than Chris.

They have a total of 158 marbles.

Work out how many marbles Becky has.
You must show all your working.

....

(Total for Question 12 is 4 marks)

13 Sal asked 60 adults if they liked Chinese food best or Italian food best or Thai food best.

29 of the adults were women.
6 of the women liked Thai food best.
10 of the men liked Chinese food best.
8 of the 13 adults who liked Italian food best were women.

Work out the number of men who liked Thai food best.

....

(Total for Question 13 is 4 marks)

P 4 2 0 6 1 A 0 1 3 2 4

14 Malcolm's salary is £28 000
His salary is increased by £700

(a) Work out the percentage increase in Malcolm's salary.

....%

(2)

Malcolm puts £3000 into a savings account for 3 years.

The account pays compound interest of

   4% per annum in the first year
   4.6% per annum in the second year
   4.6% per annum in the third year

(b) Work out how much money will be in Malcolm's account at the end of the third year.

£..

(3)

(c) Work out the annual equivalent rate (AER) over these 3 years.
Give your answer correct to one decimal place.
You must show your working.

....%

(3)

**(Total for Question 14 is 8 marks)**

15 Liam measured the heights, in centimetres, of the boys in his class.

The table shows some information about the heights.

Height of shortest boy	154 cm
Lower quartile	160 cm
Median	172 cm
Upper quartile	178 cm
Height of tallest boy	191 cm

(a) On the grid, draw a box plot to show this information.
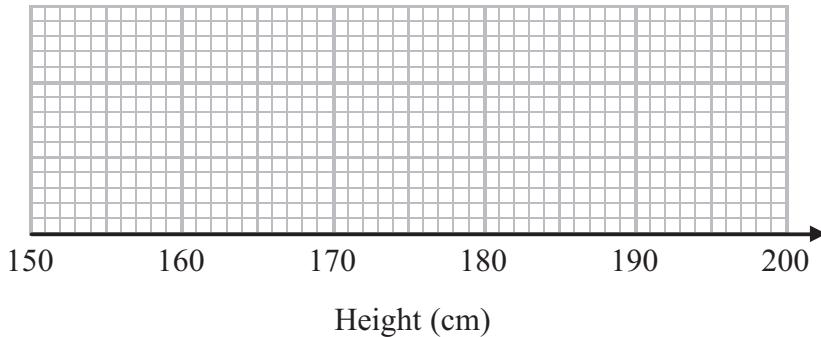
Height (cm)

(2)

Liam also measured the heights, in centimetres, of the girls in his class.

The girls have

a median height of 168 cm
a range of 42 cm

*(b) Compare the distribution of the heights of the boys with the distribution of the heights of the girls.

....

....

....

....

....

(2)

(Total for Question 15 is 4 marks)

16 120 students did an English exam.

The cumulative frequency table gives information about their marks.

Mark (*m*)	Cumulative frequency
$0 < m \leqslant 20$	9
$0 < m \leqslant 40$	66
$0 < m \leqslant 60$	100
$0 < m \leqslant 80$	112
$0 < m \leqslant 100$	120

(a) On the grid opposite, draw a cumulative frequency graph for this information.

(2)

Students with a mark from 64 to 80 got a grade A.

(b) Work out an estimate for the percentage of students getting a grade A.

....

(4)
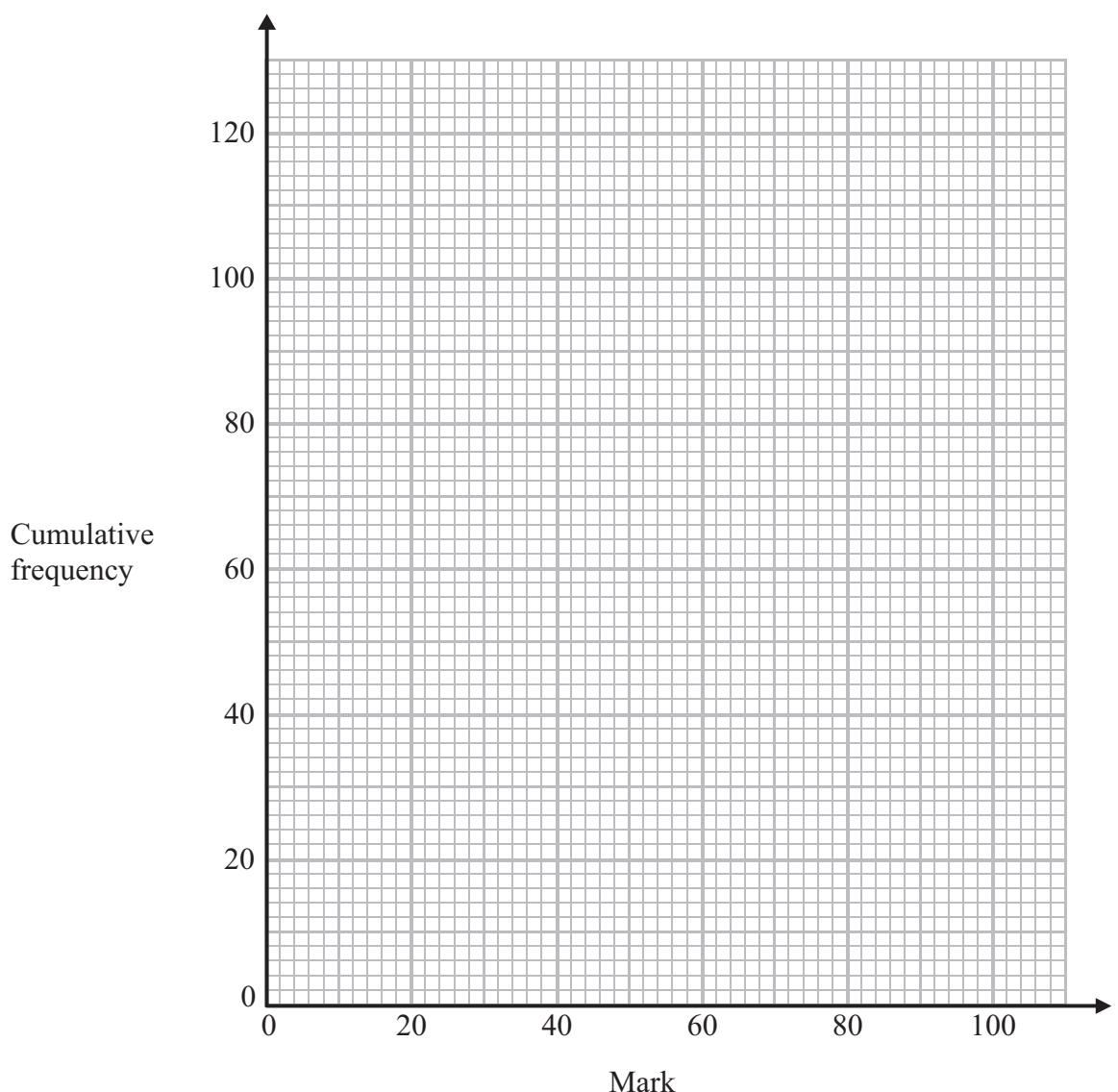
(Total for Question 16 is 6 marks)

17 A company makes two different desks.

The top of one desk is in the shape of a trapezium.
The top of the other desk is in the shape of a rectangle.

The diagram shows the tops of the two desks.

Diagram **NOT** accurately drawn
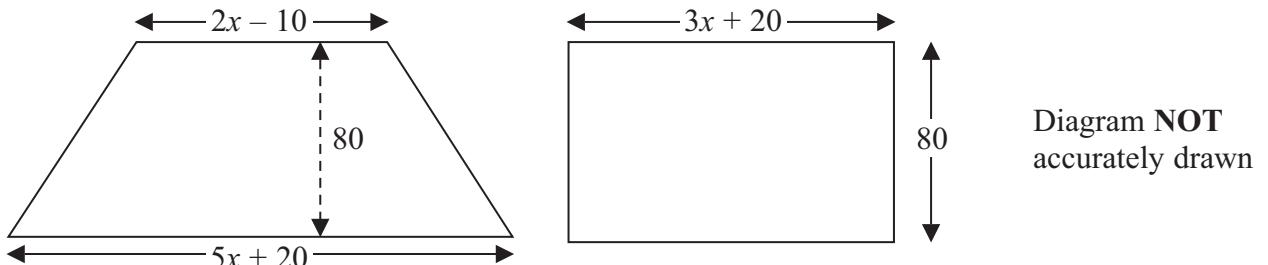
All measurements are in centimetres.

The tops of the two desks have the same area.

Work out the length, in centimetres, of the rectangular desk.
You must show all your working.

.... cm

(Total for Question 17 is 6 marks)

18 The table shows the distance from Earth, in kilometres, of seven planets.

Planet	Distance from Earth (km)
Mercury	91.7×10^6
Venus	4.14×10^7
Mars	78.3×10^6
Jupiter	624.4×10^6
Saturn	1.25×10^9
Uranus	2.72×10^9
Neptune	43.5×10^8

(a) Write the distance in kilometres of Jupiter from Earth in standard form.

.... km

(1)

Saturn is further from Earth than Venus is.

(b) How many times further?
Give your answer correct to the nearest integer.

....

(2)

(c) How many **miles** is Mars from Earth?
Give your answer correct to 1 significant figure.

....miles

(2)

(Total for Question 18 is 5 marks)

Turn over ▶

19 In a sale, normal prices are reduced by 15%.

Janice buys a computer in the sale.
She pays £578

Work out what the normal price of the computer was.

£...

(Total for Question 19 is 3 marks)

20 The table shows information about the ages of the people in a tennis club.

Age range	Frequency
under 18	67
18 to 35	52
36 to 60	124
over 60	63

The membership secretary gives a questionnaire to some of these people.
She takes a sample of exactly 50 people stratified by age range.

Work out the number of people aged 36 to 60 she should have in the sample.

....

(Total for Question 20 is 2 marks)

21 Alex and Ben go to a cafe with some friends.

Alex buys 4 cups of coffee and 3 cups of tea.
He pays a total of £6.95

Ben buys 5 cups of coffee and 2 cups of tea.
He pays a total of £7.20

Work out the cost of each cup of coffee and the cost of each cup of tea.

Cup of coffee...

Cup of tea...

(Total for Question 21 is 5 marks)

22 Dennis is going to buy some bookcases and some lamps to sell in his shop.

Each bookcase costs £18
Each lamp costs £12

Dennis has a maximum of £360 to spend.

He is going to buy x bookcases.
He is going to buy y lamps.

(a) Show that $3x + 2y \leqslant 60$

(2)

The first constraint is $\qquad 3x + 2y \leqslant 60$

The other constraints are $y \leqslant 2x, \qquad x + y \leqslant 24$

(b) On the grid, represent these constraints and show the feasible region.

(4)

Dennis makes a profit of £20 for each bookcase he sells.
He makes a profit of £15 for each lamp he sells.

(c) Write down the objective function.

....

(1)

(d) Use your objective function to find

   (i)   the greatest profit Dennis can make,
   (ii) the number of bookcases he should buy to make the greatest profit,
   (iii) the number of lamps he should buy to make the greatest profit.

greatest profit £ ....

number of bookcases ....

number of lamps ....

(3)
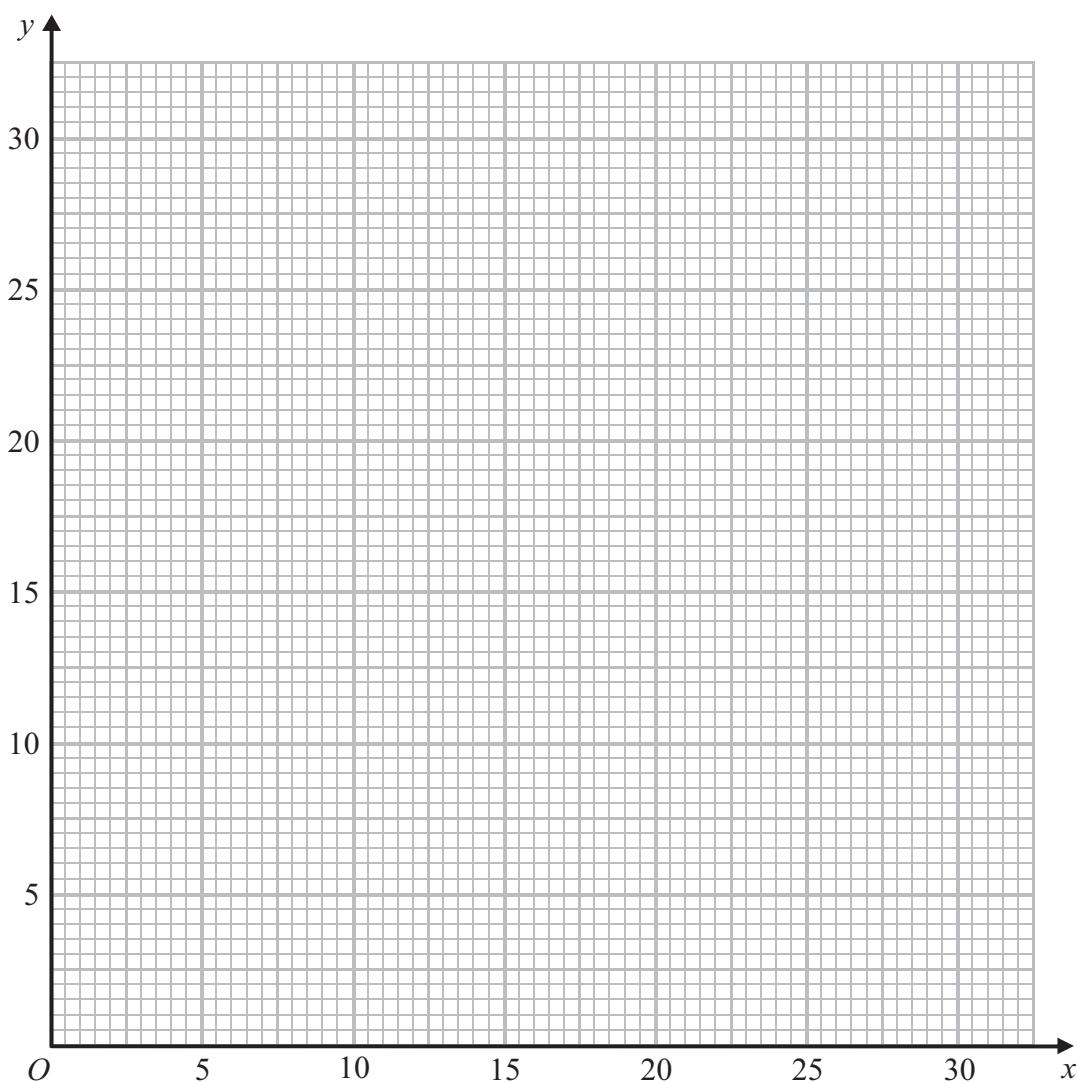
(Total for Question 22 is 10 marks)

Turn over for Question 23

**23** The table gives information about the weights, in kg, of some parcels.

Weight (*w* kg)	Frequency
$0 < w \leqslant 5$	20
$5 < w \leqslant 10$	13
$10 < w \leqslant 20$	10
$20 < w \leqslant 40$	7

(a) Work out an estimate for the mean weight of a parcel.

.... kg

(4)

(b) On the grid, draw a histogram for the information in the table.

Weight (*w* kg)

(3)
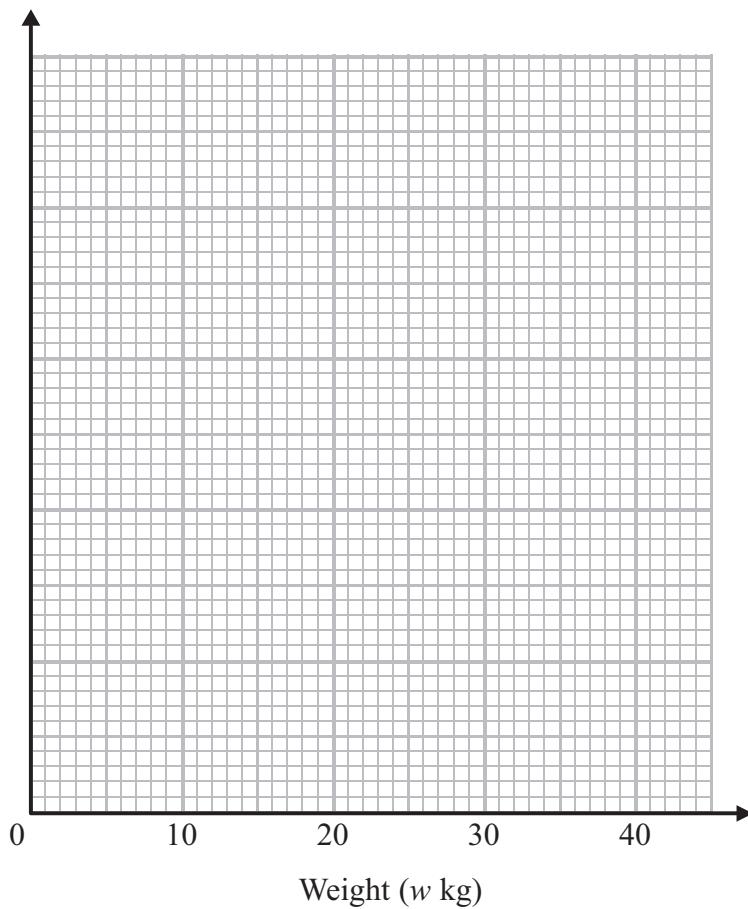
(Total for Question 23 is 7 marks)

TOTAL FOR PAPER IS 100 MARKS