

Write your name here

Surname

Other names

**Edexcel GCSE**

Centre Number

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Candidate Number

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# Mathematics A

## Paper 1 (Non-Calculator)

**Higher Tier**

Thursday 28 February 2013 – Afternoon

**Time: 1 hour 45 minutes**

Paper Reference

**1MA0/1H**

**You must have:** Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. 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 must not be used.**

### 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 ►

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6/7/14/



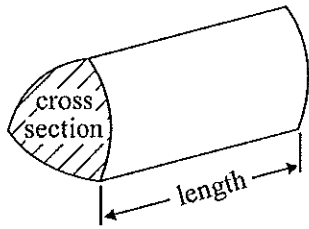
**PEARSON**

GCSE Mathematics 1MA0

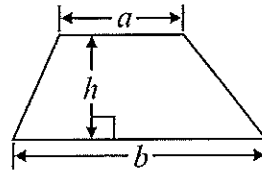
Formulae: Higher Tier

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  $\times$  length



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

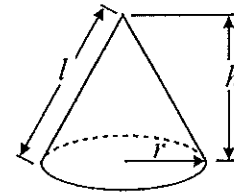
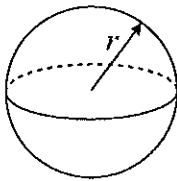


Volume of sphere =  $\frac{4}{3}\pi r^3$

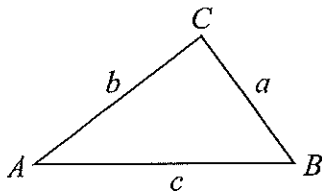
Volume of cone =  $\frac{1}{3}\pi r^2 h$

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

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.

You must NOT use a calculator.

1 Work out  $1.83 \times 47$

	100	80	3
40	4000	3200	120
7	700	560	21

$$\begin{array}{r} 1 \times \\ 4000 \\ 3200 \\ 700 \\ 560 \\ 120 \\ 21 \\ \hline 8601 \end{array} = 8601 \div 100 = 86.01$$

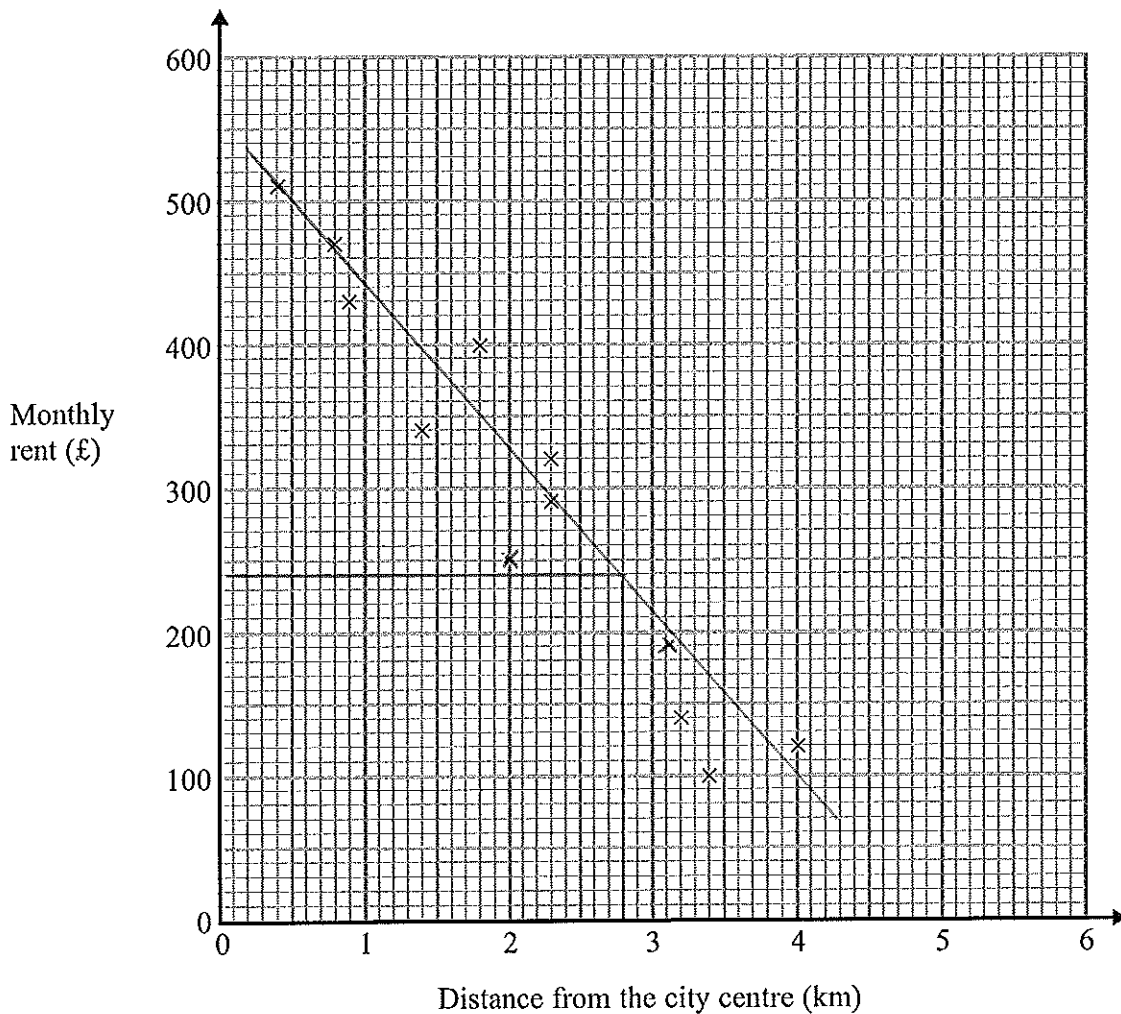
86.01

(Total for Question 1 is 3 marks)



2 The scatter graph shows information about 10 apartments in a city.

The graph shows the distance from the city centre and the monthly rent of each apartment.



The table shows the distance from the city centre and the monthly rent for two other apartments.

Distance from the city centre (km)	2	3.1
Monthly rent (£)	250	190

(a) On the scatter graph, plot the information from the table.

(1)

(b) Describe the relationship between the distance from the city centre and the monthly rent.

Negative correlation - as the distance from the city centre increases, the monthly rent decreases.

(1)



An apartment is 2.8 km from the city centre.

(c) Find an estimate for the monthly rent for this apartment.

£ 240  
(2)

(Total for Question 2 is 4 marks)

3 Paula wants to find out how much money people spend buying CDs.

She uses this question on a questionnaire.

How much money do you spend buying CDs?

£10 – £30     £30 – £50     £50 – £70     more than £70

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

1 Overlapping response for £30 and £50

2 No Time reference given in the question

(2)

Paula asks 100 people in a CD store to do her questionnaire.

(b) Her sample is biased.  
Explain why.

People in a CD store are more likely to spend more money on CD's than random people asked on the Street.

(1)

(Total for Question 3 is 3 marks)

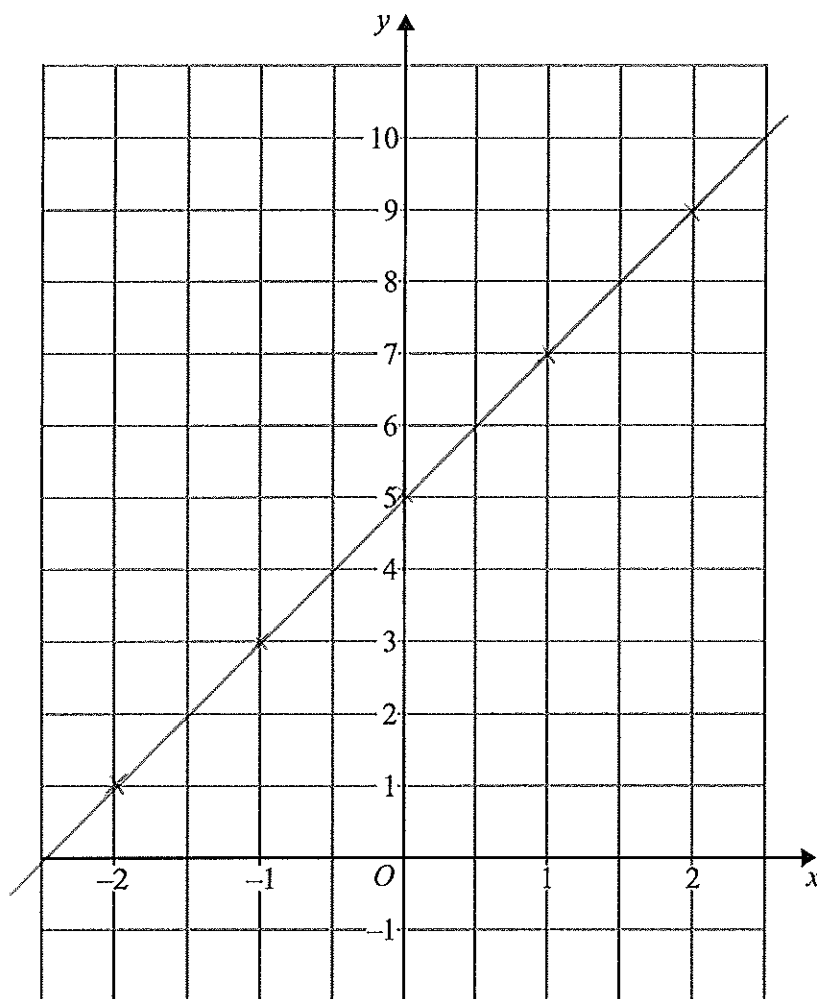


4 (a) Complete the table of values for  $y = 2x + 5$

$x$	-2	-1	0	1	2
$y$	1	3	5	7	9

(2)

(b) On the grid, draw the graph of  $y = 2x + 5$  for values of  $x$  from  $x = -2$  to  $x = 2$



(2)

(Total for Question 4 is 4 marks)



5 Here are the first 5 terms of an arithmetic sequence.

3      9      15      21      27

(a) Find an expression, in terms of  $n$ , for the  $n$ th term of this sequence.

$$\frac{6n-3}{(2)}$$

Ben says that 150 is in the sequence.

(b) Is Ben right?

You must explain your answer.

150 is not in the sequence because all the terms are odd, and 150 is even. Also,  $6n-3=150$

$$\text{so } 6n = 153$$

$$\div 6 \quad \div 6$$

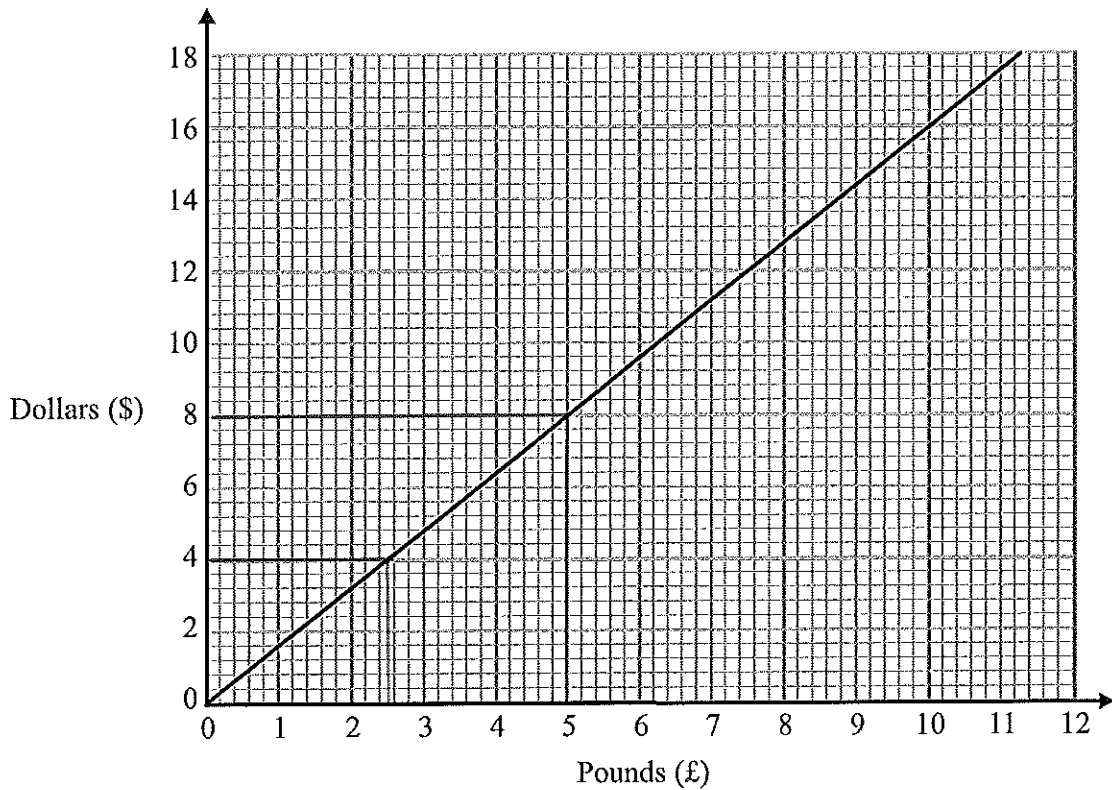
$$n = 25.5 \text{ not a whole number.}$$

(1)

(Total for Question 5 is 3 marks)



6 You can use this conversion graph to change between pounds (£) and dollars (\$).



(a) Use the conversion graph to change £5 to dollars.

\$ 8  
(1)

Ella has \$200 and £800  
Her hotel bill is \$600

Ella pays the bill with the \$200 and some of the pounds.

(b) Use the conversion graph to work out how many pounds she has left.

$$\$600 - \$200 = \$400$$

$$\$400 = £250 \quad \text{because} \quad \$4 = £2.50$$

$$£800 - £250 = £550$$

£ 550  
(4)

(Total for Question 6 is 5 marks)





7 (a) Simplify  $5x + 4y + x - 7y$

$$5x + x = 6x$$
$$4y - 7y = -3y$$

$$\frac{6x - 3y}{(2)}$$

(b) Solve  $7(x+2) = 7$

$$7x + 14 = 7$$
$$\quad -14 \quad -14$$
$$7x = -7$$
$$\quad \div 7 \quad \div 7$$
$$x = -1$$

$$\frac{x = -1}{(2)}$$

(Total for Question 7 is 4 marks)



8 Trams leave Piccadilly

to Eccles every 9 minutes

to Didsbury every 12 minutes

A tram to Eccles and a tram to Didsbury both leave Piccadilly at 9 am.

At what time will a tram to Eccles and a tram to Didsbury next leave Piccadilly at the same time?

E

9:00  
 9:09  
 9:18  
 9:27  
9:36

D

9:00  
 9:12  
 9:24  
9:36

9:36 am

(Total for Question 8 is 3 marks)

9 (a) Simplify  $a^4 \times a^5$

$$4 + 5 = 9$$

$$\frac{a^9}{(1)}$$

(b) Simplify  $\frac{45e^6f^8}{5ef^2}$

$$45 \div 5 = 9$$

$$\frac{9e^5f^6}{(2)}$$

(c) Write down the value of  $9^{\frac{1}{2}}$

$$= \sqrt{9} = 3$$

$$\frac{3}{(1)}$$

(Total for Question 9 is 4 marks)



\*10

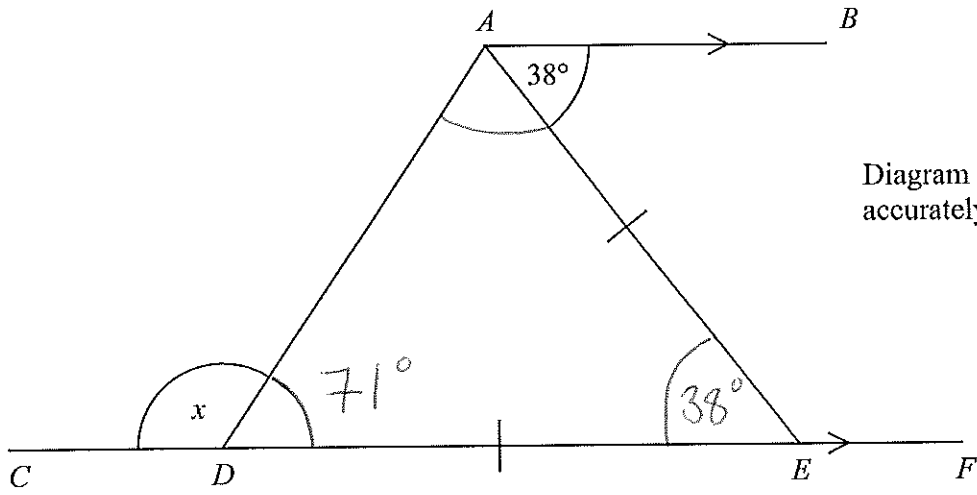


Diagram NOT accurately drawn

*CDEF* is a straight line.  
*AB* is parallel to *CF*.  
*DE = AE*.

Work out the size of the angle marked *x*.  
You must give reasons for your answer.

Angle AED =  $38^\circ$  because alternate angles are equal.

Angle ADE =  $(180^\circ - 38^\circ) \div 2 = 71^\circ$  because triangle is isosceles and base angles in an isosceles triangle are equal.

Angle *x* =  $180^\circ - 71^\circ$  because angles on a straight line equal  $180^\circ$   
=  $109^\circ$

(Total for Question 10 is 4 marks)



11 Greg sells car insurance and home insurance.

The table shows the cost of these insurances.

Insurance	car insurance	home insurance
Cost	£200	£350

Each month Greg earns

£530 basic pay  
5% of the cost of all the car insurance he sells  
and 10% of the cost of all the home insurance he sells

In May Greg sold

6 car insurances  
and 4 home insurances

Work out the total amount of money Greg earned in May.

Car insurance

$$£530 + £60$$

$$£200 \times 6 = £1200$$

$$5\% \text{ of } £1200 = £60.$$

Home insurance

$$£350 \times 4 = £1400$$

$$10\% \text{ of } £1400 = £140.$$

$$\begin{aligned} \text{Total money earned} &= £530 + £60 + £140 \\ &= \underline{\underline{£730}} \end{aligned}$$



12 5 schools sent some students to a conference.

One of the schools sent both boys and girls.

This school sent 16 boys.

The ratio of the number of boys it sent to the number of girls it sent was 1 : 2

The other 4 schools sent only girls.

Each of the 5 schools sent the same number of students.

Work out the total number of students sent to the conference by these 5 schools.

$$\begin{aligned} 1:2 &= 16:32 \\ &= 48 \text{ pupils from one school.} \end{aligned}$$

$$5 \text{ schools} \times 48 \text{ pupils} = 240 \text{ pupils}$$

240

(Total for Question 12 is 4 marks)



13

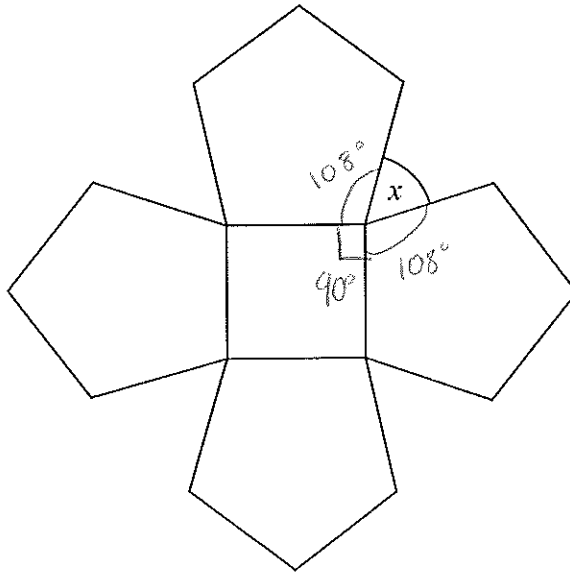


Diagram NOT  
accurately drawn

The diagram shows a square and 4 regular pentagons.

Work out the size of the angle marked  $x$ .

$$\text{interior angle of the square} = 90^\circ$$

$$\text{interior angle of a pentagon} =$$

$$360 \div 5 = 72^\circ \text{ (exterior)}$$

$$180 - 72 = 108^\circ \text{ (interior)}$$

$$\begin{aligned} \text{Angle } x &\Rightarrow 360 - 108 - 108 - 90 \\ &= 54^\circ \end{aligned}$$

54 °

(Total for Question 13 is 3 marks)



P 4 2 0 5 7 A 0 1 5 2 8

14 The grouped frequency table shows information about the weekly wages of 80 factory workers.

Weekly wage (£x)	Frequency
$100 < x \leq 200$	8
$200 < x \leq 300$	15
$300 < x \leq 400$	30
$400 < x \leq 500$	17
$500 < x \leq 600$	7
$600 < x \leq 700$	3

(a) Complete the cumulative frequency table.

Weekly wage (£x)	Cumulative Frequency
$100 < x \leq 200$	8
$100 < x \leq 300$	23
$100 < x \leq 400$	53
$100 < x \leq 500$	70
$100 < x \leq 600$	77
$100 < x \leq 700$	80

\* Plot endpoints with cumulative frequency.

(1)

(b) On the grid opposite, draw a cumulative frequency graph for your table.

(2)

(c) Use your graph to find an estimate for the interquartile range.

$$\begin{aligned} \text{IQR} &= \text{UQ} - \text{LQ} \\ &= 430 - 280 \end{aligned}$$

$$\begin{array}{r} \text{£ } 150 \\ \hline (2) \end{array}$$

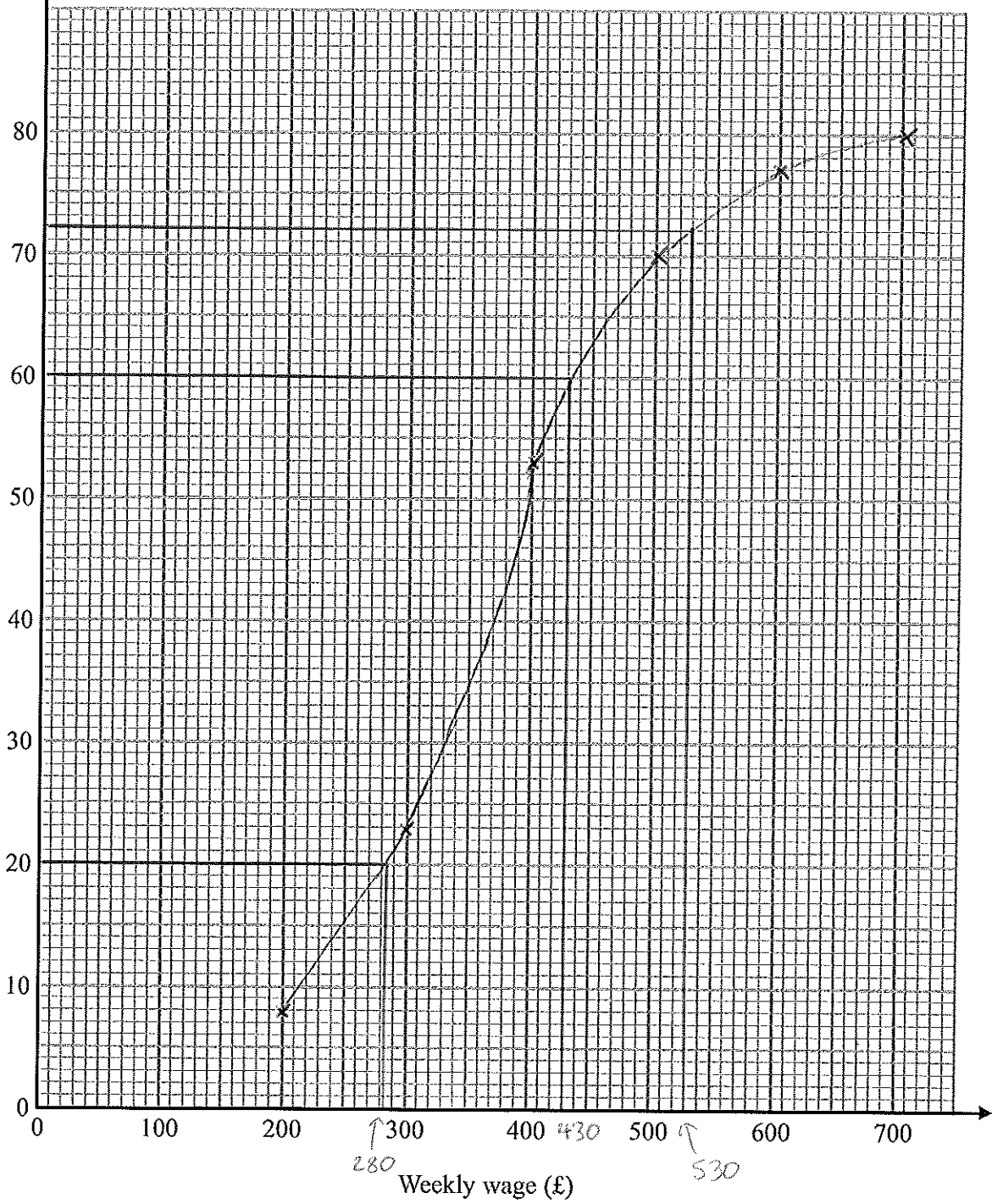
(d) Use your graph to find an estimate for the number of workers with a weekly wage of more than £530

$$80 - 72 = 8$$

$$\begin{array}{r} 8 \\ \hline (2) \end{array}$$



Cumulative frequency



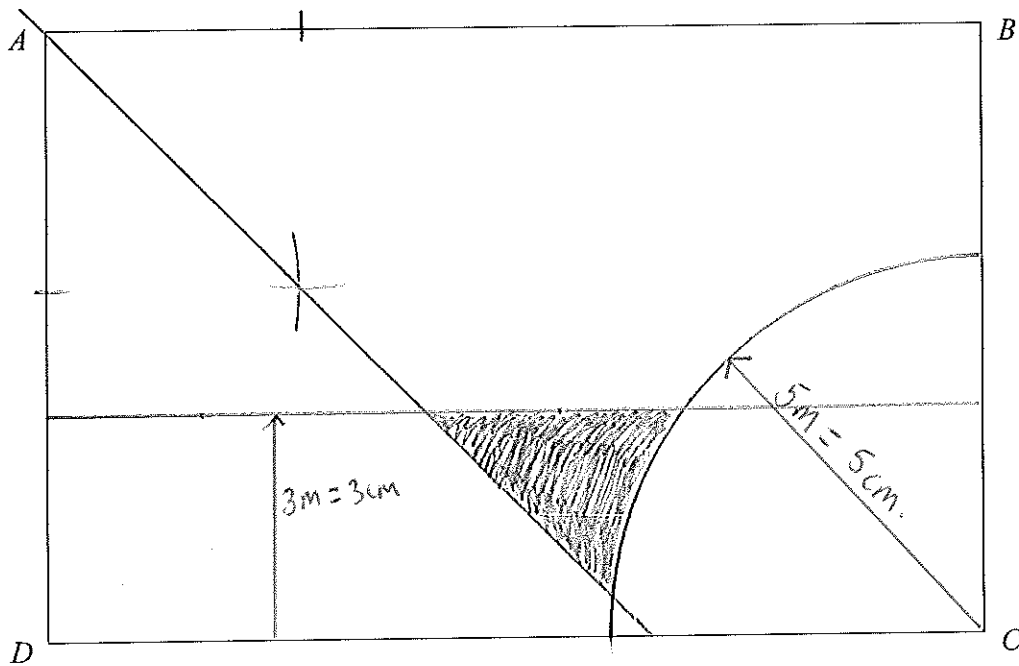
(Total for Question 14 is 7 marks)



P 4 2 0 5 7 A 0 1 7 2 8



15 Here is a scale drawing of a rectangular garden  $ABCD$ .



Scale: 1 cm represents 1 metre.

Jane wants to plant a tree in the garden  
 at least 5 m from point  $C$ ,  
 nearer to  $AB$  than to  $AD$   
 and less than 3 m from  $DC$ .

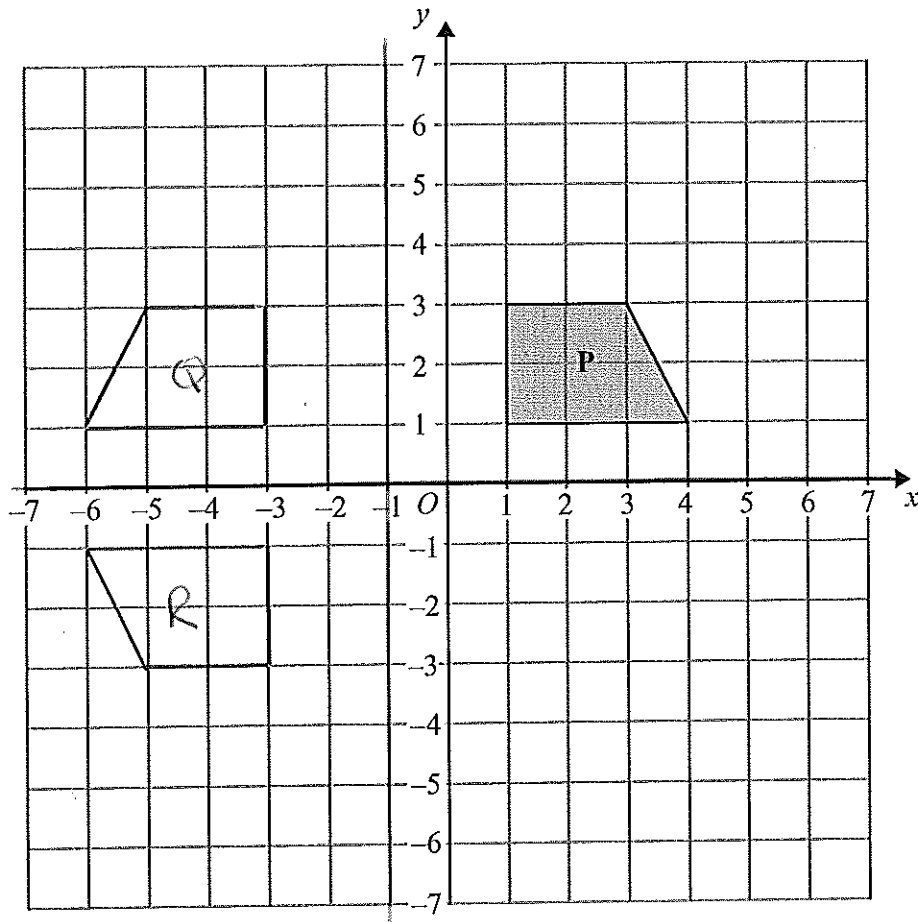
On the diagram, shade the region where Jane can plant the tree.

(Total for Question 15 is 4 marks)

- \* arc radius from point  $C$  (5cm)
- \* Angle bisect angle  $BAD$
- \* Draw a line 3cm away from  $DC$ .



18



Shape **P** is reflected in the line  $x = -1$  to give shape **Q**.

Shape **Q** is reflected in the line  $y = 0$  to give shape **R**.  $y = 0$  is the  $x$ -axis

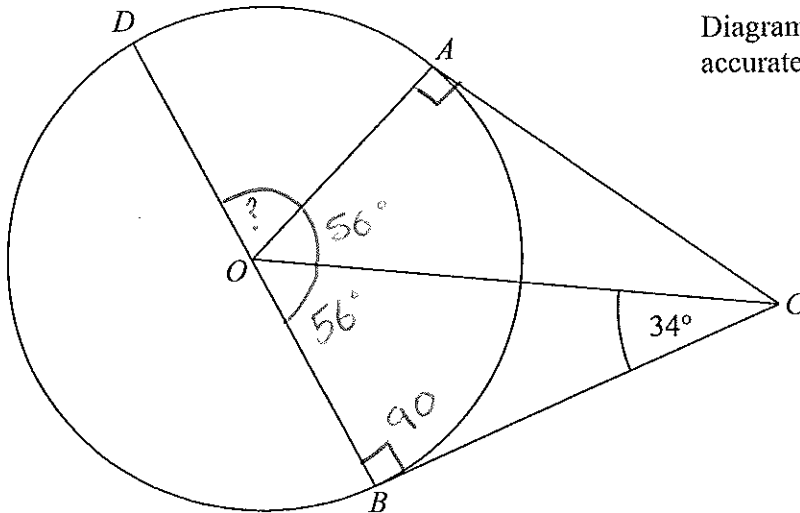
Describe fully the **single** transformation that maps shape **P** onto shape **R**.

Shape **P** has been rotated by  $180^\circ$  about the point  $(-1, 0)$ .

(Total for Question 18 is 3 marks)



19

Diagram NOT  
accurately drawn

$A$ ,  $B$  and  $D$  are points on the circumference of a circle, centre  $O$ .  
 $BOD$  is a diameter of the circle.  
 $BC$  and  $AC$  are tangents to the circle.  
 Angle  $OCB = 34^\circ$ .

Work out the size of angle  $DOA$ .

$$OBC = 90^\circ \text{ (Tangent meets radius at } 90^\circ)$$

$$BOC = 180^\circ - 90^\circ - 34^\circ = 56^\circ \text{ (Angles in triangle} = 180^\circ)$$

Because triangles  $OAC$  and  $OBC$  are identical

$$OAC = 90^\circ \text{ and } OCA = 34^\circ \text{ and } AOC = 56^\circ$$

$$\text{So angle } DOA = 180^\circ - 56^\circ - 56^\circ \\ = 68^\circ$$

because angles on a straight line equal  $180^\circ$

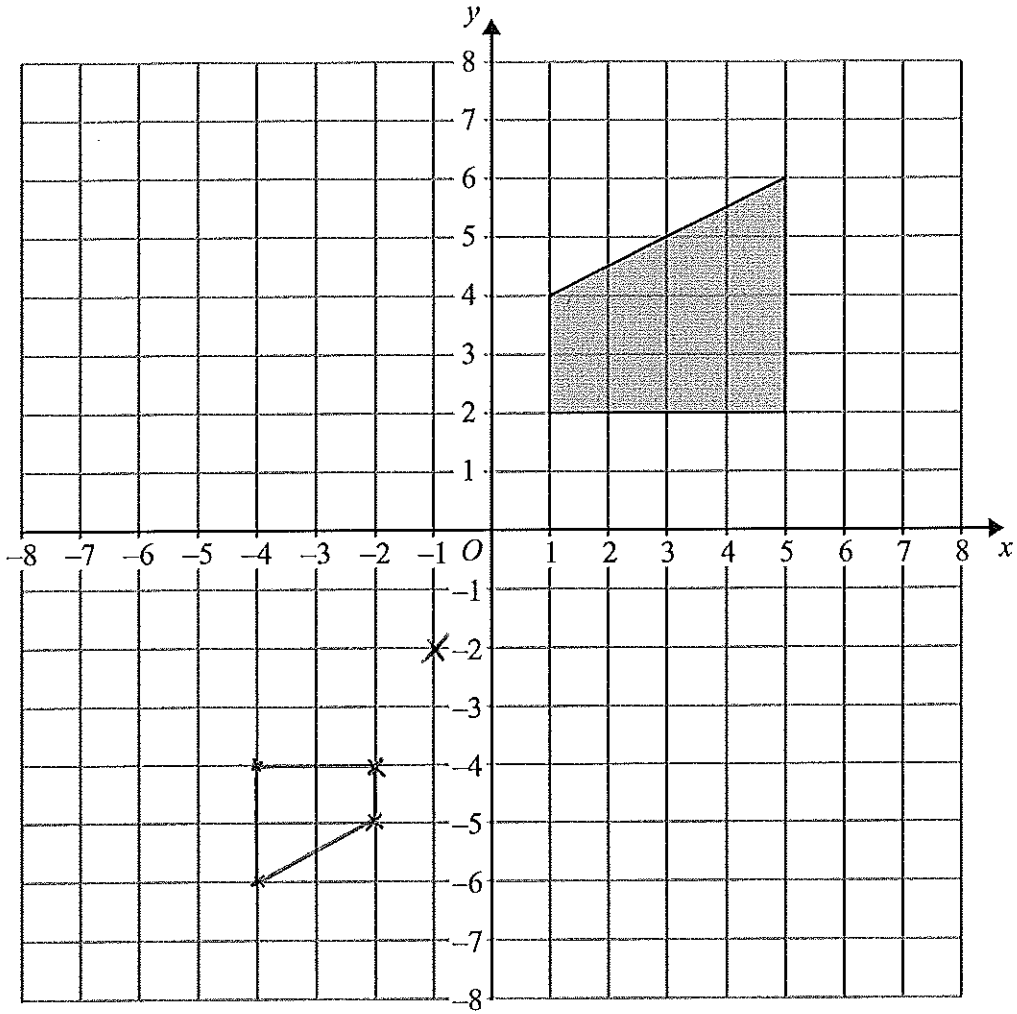
..... 68°

(Total for Question 19 is 3 marks)



P 4 2 0 5 7 A 0 2 1 2 8

22



Enlarge the shaded shape by scale factor  $-\frac{1}{2}$  with centre  $(-1, -2)$ .

(Total for Question 22 is 3 marks)



23 The diagram shows a solid hemisphere of radius 5 cm.

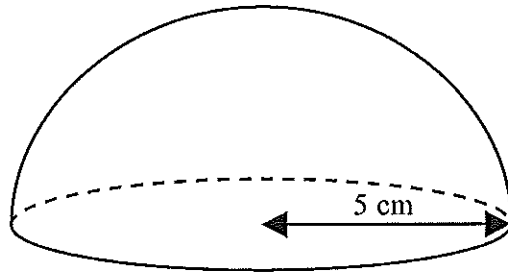


Diagram NOT  
accurately drawn

Find the **total** surface area of the solid hemisphere.  
Give your answer in terms of  $\pi$ .

$$\begin{aligned}\text{Surface area of sphere} &= 4\pi r^2 \\ &= \frac{4 \times \pi \times 5^2}{2} = \frac{100\pi}{2} \\ &= 50\pi\end{aligned}$$

$$\begin{aligned}\text{Area of base circle} &= \pi r^2 \\ &= \pi 5^2 \\ &= 25\pi\end{aligned}$$

$$\begin{aligned}\text{Total surface area} &= 50\pi + 25\pi \\ &= 75\pi\end{aligned}$$

..... cm<sup>2</sup>

(Total for Question 23 is 3 marks)



24 There are three different types of sandwiches on a shelf.

There are

4 egg sandwiches,  
5 cheese sandwiches  
and 2 ham sandwiches.

Erin takes at random 2 of these sandwiches.

Work out the probability that she takes 2 different types of sandwiches.

Probability of two the same

$$\begin{aligned} EE &= \frac{4}{11} \times \frac{3}{10} = \frac{12}{110} \\ CC &= \frac{5}{11} \times \frac{4}{10} = \frac{20}{110} \\ HH &= \frac{2}{11} \times \frac{1}{10} = \frac{2}{110} \end{aligned} \quad \begin{aligned} & \\ &+ \\ &+ \end{aligned} \quad = \frac{34}{110}$$

$$\begin{aligned} P(\text{different}) &= 1 - P(\text{same}) \\ &= 1 - \frac{34}{110} \\ &= \frac{110}{110} - \frac{34}{110} \end{aligned}$$

$$\frac{76}{110}$$

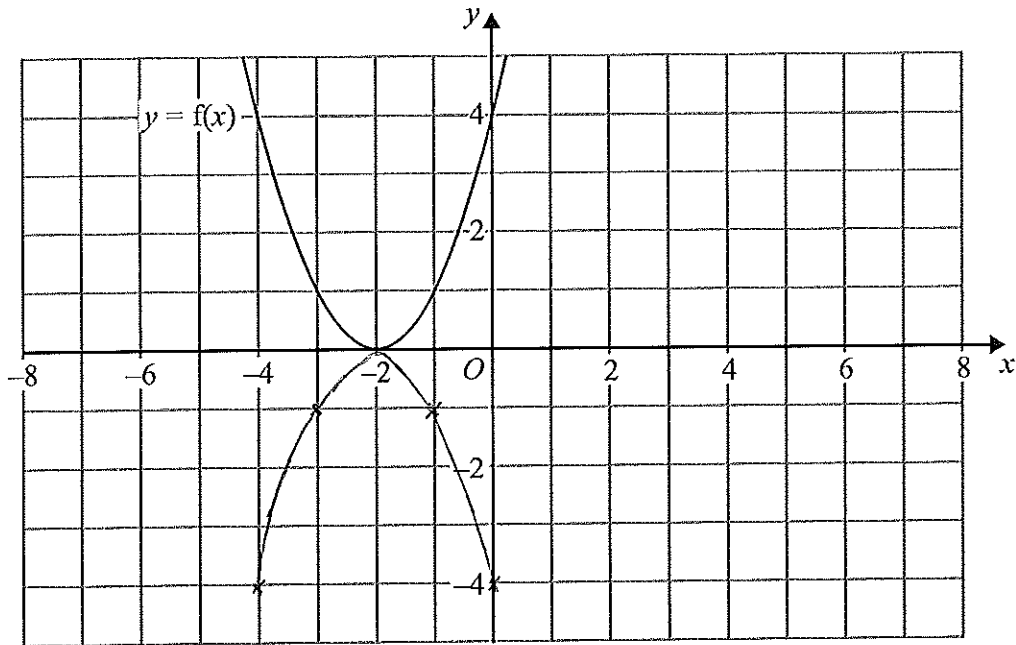
(Total for Question 24 is 5 marks)



P 4 2 0 5 7 A 0 2 5 2 8

25  $y = f(x)$

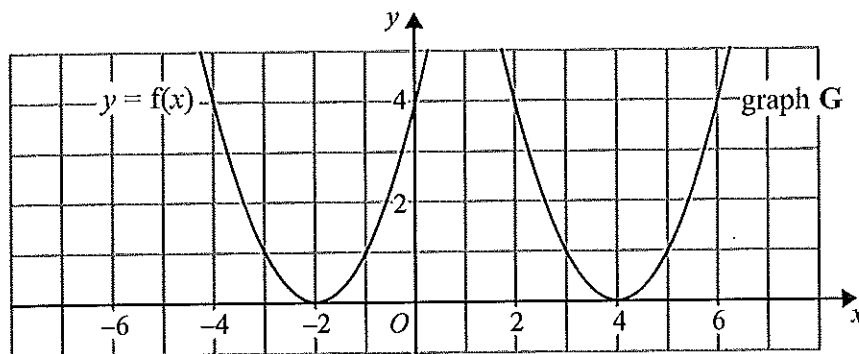
The graph of  $y = f(x)$  is shown on the grid.



(a) On the grid above, sketch the graph of  $y = -f(x)$ . *Reflect in the x-axis*

(2)

The graph of  $y = f(x)$  is shown on the grid.



The graph G is a translation of the graph of  $y = f(x)$ .

(b) Write down the equation of graph G.

$$y = f(x - 6)$$

(1)

(Total for Question 25 is 3 marks)



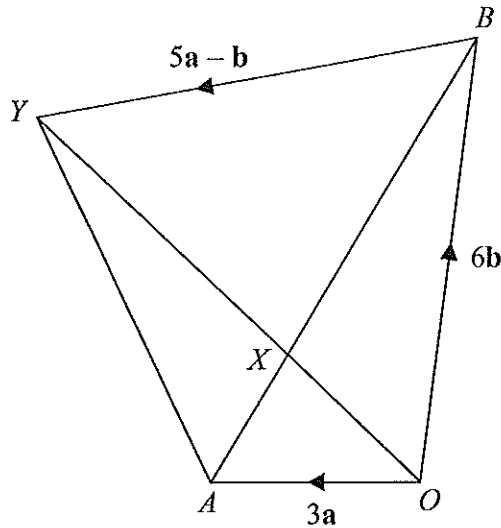


Diagram NOT  
accurately drawn

$OAYB$  is a quadrilateral.

$$\vec{OA} = 3a$$

$$\vec{OB} = 6b$$

(a) Express  $\vec{AB}$  in terms of  $a$  and  $b$ .

$$\frac{6b - 3a}{(1)}$$

$X$  is the point on  $AB$  such that  $AX : XB = 1 : 2$

and  $\vec{BY} = 5a - b$

\* (b) Prove that  $\vec{OX} = \frac{2}{5} \vec{OY}$

$$\vec{AX} = \frac{1}{3} \vec{AB} \Rightarrow 2b - a$$

$$\vec{OY} = \vec{OB} + \vec{BY} \Rightarrow 6b + 5a - b \Rightarrow 5b + 5a$$

$$\vec{OX} = 3a + 2b - a = \underline{\underline{2a + 2b}}$$

$$\frac{2}{5} \vec{OY} = \frac{2}{5} \times 5(a+b) = 2(a+b) = \underline{\underline{2a + 2b}} \quad (4)$$

(Total for Question 26 is 5 marks)

TOTAL FOR PAPER IS 100 MARKS





