UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

Paper 3 (Core)　　　　　　　　　　　**0580/03 0581/03**

Candidates answer on the Question Paper.
Additional Materials:　Electronic calculator
　　　　　　　　　　　Geometrical instruments　　October/November 2004
　　　　　　　　　　　Mathematical tables (optional)
　　　　　　　　　　　Tracing paper (optional)　　　　**2 hours**

Candidate Name	

Centre Number		Candidate Number	

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.

Write in dark blue or black pen in the spaces provided on the Question Paper.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

DO **NOT** WRITE IN THE BARCODE.

DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

Answer **all** questions.

If working is needed for any question it must be shown below that question.

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

For Examiner's Use

The total number of marks for this paper is 104.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is

not exact, give the answer to three significant figures. Given answers
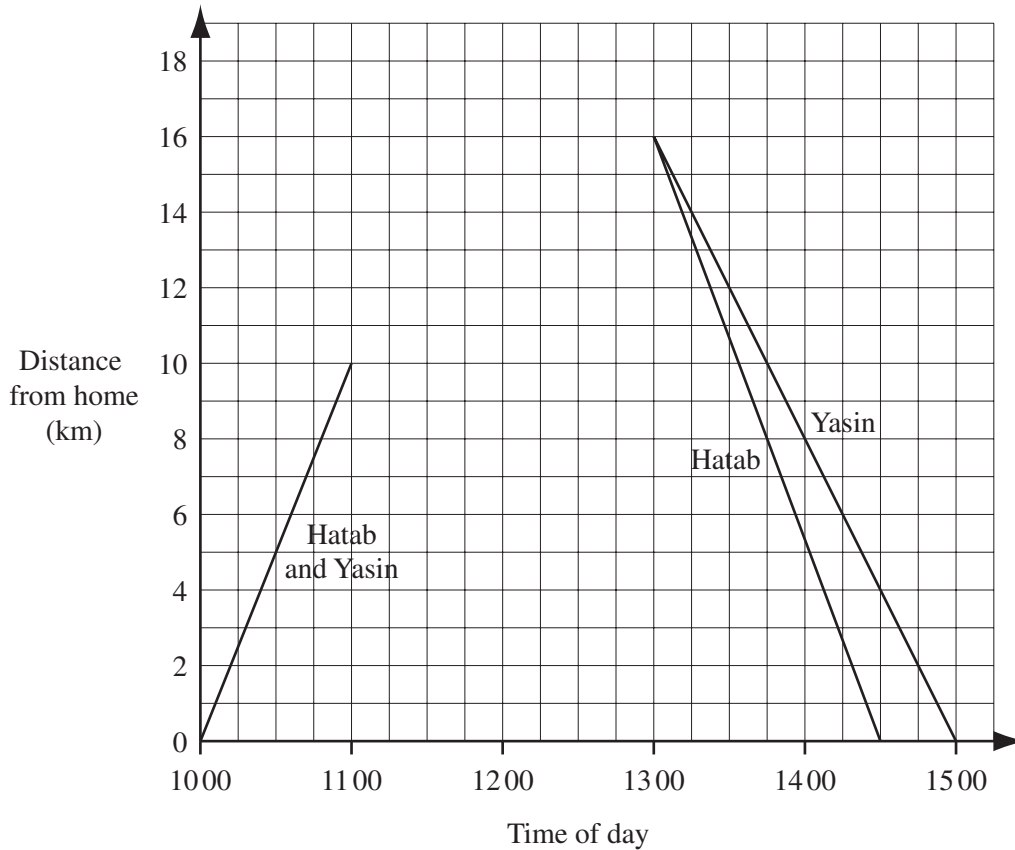
in degrees to one decimal place.

For π, use either your calculator value or 3.142.

This document consists of **15** printed pages and **1** blank page.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1   **(a)** Two friends, Hatab and Yasin, went on a cycle ride.
Part of the distance-time graph for their journey is shown below.

For the first part of the journey they cycled at the same speed.

(i) Find their speed for the first part of the journey.

Answer(a)(i) .... km/h [1]

(ii) At 11 00 they stopped for half an hour. Show this on the graph.   [1]

(iii) They continued on their ride and at 12 45 they were 16 kilometres from home.
Show this part of the journey on the graph.   [1]

(iv) They stopped again and then had a race going home.

(a) For how long did they stop?

Answer(a)(iv)*(a)* .... min [1]

(b) Who won the race?

Answer(a)(iv)*(b)* .... [1]

(v) What was the total length of their journey?

Answer(a)(v) .... km [1]

(b) On a certain day the conversion rate between dollars ($) and Indian rupees was

$1 = 45 rupees.

(i) How many rupees were equivalent to $10?

Answer(b)(i) .... rupees [1]

(ii) Use this information to draw a conversion graph on the axes below.
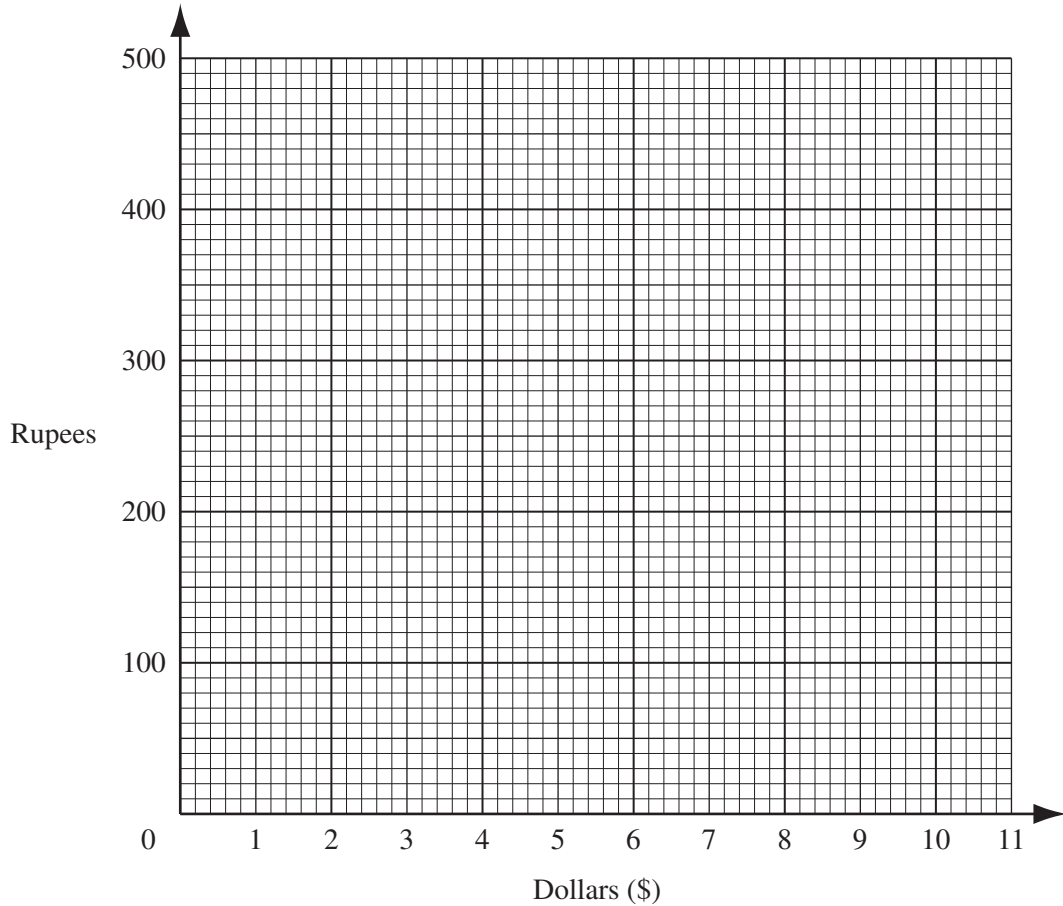
[2]

(iii) Use your graph to find

(a) how many rupees were equivalent to $6.80,

Answer(b)(iii)*(a)* .... rupees [1]

(b) how many dollars were equivalent to 480 rupees.

Answer(b)(iii)*(b)* $ .... [1]

2
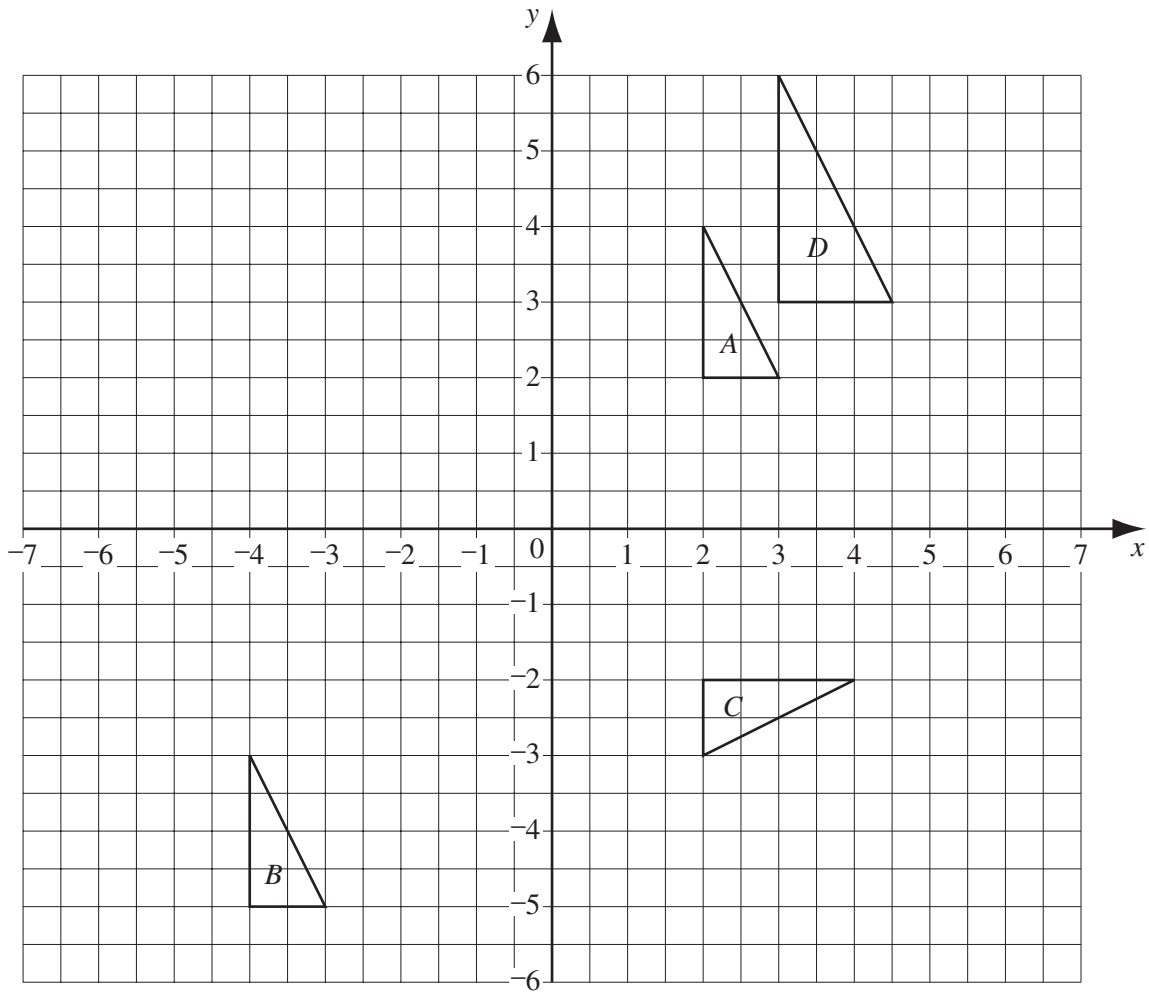
(a) Describe fully the single transformation that maps triangle *A* onto triangle *B*.

Answer(a) ....

.... [3]

(b) Describe fully the single transformation that maps triangle *A* onto triangle *C*.

Answer(b) ....

.... [3]

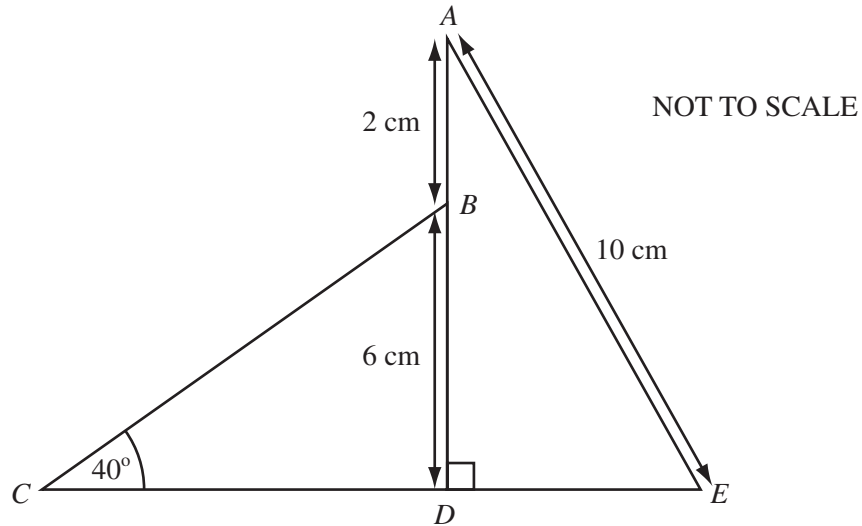**(c)** Find the centre and the scale factor of the enlargement that maps triangle *A* onto triangle *D*.

Answer(c) centre   (.........., ...)   scale factor .... [2]

(d) On the grid

    (i) draw the image of triangle *A* under a reflection in the line $x = -1$,   [2]

    (ii) draw the image of triangle *B* under a rotation of 180° about (−4, −3).   [2]

3

A

2 cm

NOT TO SCALE

B

10 cm

6 cm

40°

C

D

E

On the above diagram, $AB = 2$ cm, $BD = 6$ cm, $AE = 10$ cm, angle $BCD = 40°$ and angle $BDE = 90°$.

(a) Write down the length of AD.

Answer(a) AD = ... cm [1]

(b) Calculate the length of DE.

Answer(b) DE = ... cm [2]

(c) Calculate the size of angle AED.

Answer(c) angle $AED =$ .... [2]

(d) Calculate the length of CD.

Answer(d) CD = ... cm [3]

(e) Find the length of CE.

Answer(e) CE = ... cm [1]

4   **(a)**

A

NOT TO SCALE

5 cm   6 cm

B   C
4 cm
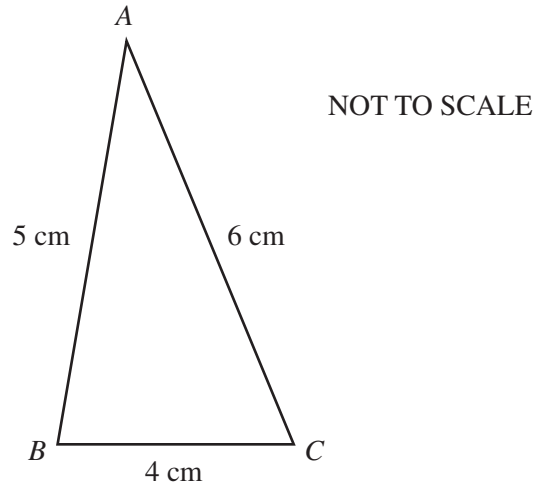
(i) In the space below, using a ruler and compasses only, construct the above triangle
accurately.   [3]

**(ii)** Using the triangle you have drawn, measure and write down the size of angle *ACB*.

Answer(a)(ii) angle *ACB* = ... [1]

(b) In the diagram below two points, *P* and *Q*, are joined by a straight line.

P •————————————————————————• *Q*

(i) On the diagram draw the locus of all the points that are 4 centimetres from the line *PQ*. [3]

(ii) On the same diagram, using a straight edge and compasses only, construct the locus of the points that are equidistant from *P* and *Q*.
Show all your construction lines. [2]

(iii) Shade the region which contains the points that are closer to *P* than to *Q* **and** are less than 4 centimetres from the line *PQ*. [2]

5 **(a)**

NOT TO SCALE
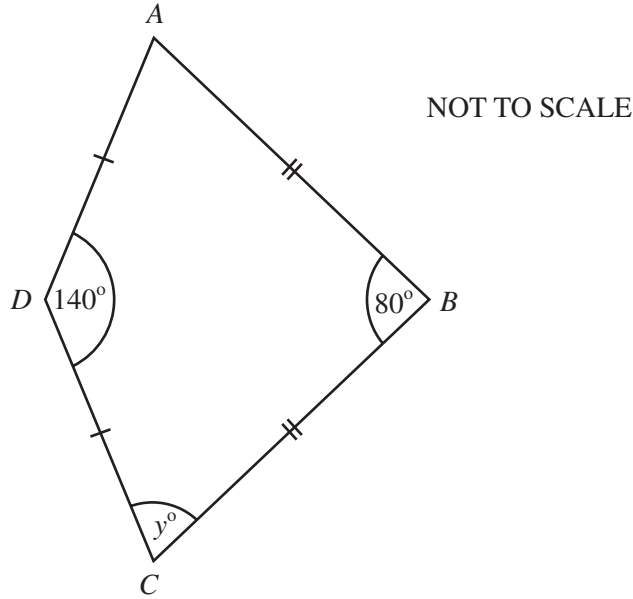
In the diagram above *AB=BC* and *AD=DC*.

(i) What is the special name of the quadrilateral *ABCD*?

Answer(a)(i) .... [1]

(ii) On the diagram draw the line of symmetry. [1]

(iii) Calculate the value of *y*.

Answer(a)(iii) *y* = ... [2]
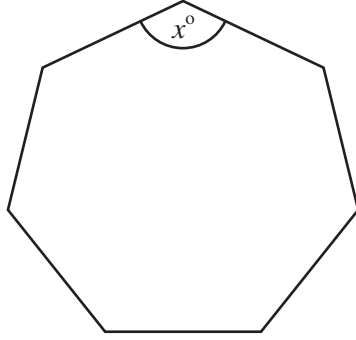
(b)
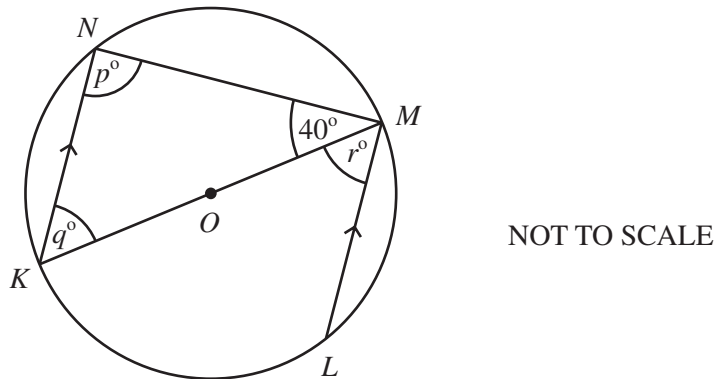
NOT TO SCALE

In the diagram above, the points *K,L,M* and *N* lie on the circle centre *O*.
KN is parallel to *LM*.
Find the values of *p,q* and *r*.

Answer(b) *p* = ... , *q* = ... , *r* = ... [3]

(c)

NOT TO SCALE

The diagram above shows a regular seven-sided polygon.
Each of the interior angles measures $x°$.
One of the angles is marked in the diagram.
Calculate the value of x, giving your answer correct to 1 decimal place.
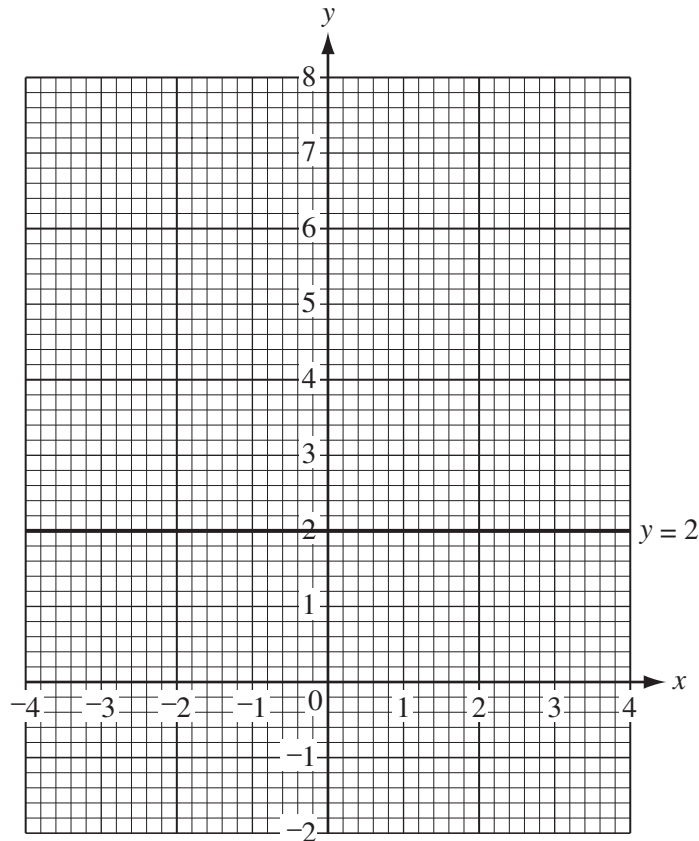**Show all your working.**

Answer(c) x = ... [4]

6 (a) Complete the table below for $y = x^2 - 2x$.

x	-2	-1	0	1	2	3	4
y	8			-1		3	8

[3]

(b) On the grid below, draw the graph of $y = x^2 - 2x$ for $-2 \leqslant x \leqslant 4$.

[4]

(c) The line $y = 2$ is drawn on the diagram.
Use your graph to find the values of x that solve the equation $x^2 - 2x = 2$.

Answer(c) $x = $ .... or $x = $ .... [2]

(d) Complete the table below for $y = 4 - x$.

x	-4	0	4
y	8		

[2]

(e) On the grid above, draw the line $y = 4 - x$ for $-4 \leqslant x \leqslant 4$. [1]

(f) Write down the x coordinates of the points of intersection of the graphs of $y = x^2 - 2x$ and $y = 4 - x$.

Answer(f) $x = $ .... or $x = $ .... [2]

7 **(a)** Rajeesh thought of a number.
He multiplied this number by 2.
He then added 10.
The answer was 42.

(i) What was the number Rajeesh first thought of?

Answer(a)(i) .... [1]

(ii) Simon thought of a number x.
He multiplied this number by 3 and then added 8.
Write down an expression in x for his answer.

Answer(a)(ii).. [2]

(b) Simplify $-8a + 7b - a - 2b$.

Answer(b) .... [2]

(c) Factorise fully $6a - 9a^2$.

Answer(c) .... [2]

(d) Make t the subject of the formula

$$v = u + at.$$

Answer(d) t= .... [2]

(e) Solve the simultaneous equations
$$8x + 2y = 13,$$
$$3x + y = 4.$$

Answer(e) $x =$ .... , $y =$ .... [4]

8 **(a)** The list shows the rainfall in millimetres in Prestbury for the 12 months of 2002.

61   146   22   54   67   94   141   22   37   167   87   170

(i) Write down the mode.
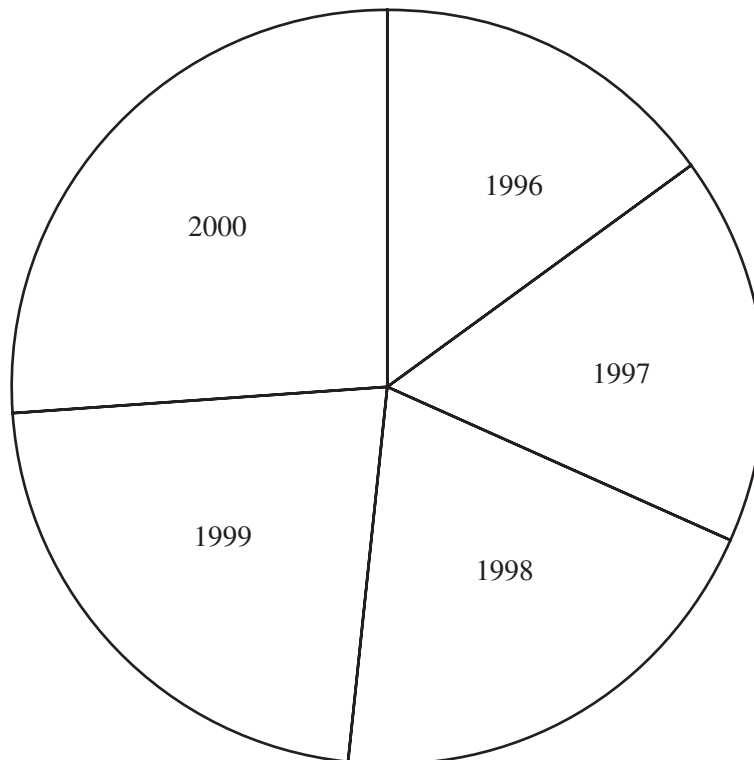
Answer(a)(i)   .... mm [1]

(ii) Find the median.

Answer(a)(ii)   .... mm [2]

(iii) Calculate the mean.

Answer(a)(iii)   .... mm [2]

(b) During the years 1996 - 2000 the total rainfall in Prestbury was 5400 millimetres.
The pie chart shows how this was spread over the five years.

(i) Measure the angles of the sectors for 1998, 1999 and 2000.
Write your answers in the table below. [3]

(ii) Work out the annual rainfall, in millimetres, for each of the years 1998, 1999 and 2000.
Write your answers in the table below. [3]

Answers (b)(i) *and* (ii)

Year	Angle (degrees)	Rainfall (mm)
1996	54	810
1997	60	900
1998		
1999		
2000		
Total	360	5400

(iii) What do you notice about the trend in the rainfall from 1996 to 2000?

Answer(b)(iii) ....

.... [1]

9 **(a)** A pattern of numbers is shown below.

row

```
1 - - - ►                          1
2 - - - ►                 2    3    4
3 - - - ►            5    6    7    8    9
4 - - - ►       10   11   12   13   14   15   16
5 - - - ►   17  18   19   20   21   22   23   24   25
6 - - - ► 26 ..... ..... ..... ..... ..... ..... ..... ..... ..... .....
```

(i) On the diagram complete row 6. [1]

(ii) The last numbers in each row form a sequence.

$$1, 4, 9, 16, 25, \ldots\ldots\ldots\ldots$$

(a) What is the special name given to these numbers?

Answer(a)(ii)*(a)* .... [1]

(b) Write down the last number in the 10th row.

Answer(a)(ii)*(b)* .... [1]

(c) Write down an expression for the last number in the nth row.

Answer(a)(ii)*(c)* .... [1]

(iii) The numbers in the middle column of the pattern form a sequence.

$$1, 3, 7, 13, 21, 31, \ldots\ldots\ldots..$$

(a) Write down the next number in this sequence.

Answer(a)(iii)*(a)* .... [1]

(b) The expression for the nth number in this sequence is $n^2 - n + 1$.
Work out the 30th number.

Answer(a)(iii)*(b)* .... [2]

(b) Another pattern of numbers is shown below.

row

1	---►	1	2	3	4	5	6	7	8	9	10
2	---►	11	12	13	14	15	16	17	18	19	20
3	---►	21	22	23	24	25	26	27	28	29	30
4	---►	31	32	33	34	35	36	37	38	39	40

(i) What is the last number in the 10th row?

Answer(b)(i) .... [1]

(ii) Find an expression for the last number in the nth row.

Answer(b)(ii) .... [1]

(iii) What is the **first** number in the 10th row?

Answer(b)(iii) .... [1]

(iv) Find an expression for the **first** number in the nth row.

Answer(b)(iv) .... [1]

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