Candidate Name _____

International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL EXAMINATIONS

MATHEMATICS   **0580/3, 0581/3**

PAPER 3

MAY/JUNE SESSION 2002

2 hours

Candidates answer on the question paper.
Additional materials:
    Electronic calculator
    Geometrical instruments
    Mathematical tables (optional)
    Tracing paper (optional)

TIME   2 hours

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

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

INFORMATION FOR CANDIDATES

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

The total of the 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. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

UNIVERSITY *of* CAMBRIDGE
Local Examinations Syndicate   **[Turn over**

1 **(a)** Seven students from a class worked out the number of calories in their food and drink one morning.
The list shows the results.

<div align="center">1400, 1650, 1880, 1530, 1210, 1390, 1440</div>

(i) Find the median number of calories.

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

(ii) Calculate the mean number of calories.

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

(iii) Explain why this list of numbers has no mode.

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

(b) All 24 students in the class then estimated how many units of energy they had used during the morning. The list shows the results.

20, 40, 20, 30, 30, 30, 25, 35, 30, 30, 25, 30,
30, 20, 25, 35, 30, 25, 25, 30, 25, 25, 30, 30.

(i) Complete the frequency table.

| Number of units of energy used	Number of students (frequency)
20	
25	
30	
35	
40	

[2]

(ii) Calculate the mean number of units of energy used.

Answer (b)(ii) .... [3]

(c) The 24 students estimated how many units of energy they had used during the afternoon. The results are shown in the table below.

Number of units of energy used	20	25	30	35	40
Number of students (frequency)	4	6	9	3	2

Draw and label an accurate pie chart in the circle below to show this information.
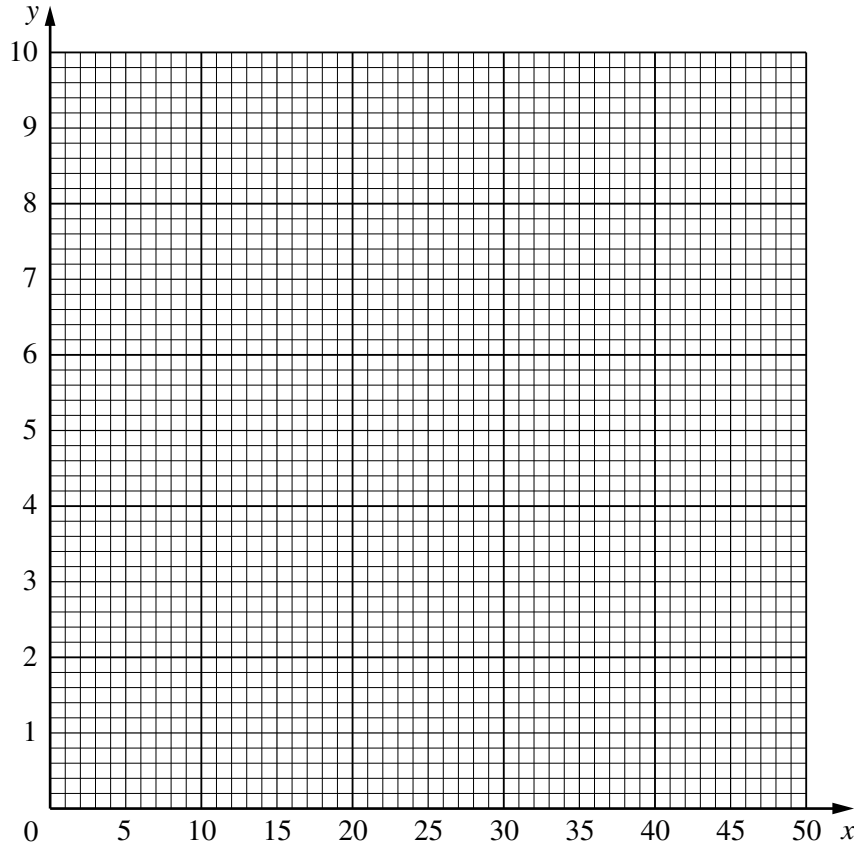Show clearly how you calculated your angles.

[5]

[Turn over
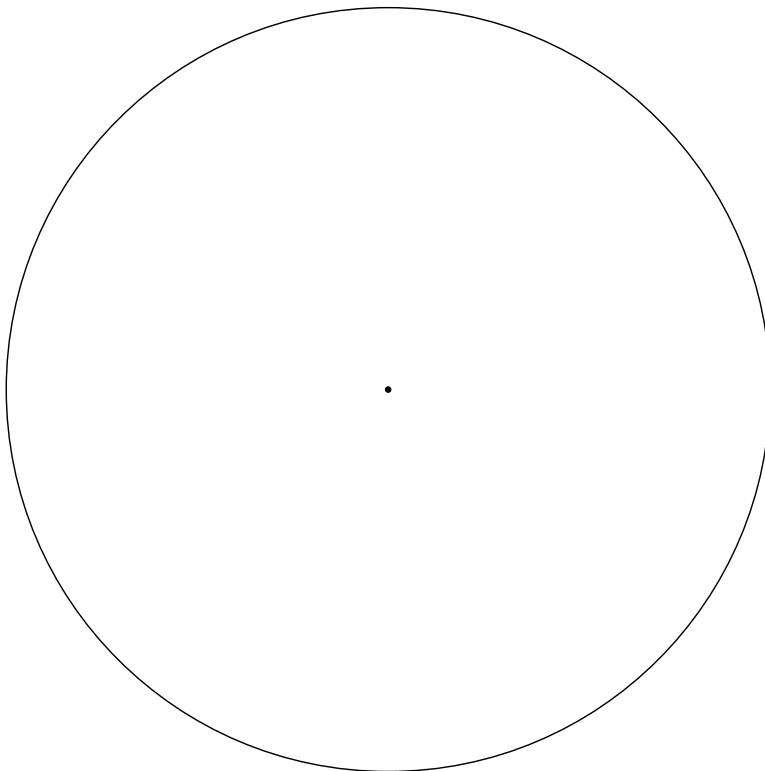
2 **(a)** Complete the table of values for the function $y = \dfrac{50}{x}$.

x	5	10	15	20	25	30	35	40	45	50
y						1.7	1.4	1.3		

[3]

(b) On the grid draw the graph of $y = \dfrac{50}{x}$ for $5 \leqslant x \leqslant 50$.

[4]

(c) Use your graph to

(i) find the value of x when $y = 4$, *Answer (c)(i)* .... [1]

(ii) solve the equation $\dfrac{50}{x} = 3$. *Answer (c)(ii)* .... [1]

(d) **(i)** Complete the table of values for the function $y = 8 - \dfrac{x}{5}$.

x	0	20	40
y		4	

[2]

(ii) On the same grid, draw the graph of $y = 8 - \dfrac{x}{5}$ for $0 \leqslant x \leqslant 40$. [2]

(e) Write down the coordinates of the points of intersection of the two graphs.
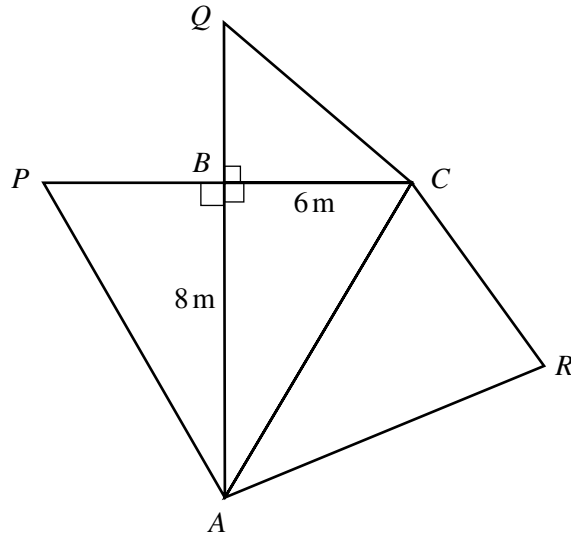
Answer (e) (.......... , ...), (.......... , ...) [2]

(f) Find the gradient of the graph of $y = 8 - \dfrac{x}{5}$

Answer (f) .... [2]

3

NOT TO SCALE

In the diagram $AB = 8$ m, $BC = 6$ m and angle $ABC = 90\,°$.

(a) **Calculate** the length of AC.

Answer (a) AC = ... m   [2]

(b) **Calculate** the size of angle BAC.

Answer (b) Angle BAC = ...   [2]

(c) In triangle ACR, $RC = 8.5$ m and $AR = AC$.

    (i) Make an accurate drawing of **triangle ACR** using a scale of 1 centimetre to represent 2 metres.

[3]

    (ii) Measure angle CAR.

Answer (c)(ii) Angle CAR = ...   [1]

(d) *APBQCR* is a net of a solid. Write down the name of this solid.

Answer (d) ....   [1]

[Turn over

4 **(a)** Simplify $7k - 3m - k - 2m$.

Answer (a) .... [2]

(b) Solve the equation $2(x - 4) + 3(5 - 3x) = 4$.

Answer (b) x = ... [3]

(c) Pencils cost *p* cents each and erasers cost *e* cents each.
Farah buys 7 pencils and 3 erasers.

(i) Write down the total cost in cents, in terms of *p* and *e*.

Answer (c)(i) .... cents [2]

(ii) Change your answer into dollars.

Answer (c)(ii) $ .... [1]

(iii) What is the total cost, in dollars, when $p = 20$ and $e = 15$?

Answer (c)(iii) $ .... [2]

(d) Zak starts with $1.
Each day the money he has doubles.
After 1 day he has $2, after 2 days he has $4 and so on.
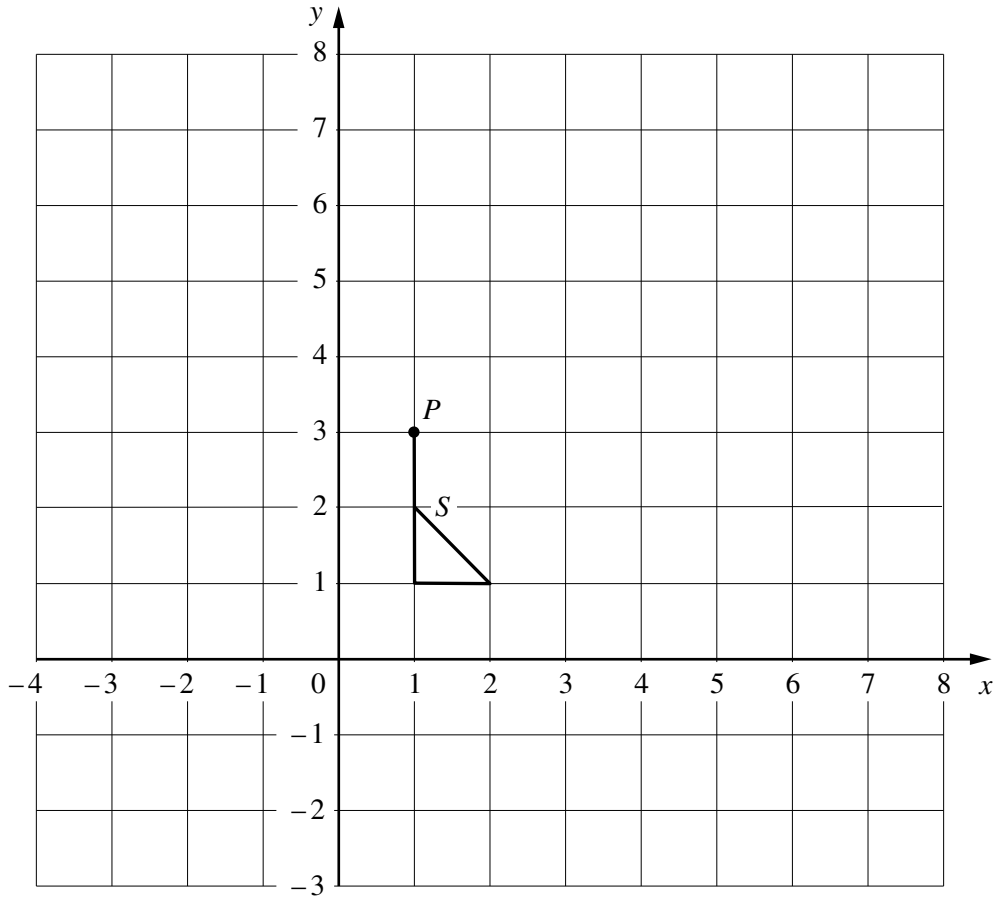How much money does he have after

(i) 4 days,

Answer (d)(i) $ .... [1]

(ii) 7 days,

Answer (d)(ii) $ .... [1]

(iii) *d* days? (Give your answer in its simplest form.)

Answer (d)(iii) $ .... [1]

5

The shape *S*, , is drawn on the grid above and the point *P* (1,3) is labelled.

(a) On the grid, draw the following transformations.

    (i) The rotation of *S*, 90° clockwise, about the point *P*. Label it *A*. [2]

    (ii) The translation of *S* by the vector $\begin{pmatrix} -4 \\ -3 \end{pmatrix}$. Label it *B*. [2]
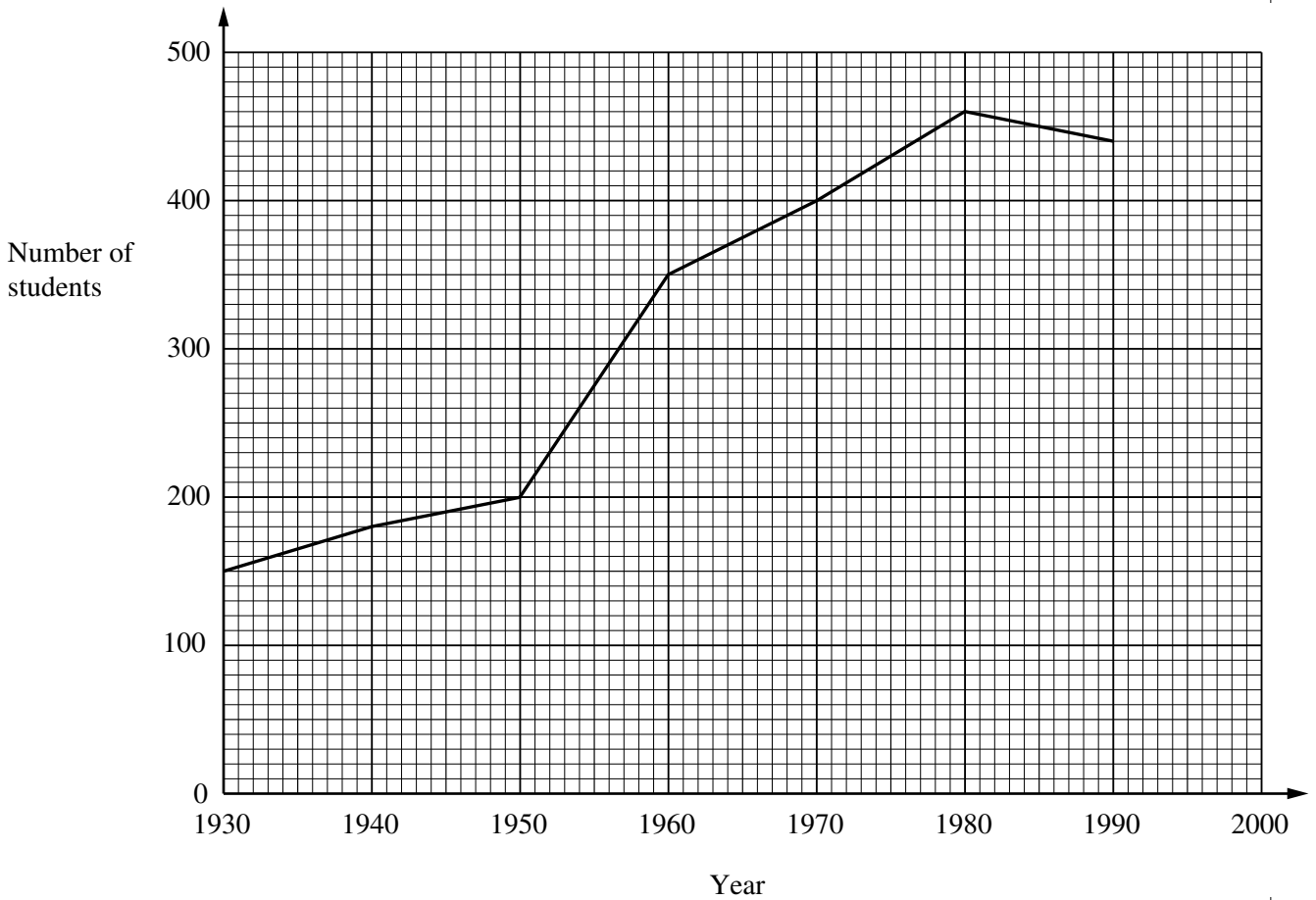
    (iii) The enlargement of *S* with centre (0, 0) and scale factor 2. Label it *C*. [3]

    (iv) The reflection of *S* in the line y = 4. Label it *D*. [3]

(b) Write down the vector which translates *B* back to the original position of *S*.

Answer (b) $\begin{pmatrix} \\ \end{pmatrix}$ [1]

**6** The graph shows the number of students in a school at ten-yearly intervals between the years 1930 and 1990.

(a) How many students were there in the school in 1940?

Answer (a) .... [1]

(b) Estimate the number of students in 1952.

Answer (b) .... [1]

(c) During which ten-year interval did the number of students increase the most?

Answer (c) ....to .... [1]

(d) The **increase** during each ten-year interval is *x*. The value of *x* between 1930 and 1940 is + 30. Write down the value of *x* between

(i) 1970 and 1980,

Answer (d)(i) *x* = ... [1]

(ii) 1980 and 1990.

Answer (d)(ii) *x* = ... [1]

(e) The trend between 1980 and 1990 continued until 2000.

Estimate the number of students in   **(i)** 2000,

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

(ii) 1996.

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

(f) Work out the average increase each year in the number of students during the ten-year interval 1960 to 1970.

Answer (f) .... [2]

7(a)

NOT TO SCALE
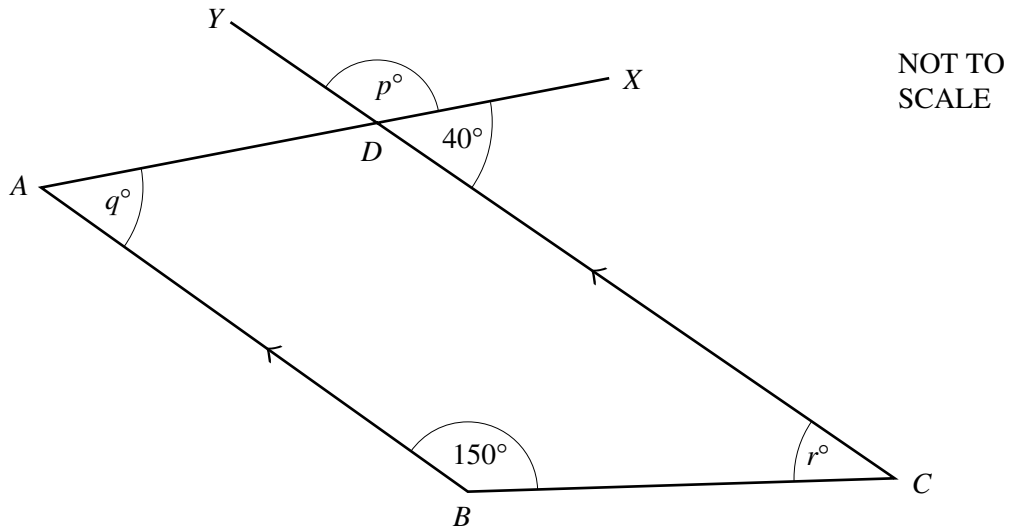
In the diagram, *AX* and *CY* are straight lines which intersect at *D*.
BA and *CY* are parallel.
Angle *CDX* = 40° and angle *ABC* = 150°.

(i) Find *p, q* and *r*.

Answer (a)(i) *p* = ... [1]

q = ... [1]

r = ... [1]

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

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

(b) (i) A nonagon is a polygon with nine sides.
Calculate the size of an interior angle of a **regular** nonagon.

Answer (b)(i) .... [3]

(ii) Each angle of another **regular** polygon is 150°.
Calculate the number of sides of this polygon.

Answer (b)(ii) .... [3]

[Turn over

8 A bank offers loans to its customers.
Customers choose to repay over periods ranging from 60 to 240 months.

Table of Monthly Repayments in Dollars

		Time taken to repay loan in months				
		60	90	120	180	240
Loan amount ($)	5000	111.83	85.17	72.43	60.78	55.89
	6000	134.20	102.20	86.92	72.94	67.07
	8000	178.93	136.27	115.89	97.25	89.43
	10 000	217.03	163.23	137.30	113.16	102.67

The table shows how much the customer must repay **each month**.
For example, Manuel takes a loan of $6000 for 180 months. The table shows that he must repay $72.94 **each month for 180 months**.

(a) Ella takes a loan of $5000 for 90 months.

(i) How much must she repay each month?

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

(ii) Calculate the **total** amount she must repay.

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

(iii) If instead she takes the loan of $5000 for 120 months, calculate how much **more** the total amount will be.

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

(b) Frida takes a loan of $10 000 for 60 months.

(i) Calculate the **total** amount she must repay.

Answer (b)(i) $ .... [2]

(ii) Work out your answer to **part(b)(i)** as a percentage of $10 000.

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

(c) Pedro takes a loan of $8000. He repays a total amount of $13 906.80.
Using the table, find the number of months of Pedro's loan.

Answer (c) .... [3]

9 **(a)** The table below shows a pattern of numbers.
Fill in the two empty boxes.

1	2	3	4	5		n
3	5		9			$2n + 1$

[2]

(b) The new table shows another pattern of numbers.
Fill in the two empty boxes.

1	2	3	4	5		n
5	8	11	14			

[2]

(c) By looking at the patterns, fill in the eight empty boxes in the table below.

1	2	3	4	5	6		n
1	4	9	16				n^2
0	3	8	15				
4	9	16	25				

[5]

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