Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/02
0581/02

Paper 2

May/June 2003

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometric instruments
Mathematical tables (optional)
Tracing paper (optional)

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 soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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

If working is needed for any question it must be shown below that question.
The total of the marks for this paper is 70.
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

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of **12** printed pages.

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Local Examinations Syndicate
[Turn over

For Examiner's use

1 Write in order of size, smallest first,

$$\frac{5}{98}, \quad 0.049, \quad 5\%.$$

Answer .....<.....<..... [2]

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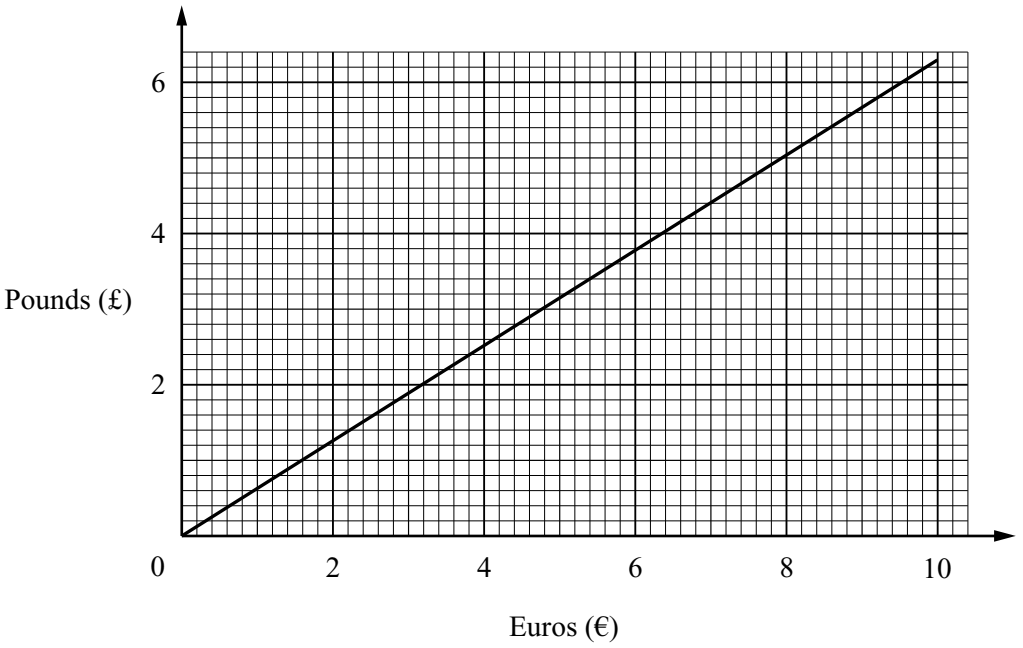
2 The graph below can be used to convert between euros (€) and pounds (£).



(a) Change £5 into euros.

Answer (a) € ..... [1]

(b) Change €90 into pounds.

Answer (b) £ ..... [1]

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3 The top speed of a car is 54 metres per second.
Change this speed into kilometres per hour.

Answer .....km/h [2]

---

4 $\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$. Find $3\mathbf{a} - 2\mathbf{b}$.

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

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5 The ratios of teachers : male students : female students in a school are 2 : 17 : 18.
The total number of **students** is 665.
Find the number of **teachers**.

Answer ..... [2]

---

6 A rectangular field is 18 metres long and 12 metres wide.
Both measurements are correct to the nearest metre.
Work out exactly the smallest possible area of the field.

Answer .....m^2 [2]

---

7 Solve the inequality $3 < 2x - 5 < 7$.

Answer ..... $< x <$ ..... [2]

---

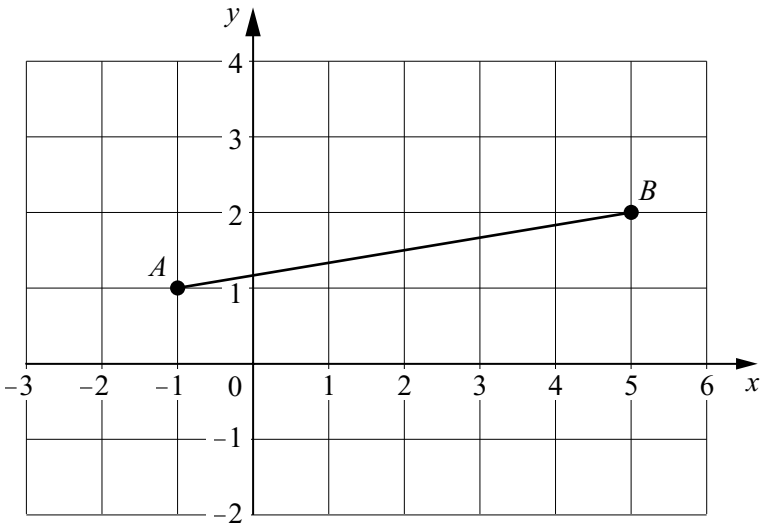
8 Complete this table of squares and cubes.
The numbers are not in sequence.

Number	Square	Cube
3	9	27
.....	121	.....
.....	.....	2744
.....	.....	−343

[3]

[Turn over

9



(a) Find the gradient of the line AB.

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

(b) Calculate the angle that AB makes with the x-axis.

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

---

10 Work out as a single fraction

$$\frac{2}{x-3} - \frac{1}{x+4}.$$

Answer ..... [3]

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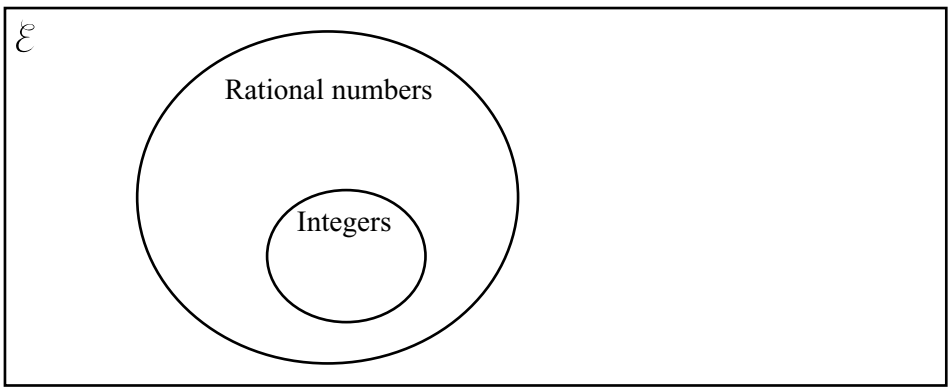
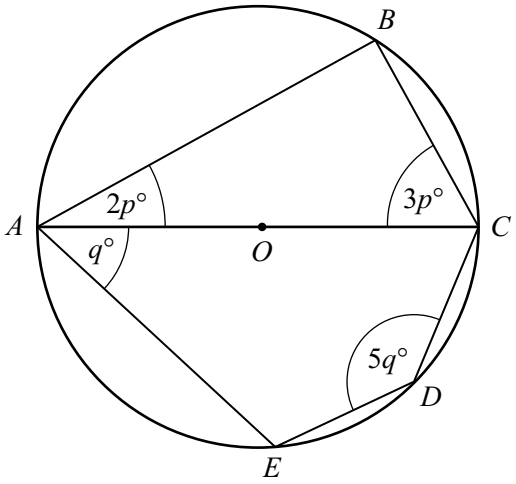
11 Write each of these four numbers in the correct place in the Venn Diagram below.

$$2.6, \quad \frac{4}{17}, \quad \sqrt{12}, \quad \sqrt{\frac{112}{7}}$$



[4]

12



NOT TO SCALE

A, B, C, D and E lie on a circle, centre O. AOC is a diameter.
Find the value of

(a) p,

Answer (a) $p =$ ..... [2]

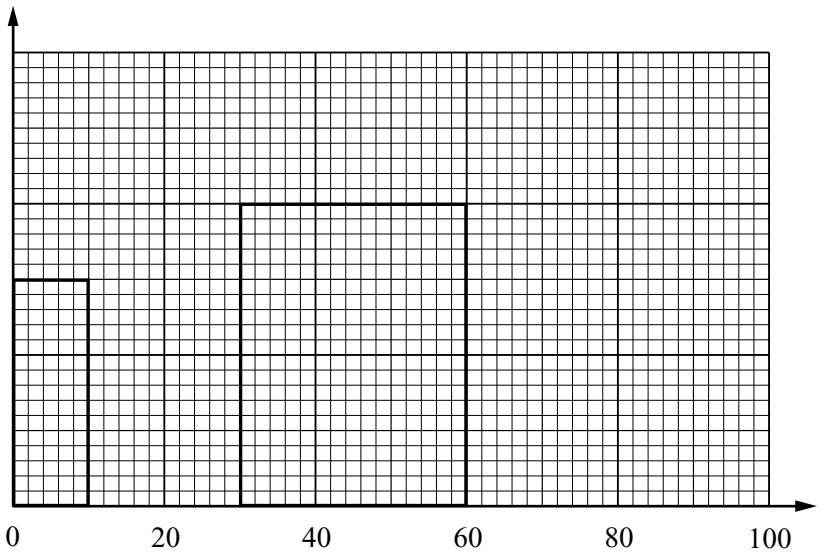
(b) q.

Answer (b) $q =$ ..... [2]

[Turn over

13 A doctor's patients are grouped by age, as shown in the table and the histogram below.

Age (x years)	$0 \leqslant x < 10$	$10 \leqslant x < 30$	$30 \leqslant x < 60$	$60 \leqslant x < 100$
Number of patients	300	600		880



(a) Complete the following:

1 cm^2 represents ..... patients. [1]

(b) Use the histogram to fill in the blank in the table. [1]

(c) Draw the missing two rectangles to complete the histogram. [2]

---

14 **(a)** Multiply $\begin{pmatrix} 5 & 4 \\ -3 & -2 \end{pmatrix}\begin{pmatrix} 2 & 1 & -4 \\ 0 & 3 & 6 \end{pmatrix}$.

Answer (a) $\begin{pmatrix} & & \end{pmatrix}$ [2]

(b) Find the inverse of $\begin{pmatrix} 5 & 4 \\ -3 & -2 \end{pmatrix}$.

Answer (b) $\begin{pmatrix} & \end{pmatrix}$ [2]

---

15 In 1950, the population of Switzerland was 4 714 900.
In 2000, the population was 7 087 000.

(a) Work out the percentage increase in the population from 1950 to 2000.

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

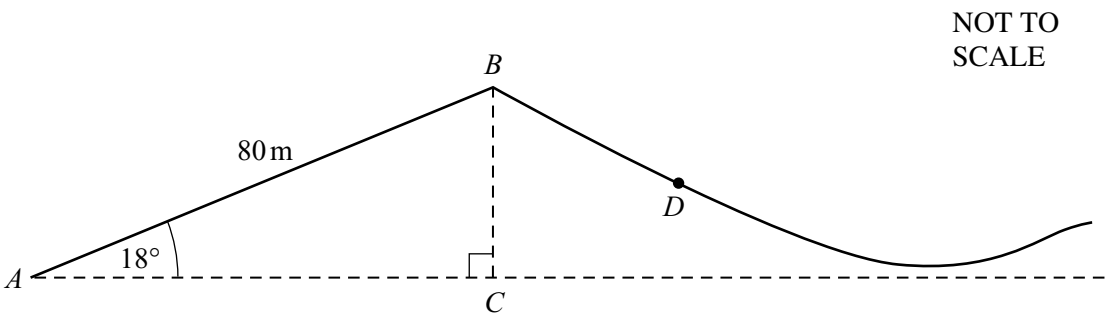
(b) **(i)** Write the 1950 population correct to 3 significant figures.

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

(ii) Write the 2000 population in standard form.

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

16



The diagram shows the start of a roller-coaster ride at a fairground.
A car rises from A to B along a straight track.

(a) $AB = 80$ metres and angle $BAC = 18°$.
Calculate the vertical height of B above A.

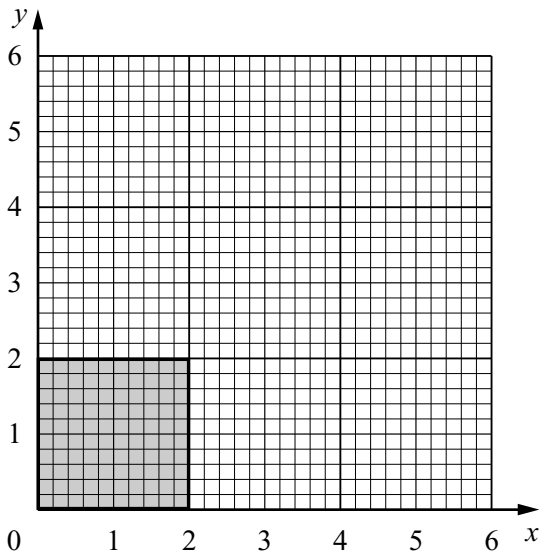
Answer (a)..... m [2]

(b) The car runs down the slope from B to D, a distance of s metres.
Use the formula $s = t(p + qt)$ to find the value of s, given that $p = 4$, $t = 3$ and $q = 3.8$.

Answer (b) $s =$ ..... [2]

[Turn over

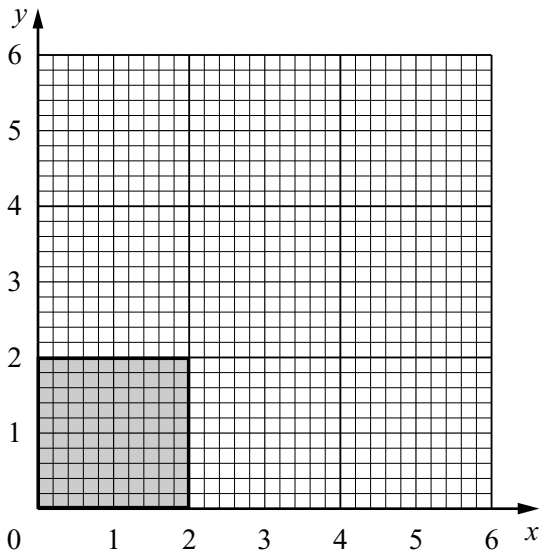
17 **(a)**



Draw the shear of the shaded square with the x-axis invariant and the point $(0, 2)$ mapping onto the point $(3, 2)$.

[2]

(b)



(i) Draw the one-way stretch of the shaded square with the x-axis invariant and the point $(0, 2)$ mapping onto the point $(0, 6)$.

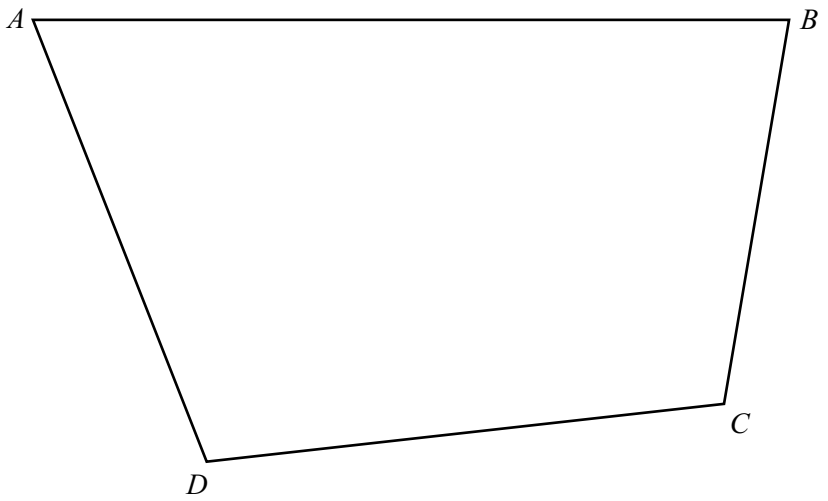
[2]

(ii) Write down the matrix of this stretch.

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

For Examiner's use

18 The diagram is a scale drawing of a field. The actual length of the side *AB* is 100 metres.



(a) Write the scale of the drawing in the form 1 : *n*, where *n* is an integer.

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

(b) In this part use a straight edge and compasses only. Leave in your construction lines.

(i) A tree in the field is equidistant from the point *A* and the point *D*. Construct the line on which the tree stands. [2]

(ii) The tree is also equidistant from the sides *BC* and *CD*. After constructing another line, mark the position of the tree and label it *T*. [3]

For Examiner's use

19 A ferry has a deck area of 3600 m^2 for parking cars and trucks.
Each car takes up 20 m^2 of deck area and each truck takes up 80 m^2.
On one trip, the ferry carries x cars and y trucks.

(a) Show that this information leads to the inequality $x + 4y \leqslant 180$.

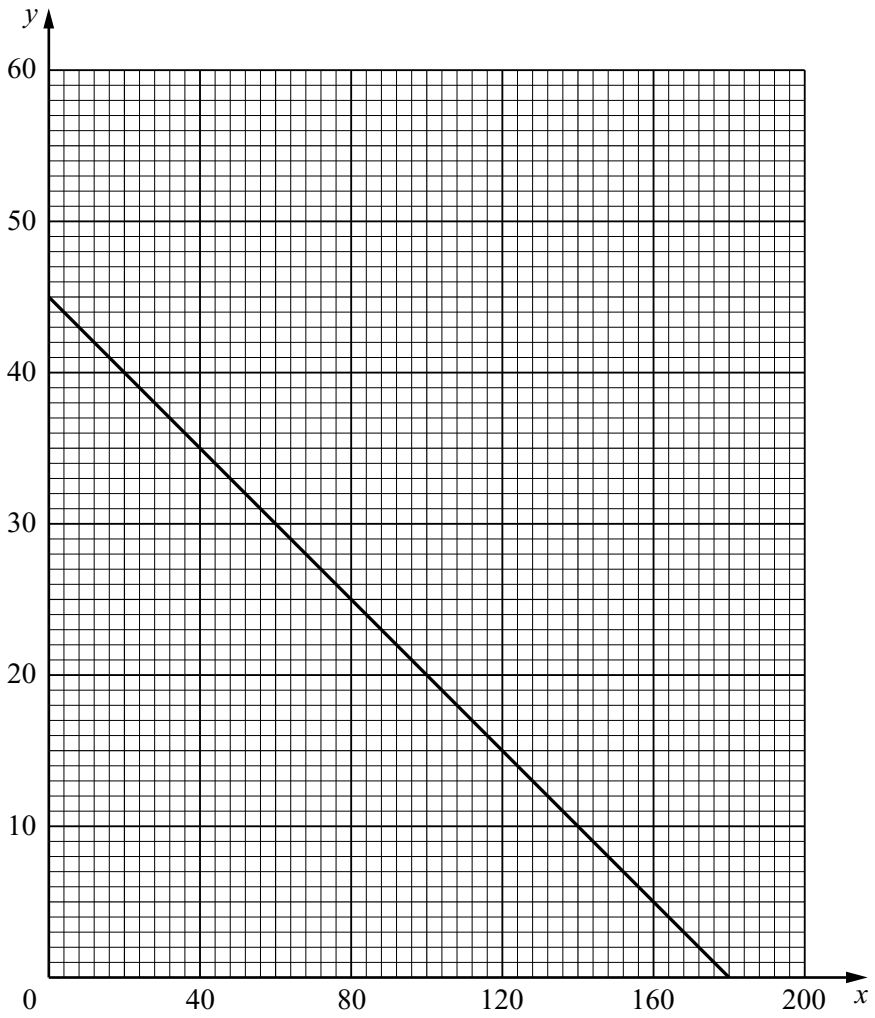
[2]

(b) The charge for the trip is \$25 for a car and \$50 for a truck.
The total amount of money taken is \$3000.
Write down an equation to represent this information and simplify it.

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

(c) The line $x + 4y = 180$ is drawn on the grid below.

(i) Draw, on the grid, the graph of your equation in part **(b)**.



[1]

(ii) Write down a possible number of cars and a possible number of trucks on the trip, which together satisfy both conditions.

Answer (c)(ii) ..... cars,..... trucks [1]

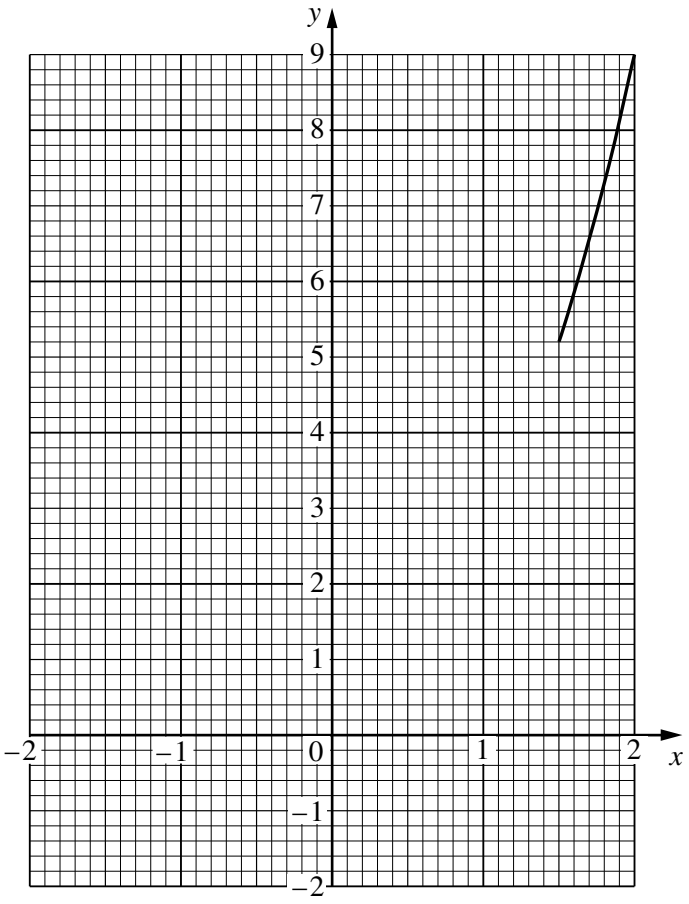
[Turn over

20 **(a)** Complete the table of values for $y = 3^x$.

x	−2	−1.5	−1	−0.5	0	0.5	1	1.5	2
y		0.2						5.2	9

[3]

(b) Use your table to complete the graph of $y = 3^x$ for $-2 \leqslant x \leqslant 2$.



[2]

(c) Use the graph to find the solution of the equation

$$3^x = 6.$$

Answer (c) $x =$ ..... [1]