Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/03
0581/03

Paper 3

October/November 2003

2 hours

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
                         Geometrical 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 pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

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.

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. Answers in degrees should be given 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.

University *of* Cambridge
Local Examinations Syndicate

[Turn over

1   20   21   22   23   24   25   26   27   28   29   30

From the set of numbers above, write down

(a) a multiple of 8,

Answer (a).. [1]

(b) a square,

Answer (b).. [1]

(c) a cube,

Answer (c).. [1]

(d) two prime numbers,

Answer (d) .... [2]

(e) a factor of 156,

Answer (e).. [1]

(f) the square root of 784,

Answer (f) ....[1]

(g) two numbers whose product is 567.

Answer (g) ....[1]

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2   **(a)** Jorina recorded the temperature every hour during the school day.
The graph shows the results.
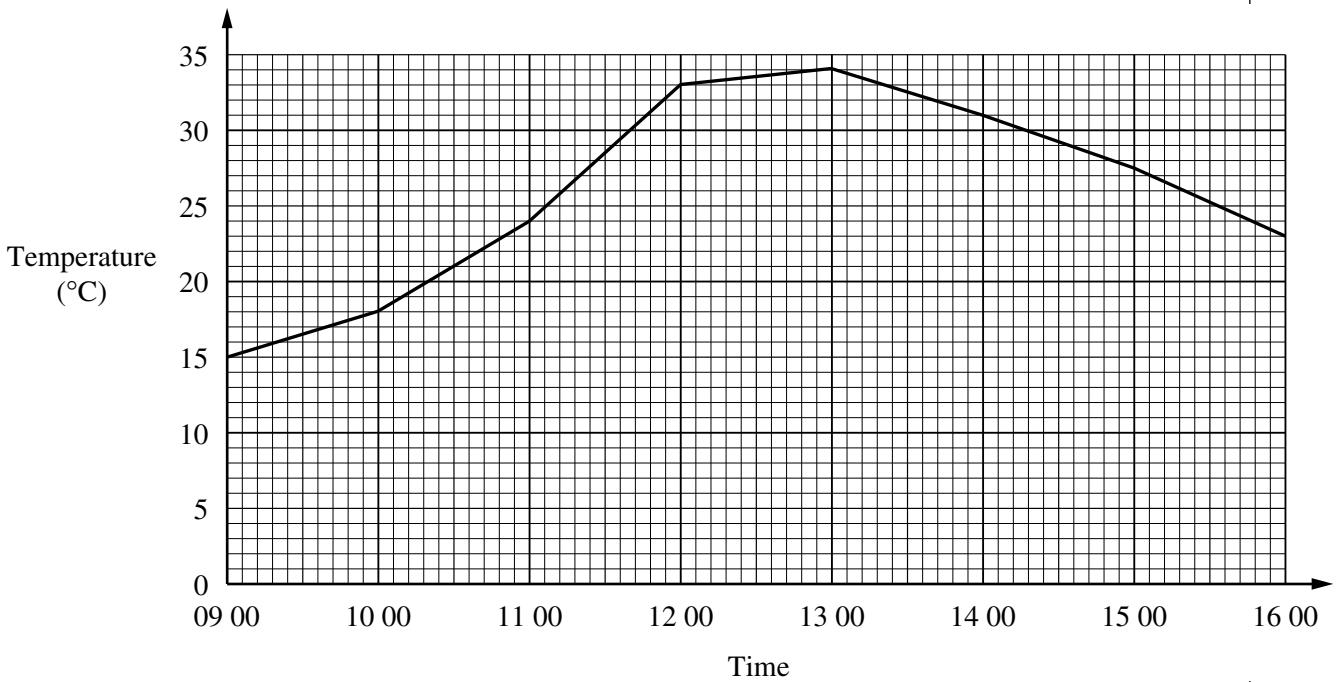
(i) At what time was the highest temperature recorded?

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

(ii) At what time was the temperature 21 °C?

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

(iii) Find the increase in temperature between 11 00 and 12 00.

Answer (a)(iii) .... °C [2]

(b) The conversion rate between euros (€) and dollars ($) was €1 = $0.87.

(i) Complete the table.

€	0	5	10
$	0		

[2]

(ii) Draw a graph on the grid below to convert between euros and dollars.

dollars ($)
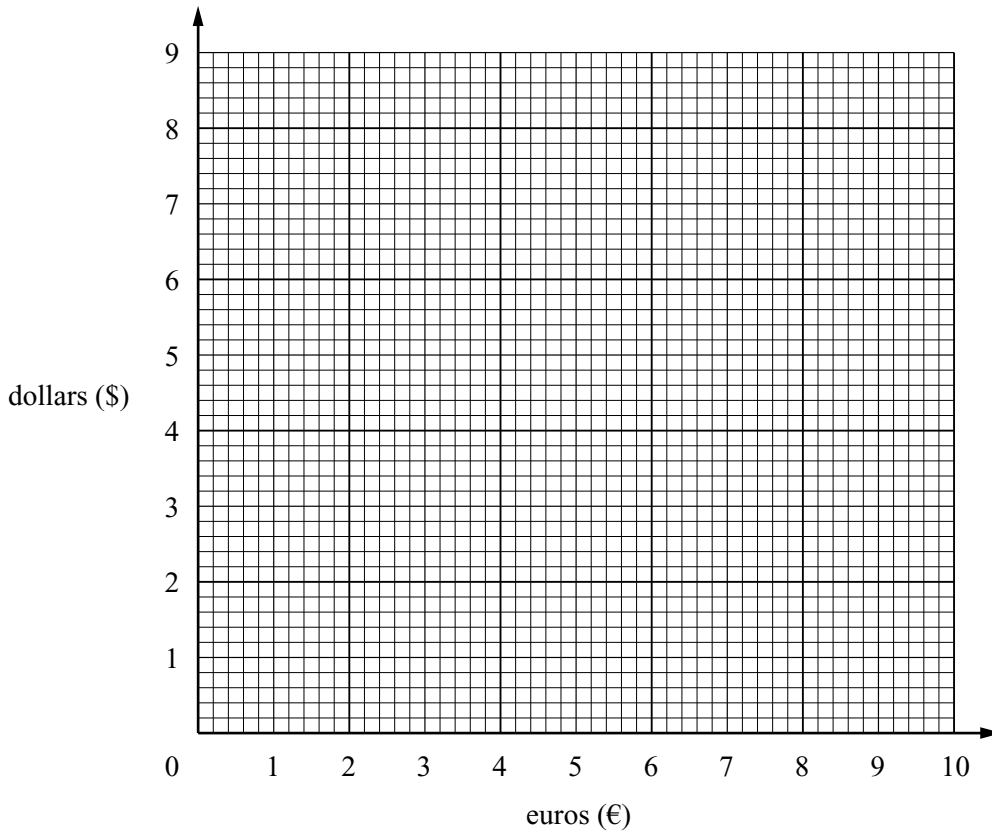
euros (€)

[2]

(iii) How many euros were equivalent to $8?

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

(iv) How many euros were equivalent to $500?

Answer (b)(iv) €................................ [1]
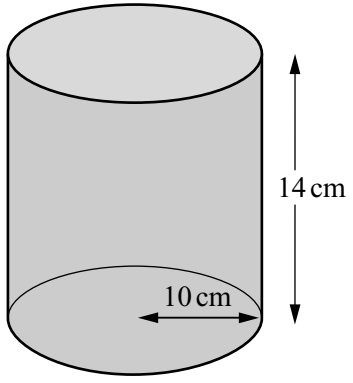
[Turn over

3

NOT TO
SCALE

8 cm
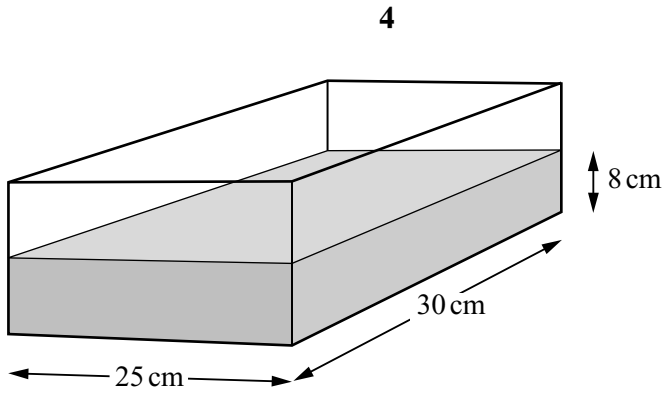
30 cm

25 cm

The diagram shows a rectangular tank of base 30 cm by 25 cm. It contains water to a depth of 8 cm.

(a) Calculate the volume of water in the tank.

Answer (a) ....cm³ [2]

(b)

NOT TO
SCALE

14 cm

10 cm

The diagram shows a cylinder of radius 10 cm and height 14 cm which is full of water.

(i) Calculate the volume of water in the cylinder.

Answer (b)(i) .... cm³ [3]

(ii) All the water in the cylinder is poured into the rectangular tank. Find the total volume of water now in the tank.

Answer (b)(ii) .... cm³ [1]

(iii) Calculate the new depth of water in the tank.

Answer (b)(iii)............................. cm [3]

4 A dentist recorded the number of fillings that each of a group of 30 children had in their teeth. The results were

$$2 \quad 4 \quad 0 \quad 5 \quad 1 \quad 1 \quad 3 \quad 2 \quad 6 \quad 0$$

$$2 \quad 2 \quad 3 \quad 2 \quad 1 \quad 4 \quad 3 \quad 0 \quad 1 \quad 6$$

$$1 \quad 4 \quad 1 \quad 6 \quad 5 \quad 1 \quad 0 \quad 3 \quad 4 \quad 2$$

(a) Complete this frequency table.

Number of fillings	Frequency
0	
1	
2	
3	
4	
5	
6	

[2]

(b) What is the modal number of fillings?

Answer (b)... [1]

(c) Find the median number of fillings.

Answer (c)... [2]

(d) Work out the mean number of fillings.

Answer (d) .... [2]

(e) One of these children is chosen at random.
Find the probability that this child has
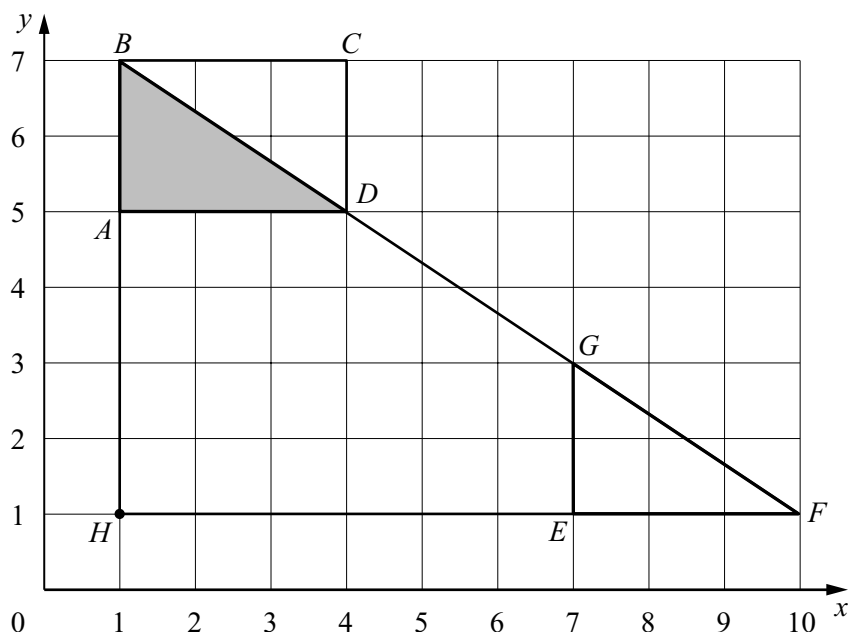
(i) exactly one filling,

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

(ii) more than three fillings.

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

(f) These 30 children had been chosen from a larger group of 300 children. Estimate how many in the larger group have no fillings in their teeth.

Answer (f) .... [1]

[Turn over

5

(a) Triangle *ABD* is translated onto triangle *EGF* by the vector $\begin{pmatrix} x \\ y \end{pmatrix}$.

Write down the value of *x* and the value of *y*.

Answer (a) *x* =.................................

y =................................. [2]

(b) Describe **fully** the single transformation which maps triangle *ABD* onto

(i) triangle *CDB*,

Answer (b)(i)...

.... [3]

(ii) triangle *HBF*.

Answer (b)(ii) ....

.... [3]

(c) (i) Work out the area of triangle *ABD*.

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

(ii) What is the ratio   area of triangle *ABD* : area of triangle *HBF*?
Give your answer in its lowest terms.

Answer (c)(ii)................. : .... [2]

(d) Find the gradient of the line *BF*.

Answer (d) .... [2]

6 **(a)** The perimeter, *P*, of a triangle is given by the formula

$$P = 6x + 3.$$

(i) Find the value of *P* when *x* = 4.

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

(ii) Find the value of *x* when *P* = 39.

Answer (a)(ii) *x* =.............................. [2]

(iii) Rearrange the formula to find *x* in terms of *P*.

Answer (a)(iii) *x* =.............................. [2]

(b) The perimeter of another triangle is (9*x* + 4) centimetres.

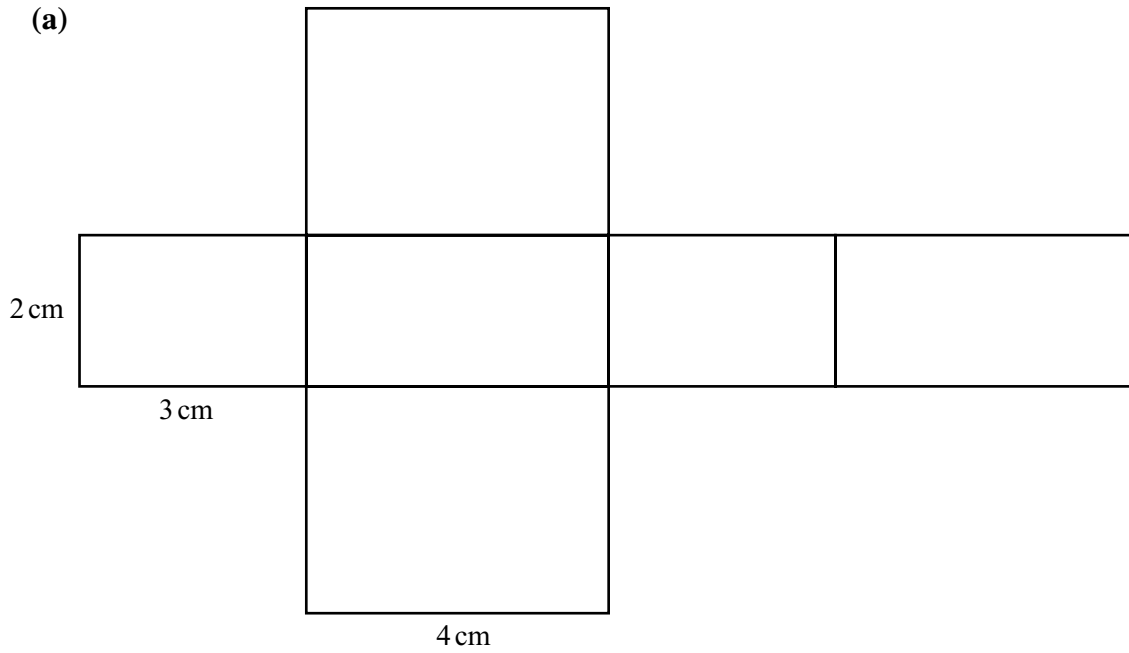Two sides of this triangle are of length 2*x* centimetres and (3*x* + 1) centimetres.

(i) Find an expression, in terms of *x*, for the length of the third side.

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

(ii) The **perimeter** of this triangle is 49 cm. Find the length of each side.

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

[Turn over

7 **(a)**

2 cm

3 cm

4 cm

The diagram shows the net of a solid.

(i) Work out the perimeter of the net.

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

(ii) Work out the area of the net.

Answer (a)(ii) ....cm^2 [3]

(iii) Write down the mathematical name of the solid.

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

(iv) Write down the surface area of the solid.

Answer (a)(iv) ....cm^2 [1]

(v) Work out the volume of the solid.

Answer (a)(v) ....cm^3 [2]

(b)
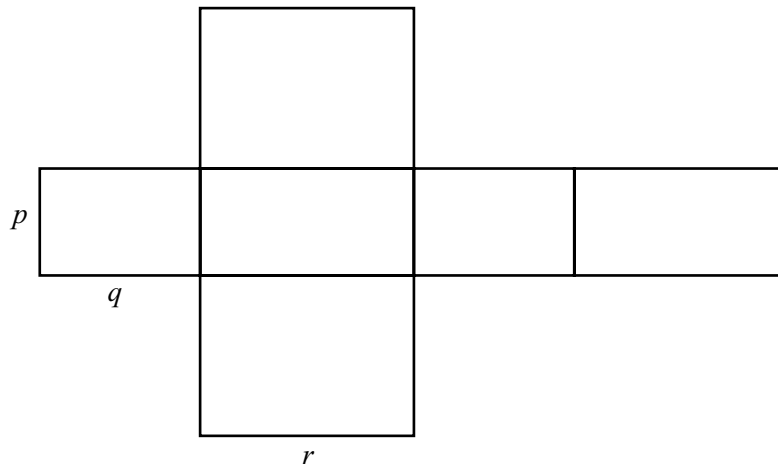
This is the net of a solid with edges of length *p*, *q* and *r*.

Find an expression for

(i) the surface area of the solid,

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

(ii) the volume of the solid.

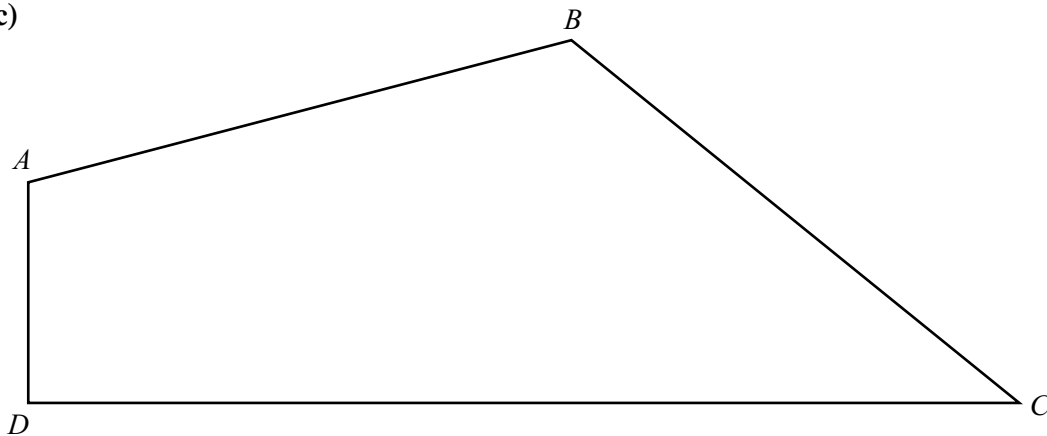*Answer (b)*(ii)................................... [2]

[Turn over

8 **(a)** A mobile phone company changes its rental charge from $80 per **year** to $7.50 per **month**.
Work out the percentage increase.

Answer (a) .... % [3]

(b) George's phone card lasts for 300 minutes. He has used $\frac{3}{5}$ of this time.
Work out how many minutes are left on his phone card.

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

(c)

(i) On the diagram above, using a straight edge and compasses only, construct the loci which are

(1) equidistant from *A* and from *B*, [2]
(2) equidistant from *CB* and from *CD*. [2]

(ii) The diagram shows a field *ABCD*. The mobile phone company plans to put a mast in the field. The mast must be

● nearer to *B* than to *A*
● nearer to *CD* than to *CB*.

Shade the part of the diagram which shows where the mast should be put. [2]

9
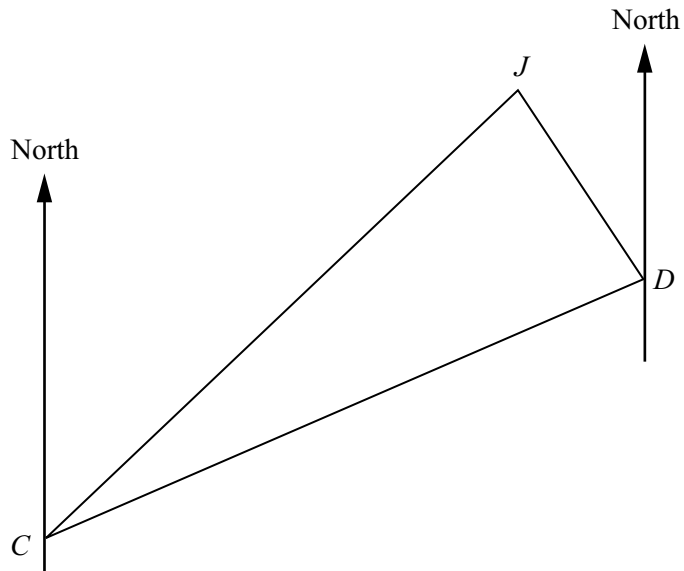
The diagram, drawn to scale, shows the positions of Johannesburg (*J*), Cape Town (*C*) and Durban (*D*).

(a) The distance from Johannesburg to Durban is 450 kilometres.
On the diagram *JD* = 3 cm.

  (i) How many kilometres are represented by 1 cm on the diagram?

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

  (ii) Work out the scale of the diagram as a ratio.

Answer (a)(ii) 1 :   .... [2]

(b) Use the diagram to find

  (i) the distance from Cape Town to Johannesburg,

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

  (ii) the bearing of Johannesburg from Cape Town,

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

  (iii) the bearing of Cape Town from Durban.

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

[Turn over

10 Look at this arrangement of numbers. It is known as Pascal's Triangle.

Line									Sum of numbers
1				1	1				2
2			1	2	1				4
3		1	3	3	1				8
4	1	4	6	4	1				16
5	1	5	10	10	5	1			32
6	__	__	__	__	__	__	__		__
7	__	__	__	__	__	__	__	__	__

(a) Complete lines 6 and 7 above. [5]

(b) (i) What is the sum of the numbers on the 9th line?

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

(ii) What is the sum of the numbers on the nth line?

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

(c) The 12th line is given below. Fill in the blanks in the 11th line.

11   1   11   55   __   __   __   __   __   __   __   __   __

12   1   12   66   220   495   792   924   792   495   220   66   12   1

[2]