CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

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

OCTOBER/NOVEMBER SESSION 2002

PAPER 3   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, the answer should be given 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

UNIVERSITY *of* CAMBRIDGE
Local Examinations Syndicate

This question paper consists of 12 printed pages.

[Turn over

1 **(a)** A bottle of mass 480 grams contains 75 centilitres of water.

   (i) Write 75 centilitres in millilitres.

Answer (a)(i) ……………..……… m*l* [1]

   (ii) Write 75 centilitres in litres.

Answer (a)(ii) ……………………… *l* [1]

   (iii) The mass of 480 grams is correct to the nearest 10 grams.
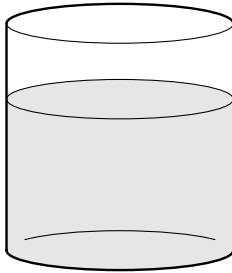
   Complete the statement on the answer line.

Answer (a)(iii) ………… g $\leqslant$ mass < ………… g [2]

   (iv) Write 480 grams in kilograms.

Answer (a)(iv) …………………… kg [1]

(b) The diagrams below are accurate scale drawings of containers with water in them.
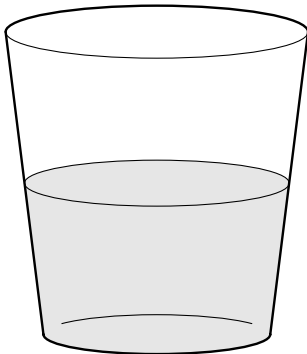
   (i) The capacity of this cylindrical jar is 600 ml of water.

   By measuring the height of the jar and the height of the water, find the amount of water in the jar.

Answer (b)(i) ……………….…… m*l* [2]

   (ii) The capacity of this bucket is 7 litres.

   Estimate the amount of water in the bucket.
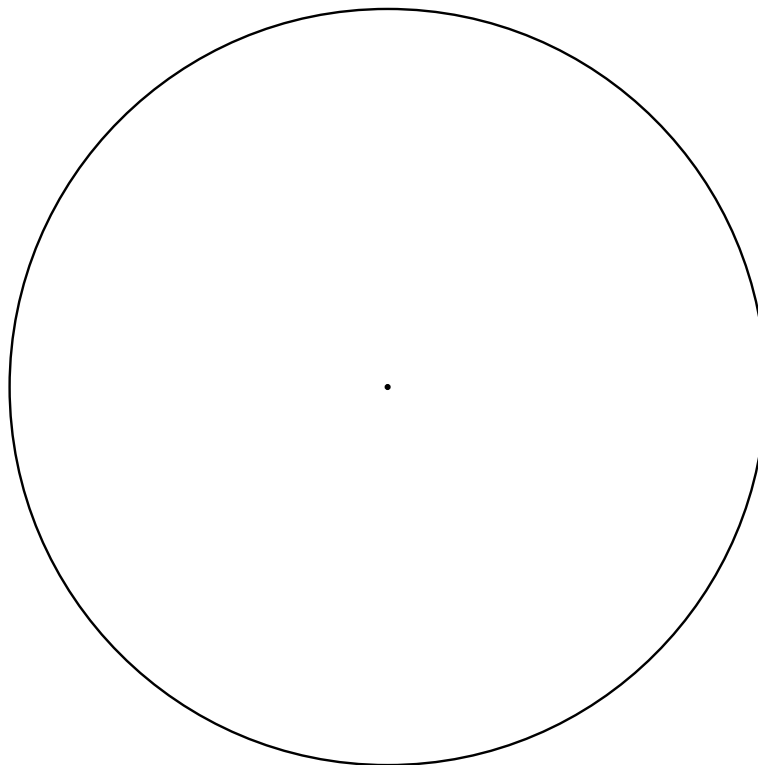
Answer (b)(ii) ……………………… *l* [2]

2 **(a)** The results of the school's senior football team during a year are recorded, using W for a win, L for a loss and D for a draw. They are:

L	L	W	D	L	W	L	W
L	L	D	L	L	W	W	L
W	L	L	W	D	L	L	W

(i) Complete the table below to show these results.

Then display this information in the pie chart below.

	Frequency	Pie chart angle
W		
L		
D		
TOTAL		360°

[6]

(ii) The team play another match.

Based on the results above, what is the probability that they will win?
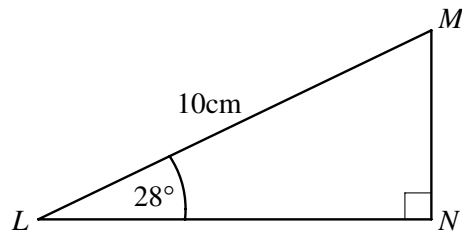
Answer (a)(ii) .... [1]

(b) The probability that the school's junior team wins is 0.45 and the probability that it loses is 0.35. What is the probability of a draw?

Answer (b) .... [2]

[Turn over

3

NOT TO SCALE

In triangle *LMN*, angle *LNM* = 90°, angle *MLN* = 28° and *LM* = 10 cm.

(a) Calculate

(i) *MN*,

Answer (a)(i) MN = ……………………. cm [2]

(ii) *LN*,

Answer (a)(ii) LN = ……………………. cm [2]

(iii) the area of triangle *LMN*.

Answer (a)(iii) ………...……………… cm² [2]

(b) A circle is drawn with *LM* as diameter.

(i) Work out the area of the circle.

Answer (b)(i) …………………………. cm² [2]

(ii) **Showing all your working**, find the area of triangle *LMN* as a percentage of the area of the circle.

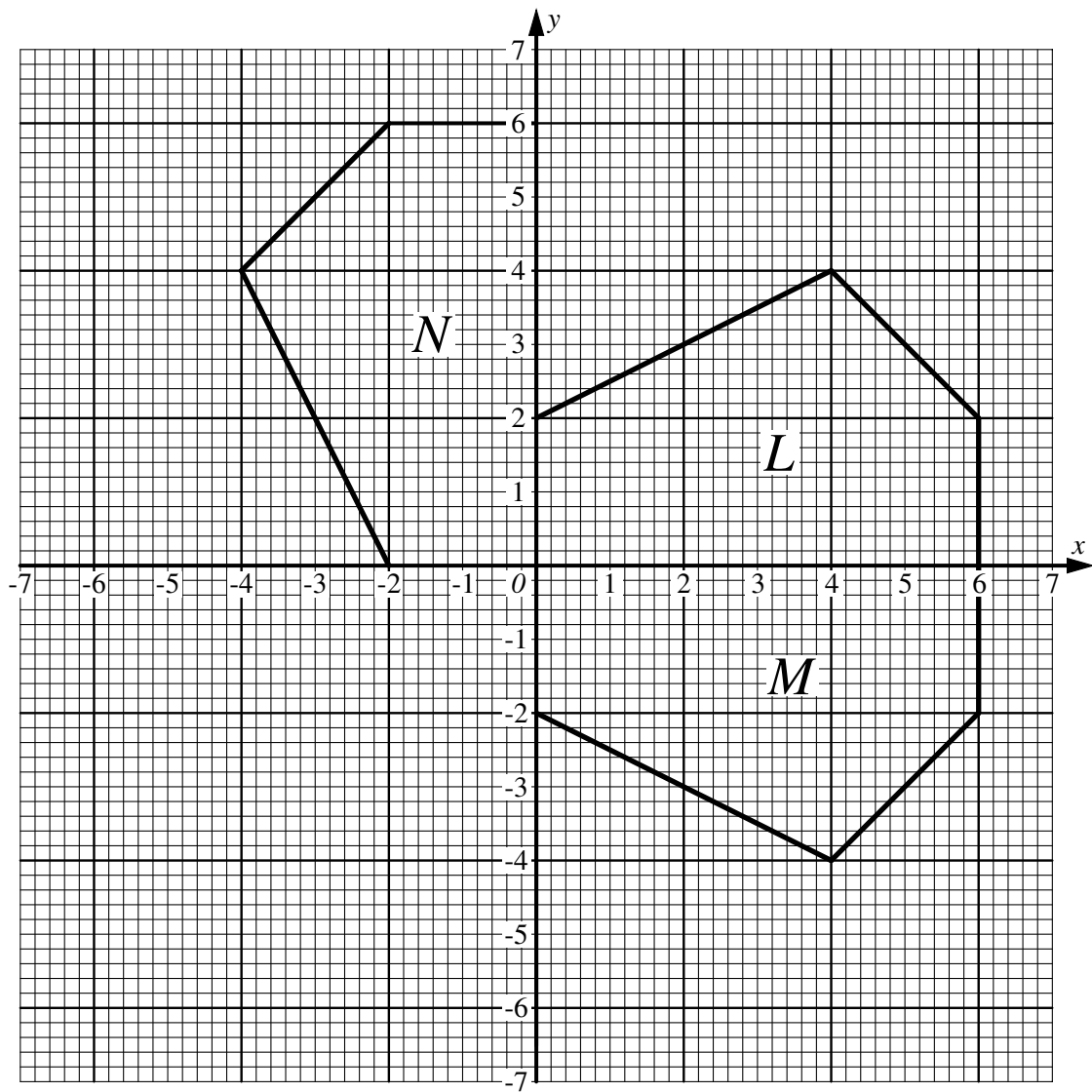*Answer (b)(ii)* …………………………... % [2]

(iii) Explain why the point *N* is on the circle.

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

4

(a) Describe fully the transformation which maps

    (i) shape *L* onto shape *M*,

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

    (ii) shape *L* onto shape *N*.

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

(b)   **(i)** Translate shape *L* using the vector $\begin{pmatrix} -7 \\ -4 \end{pmatrix}$.   [2]

    (ii) Enlarge shape *L* with centre of enlargement *0*, scale factor $\frac{1}{2}$.   [2]

         [Turn over

5 The cuboid shown in the diagram has *EF* = 4 cm, *FG* = 6 cm and *AE* = 3 cm.

NOT TO SCALE

3cm

4cm

6cm
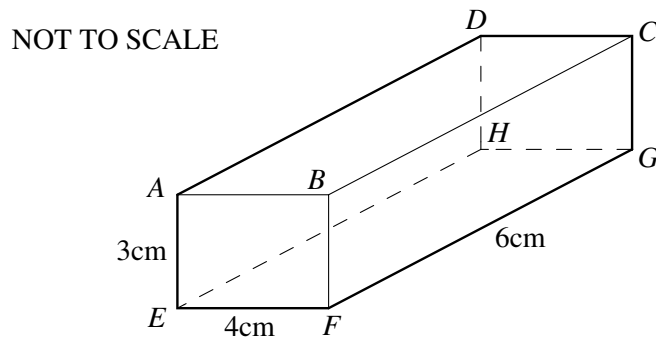
(a) Calculate

   (i) the volume of the cuboid,

   Answer (a)(i) …………………… cm^3 [2]

   (ii) the surface area of the cuboid.

   Answer (a)(ii) …………………… cm^2 [3]

(b) The cuboid is divided into two equal triangular prisms. One of them is shown in the diagram.

NOT TO SCALE
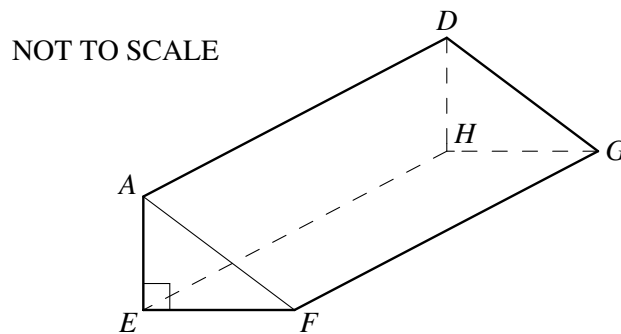
   (i) Write down the volume of the triangular prism.

   Answer (b)(i) …………………… cm^3 [1]

   (ii) Work out the area of the rectangle *AFGD*.

   Answer (b)(ii) …………………… cm^2 [3]

6   Ian and Joe start to dig a garden. They both dig at the same rate.

   (a)   When they are half-way through the job, what fraction of the garden has Ian dug?

Answer (a) ………….………… [2]

   (b)   Keith then arrives to help.
          All three dig at the same rate until the job is finished.

      (i)   What fraction of the garden did Ian dig after Keith arrived?

Answer (b)(i) …….…………… [2]

      (ii)   What fraction of the garden did Ian dig altogether?

Answer (b)(ii) …….…………… [2]
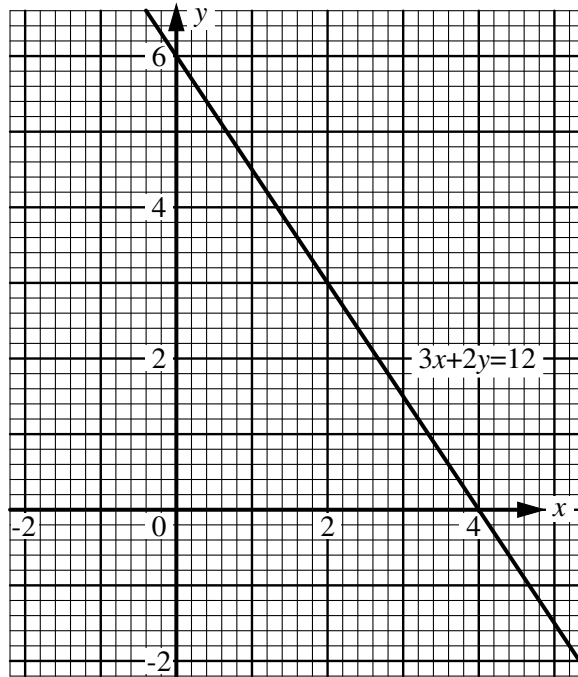
   (c)   Ian and Joe started to dig at 09 00.
          Keith started to dig at 10 00.
          Each dug at the same rate throughout.
          At what time was the job finished?

Answer (c) ….……………… [2]

[Turn over

7

The graph of $3x + 2y = 12$ is drawn on the grid above.

(a) **(i)** Complete the table of values for $y = 3x - 1$.

x	0	1	2
y		2	

[2]

(ii) On the grid above, draw the graph of $y = 3x - 1$ for $0 \leqslant x \leqslant 2$. [1]

(b) Use the graphs to find the solution of the simultaneous equations

$$3x + 2y = 12,$$
$$y = 3x - 1.$$

Answer (b) x = ………… *,   y =* ………… [2]

(c) Use algebra to find the **exact** solution of the simultaneous equations

$$3x + 2y = 12,$$
$$y = 3x - 1.$$

Answer (c) x …………, *y =* ………… [4]

8 ↑ North   Scale: 1cm to 30km
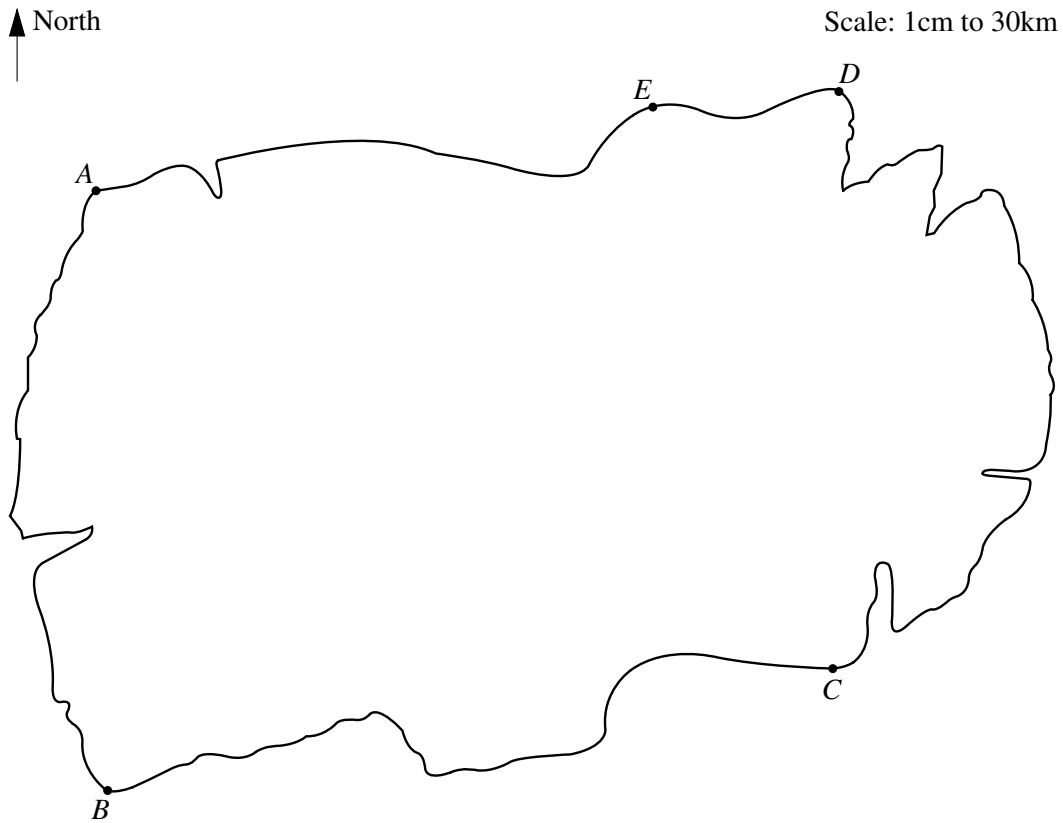
The diagram shows an island, drawn to a scale of 1cm to 30km.

(a) Find the distance in kilometres between points *A* and *B*.

Answer (a) AB = …………………… km [2]

(b) On the diagram draw the locus of points on the island which are

    (i)   150 km from *A*,   [1]

    (ii) 150 km from *B*.   [1]

Label the point *T* on the island where these two loci intersect.   [1]

(c) A tower is built at *T*, to send television signals to the western part of the island. The maximum range of its signals is 150 km.

Draw the locus of points 150 km from *T*.   [1]

(d) A second tower is built, which can send television signals up to 120 km, to reach the rest of the island.

Use the points *C*, *D* and *E* to help you to find a suitable position for the second tower.

Label the position *X*.

Leave in any construction lines or arcs that you draw.   [3]

0580/3/O/N02   **[Turn over**

9 Students try to find the best price at which to sell their school newspaper.

When the price was 10 cents, they sold 200 newspapers.

When the price was 60 cents, they sold only 75 newspapers.

They drew the graph below using this information.

(a) Use the graph to answer these questions.

   (i) At what price will no-one buy the newspaper?

<div align="right">

Answer (a)(i) …………………… cents [1]
</div>

  (ii) 150 newspapers are sold. What was the price?

<div align="right">

Answer (a)(ii) …………………… cents [1]
</div>

 (iii) Complete the table below.

Price (cents)	Number of newspapers sold	Money received (cents)
10	200	2000
20	175	3500
30		
40		
50		
60	75	4500
70		
80		
90		

<div align="right">

[6]
</div>

(b) Use the table in part **(a)(iii)** to answer these questions.

The total printing cost is $20.

(i) When the newspapers are sold at 20 cents each, calculate the profit in dollars.

Answer (b)(i) $ …………….………… [2]

(ii) Estimate the price that will give the greatest profit.

Answer (b)(ii) ……………....………… [1]

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10 A number that has only two different prime factors is called semi-prime.

For example, 77 is semi-prime since it has only two prime factors, 7 and 11.

[Remember that 1 is not prime.]

(a) Show that each of the three consecutive numbers 33, 34 and 35 is semi-prime.

Answer (a) ....

....

.... [3]

(b) Find the smallest semi-prime number.
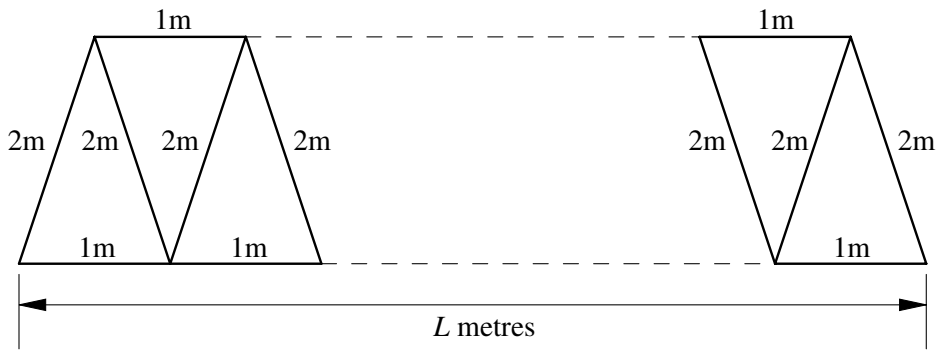
Answer (b) ……………………………… [2]

(c) Find two consecutive numbers between 10 and 20 which are semi-prime.

Answer (c) …………… and …………… [1]

(d) Find three consecutive numbers between 80 and 90 which are semi-prime.

Answer (d) …………… , …………… and …………… [3]

[Turn over

11

The diagram shows wooden beams which support the roof of a house.

(a) Complete the table below.

Length of roof (L metres)	1	2	3	4	5	6
Number of 2 metre beams (x)	2	4			10	
Number of 1 metre beams (y)	1	3			9	
Total length of wood (T metres)	5	11			29	

[4]

(b) When $L = 10$, find the values of x, y and T.

Answer (b) x = ……………………………

y = ……………………………

T = ……………………………
[3]

(c) Write down a formula for

　　(i) x in terms of L,

Answer (c)(i) x = ………………………[1]

　　(ii) y in terms of L,

Answer (c)(ii) y = …..………………… [1]

　　(iii) T in terms of L.

Answer (c)(iii) T = ……………………[2]

(d) When $T = 83$, find the value of L.

Answer (d) L = ……..………………… [1]