CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/03
0581/03

Paper 3

May/June 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 soft 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. 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.

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Local Examinations Syndicate

[Turn over

1 Fifty students take part in a quiz.
The table shows the results.

Number of correct answers	5	6	7	8	9	10	11	12
Number of students	4	7	8	7	10	6	5	3

(a) How many students had 6 correct answers?

Answer(a)………………..……… [1]

(b) How many students had less than 11 correct answers?

Answer(b)………………….....… [1]

(c) Find

(i) the modal number of correct answers,

Answer(c)(i)……………………. [1]

(ii) the median number of correct answers,

Answer(c)(ii)……………...…….. [2]

(iii) the mean number of correct answers.

Answer(c)(iii)……….…………... [3]

(d) A bar chart is drawn to show the results.
The height of the bar for the number of students who had 5 correct answers is 2 cm.
What is the height of the bar for the number of students who had 9 correct answers?

Answer(d)……….………...…cm [2]

(e) A pie chart is drawn to show the results.
What is the angle for the number of students who had 11 correct answers?

Answer(e)……………………… [2]

(f) The students who had the most correct answers shared a top prize of $22.50.
How much did each of these students receive?

Answer(f) $…………………….. [2]

(g) Work out the percentage of students who had **less than** 7 correct answers.

Answer(g)……………….……% [2]

(h) A student is chosen at random from the fifty students.
What is the probability that this student had

    (i) exactly 10 correct answers,

Answer(h)(i)…………………… [1]

    (ii) at least 10 correct answers,

Answer(h)(ii)…………………… [1]

    (iii) more than 1 correct answer?

Answer(h)(iii)………………….. [1]

2 **(a)** Complete the table for the equation $y = \dfrac{120}{x}$.

x	1	1.5	2	3	4	5	6
y		80	60	40	30		

[3]

(b) On the grid below, draw the curve $y = \dfrac{120}{x}$ for $1 \leqslant x \leqslant 6$.
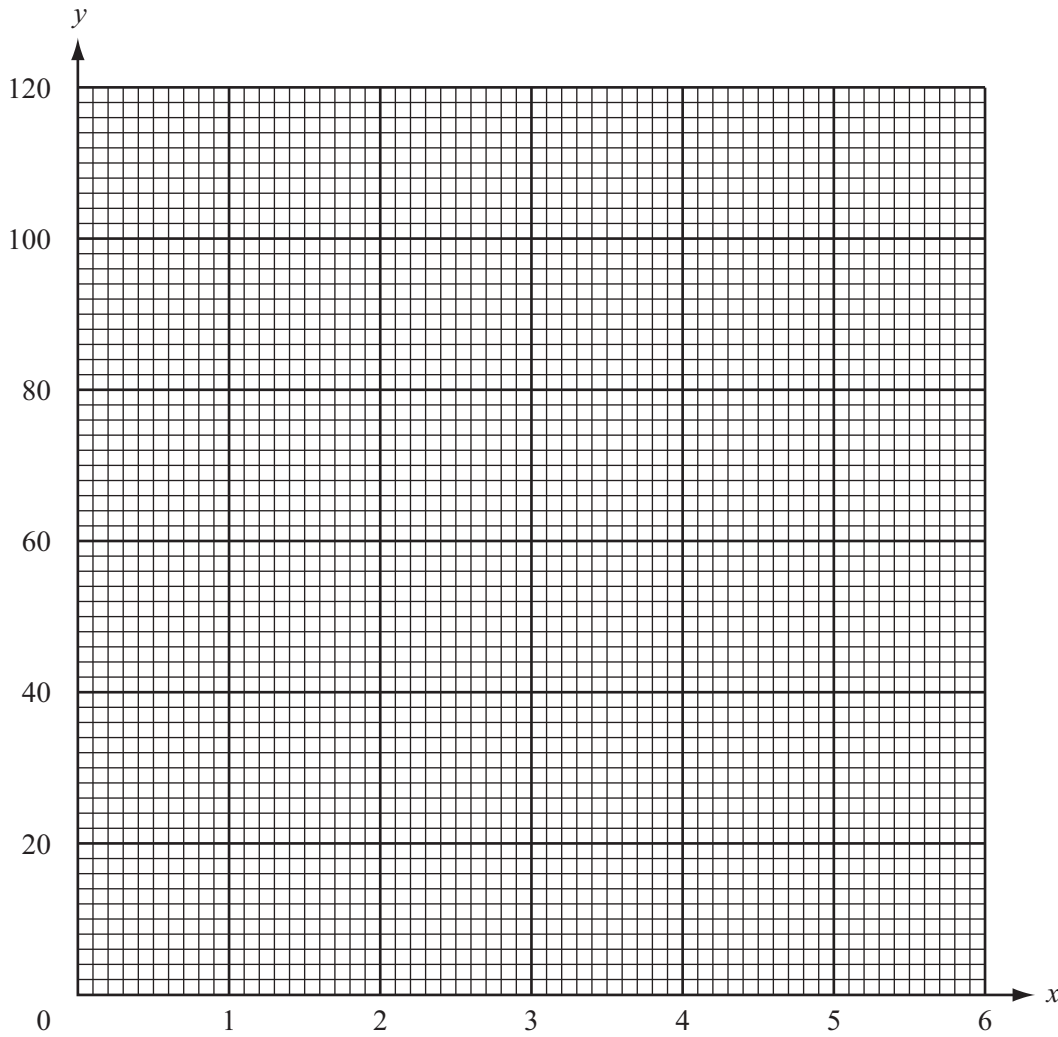
[4]

(c) Use your graph to find x when $y = 70$.

Answer(c) x = …………………. [1]

(d) Complete the table for the equation $y = 120 - 20x$.

x	0	2	4	6
y		80	40	

[2]

(e) On the same grid above, draw the graph of $y = 120 - 20x$ for $0 \leqslant x \leqslant 6$. [2]

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For Examiner's Use

(f) The graphs of $y = \dfrac{120}{x}$ and $y = 120 - 20x$ intersect at two points.

Write down the coordinates of these two points.

Answer(f) (…..… , …..…) and (…..… , …..…) [2]

(g) Write down the gradient of the line $y = 120 - 20x$.

Answer(g)……………………… [2]

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[Turn over

3 **(a)** Bottles of water cost 25 cents each.

   (i) Find the cost of 7 bottles in cents.

Answer(a)(i)……………...cents   [1]

   (ii) Write down an expression in *b* for the cost of *b* bottles in cents.

Answer(a)(ii)……………...cents   [1]

   (iii) Change your answer to **part (i)** into dollars.

Answer(a)(iii) $…..……………   [1]

   (iv) Write down an expression in *b* for the cost of *b* bottles in dollars.

Answer(a)(iv) $…………………   [1]

(b) The total cost, *T*, of *n* bars of chocolate is given by $T = nc$.

   (i) Write *c* in terms of *T* and *n*.

Answer(b)(i) *c* = …………………   [1]

   (ii) What does *c* represent?

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

(c) The average cost of a book is $*A*.

   (i) The total cost of 8 books is $36.
   Find the value of *A*.

Answer(c)(i) *A* = ………………   [1]

   (ii) One of the 8 books is removed.
   The cost of this book is $6.60.
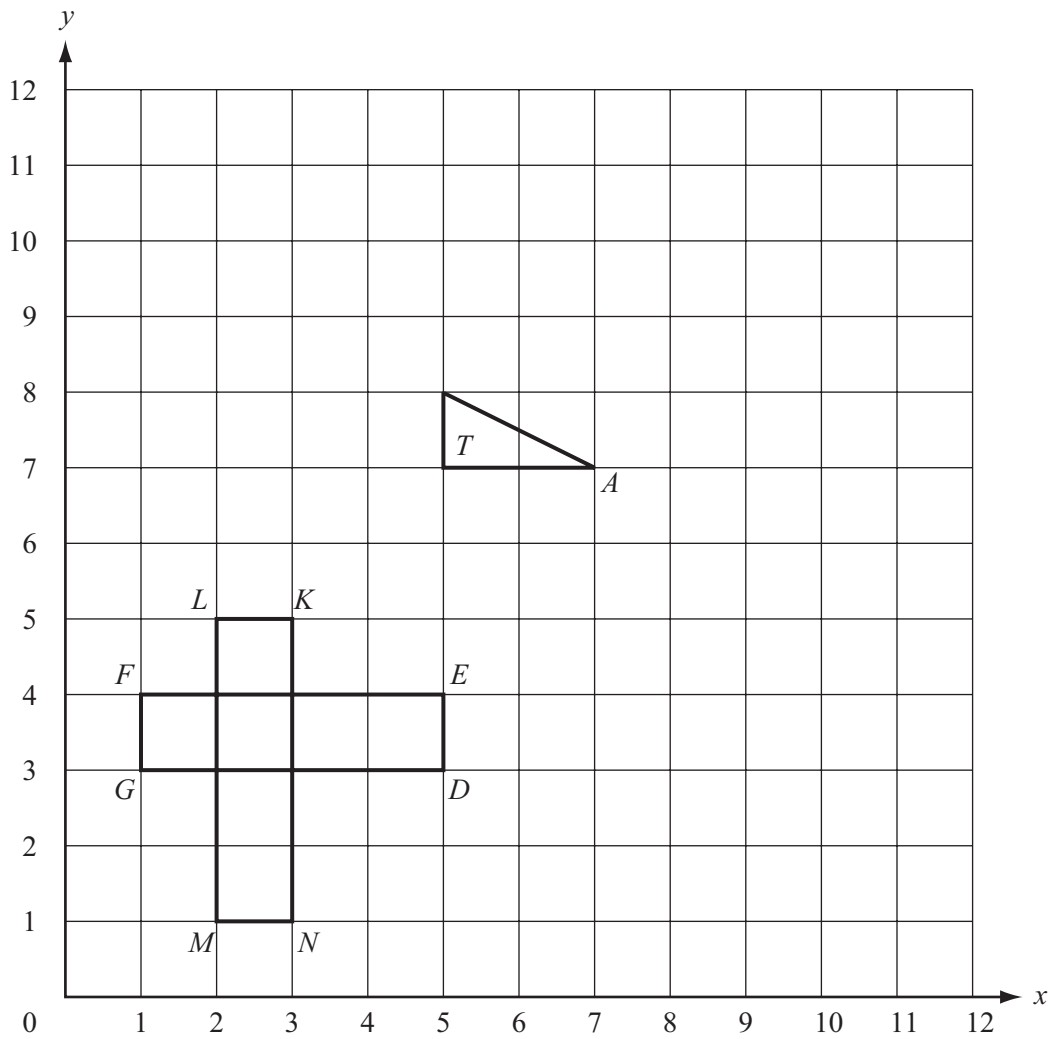   Find the new value of *A*.

Answer(c)(ii) *A* = ………………   [2]

(iii) The total cost of *x* books is $*y*.
Write an expression for *A* in terms of *x* and *y*.

Answer(c)(iii) *A* = ……………… [1]

(iv) One of the *x* books is removed.
The cost of this book is $7.
Write a new expression for *A* in terms of *x* and *y*.

Answer(c)(iv) *A* = ……………… [2]

[Turn over

4

(a) Draw accurately the image of triangle *T* under the following transformations.

(i) Translate triangle *T* by the vector $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$. Label it *P*. [2]

(ii) Reflect triangle *T* in the line *x* = 8. Label it *Q*. [2]

(iii) Rotate triangle *T* about the point *A* through 90° anti-clockwise.
Label it *R*. [2]

(iv) Enlarge triangle *T* with centre of enlargement *A* and scale factor 2.
Label it *S*. [2]

(b) Describe fully the single transformation which maps

    (i) triangle *P* onto triangle *T*,

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

    (ii) triangle *S* onto triangle *T*.

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

(c) The rectangle *DEFG* is rotated onto the rectangle *KLMN*, with *D* mapped onto *K*.

Write down

    (i) the angle of the rotation,

Answer(c)(i)…...………………….. [1]

    (ii) the coordinates of the centre of the rotation.

Answer(c)(ii) (…..……... , ...…..……) [2]

[Turn over

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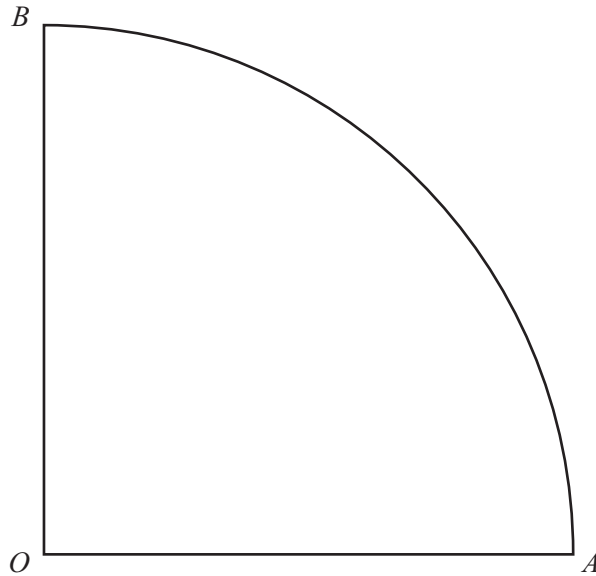
The quarter-circle above has centre *O* and radius 7 cm.

(a) Using a straight edge and compasses only construct

    (i) the perpendicular bisector of *AO*, [2]

    (ii) the locus of points inside the quarter-circle which are 5 cm from *O*. [2]

(b) Shade the region, inside the quarter-circle, containing the points which are
more than 5 cm from *O* and nearer to *A* than *O*. [1]

(c) **(i)** The line *OX* bisects angle *AOB* and is 12 cm long.
    Draw *OX* accurately. [2]

    (ii) Draw accurately the tangent to the quarter-circle at *A*. [1]

    (iii) This tangent meets the line *OX* at *Y*.
    Measure the length of *AY*.

Answer(c)(iii) *AY* = …………..…….cm [1]

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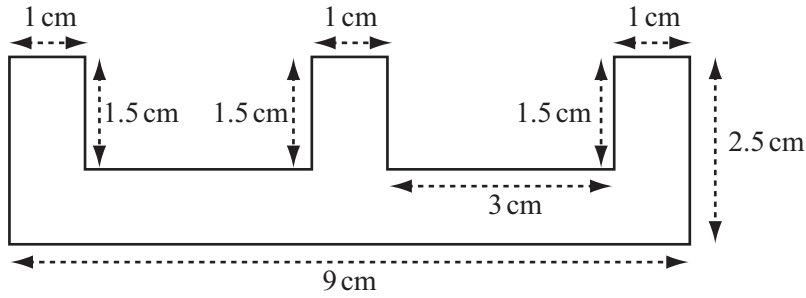
In the diagram above, all the angles are right angles.

(a) Show that the area of the shape is $13.5\,\text{cm}^2$.

Answer(a)

[2]

(b) The shape is the cross-section of a metal prism of length 2.8 **metres.**
Calculate the volume of the prism in cubic centimetres.

Answer(b)……………………cm^3 [3]

(c) A metal cuboid is melted down so that prisms as described in **part (b)** can be made.
The cuboid measures 2 metres by 1.2 metres by 0.8 metres.

(i) Calculate the volume of the cuboid in cubic metres,

Answer(c)(i)……...…………..m^3 [2]

(ii) Calculate the volume of the cuboid in cubic centimetres.

Answer(c)(ii)……...…………cm^3 [2]

(iii) Calculate the number of prisms which can be made.

Answer(c)(iii)……...……………. [2]

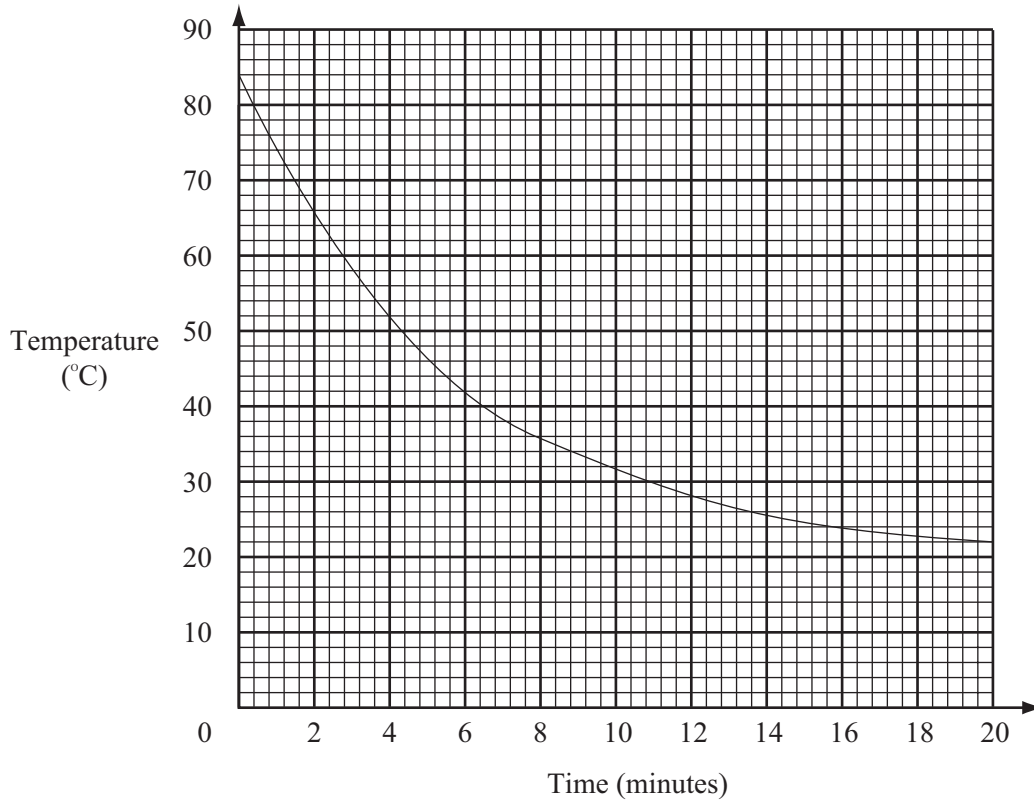**(d)** Draw any lines of symmetry of the shape on the diagram above. [1]

(e) Describe the rotational symmetry of the shape above.

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

[Turn over

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Time (minutes)

The graph shows the temperature of a cup of tea cooling down in a room.

(a) What is the temperature of the tea after

(i) 0 minutes,

Answer(a)(i)…………………….. [1]

(ii) 20 minutes?

Answer(a)(ii)...…………………. [1]

(b) After how many minutes is its temperature 30 °C?

Answer(b)……………………… [1]

(c) By how much has its temperature gone down between 4 minutes and 8 minutes?

Answer(c)……………………… [1]

(d) **(i)** Complete the table which shows falls in temperature.

Between	0 and 4 minutes	4 and 8 minutes	8 and 12 minutes	12 and 16 minutes
Fall in temperature				

[3]

(ii) What pattern do you notice about these falls in temperature?

Answer(d)(ii)………………………………………………………………… [1]

(e) Estimate the room temperature.

Answer(e)………………… °C   [1]

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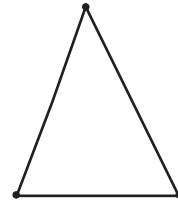| Diagram 1	Diagram 2	Diagram 3	Diagram 4

Diagram 1
3 dots
1 triangle

Diagram 2
4 dots
3 triangles

Diagram 3
5 dots
6 triangles

Look at the diagrams above.

(a) Complete Diagram 4 to continue the pattern.   [2]

(b) Complete the table below.

Diagram	1	2	3	4	5		n
Number of dots	3	4	5				

[3]

(c) Complete the table below.

Diagram	1	2	3	4	5	6		10
Number of triangles	1	3	6	10				

[3]

(d) A line is now drawn inside each of the diagrams as shown below.
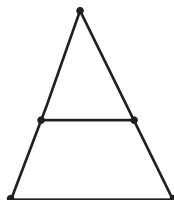
Diagram 1
2 triangles

Diagram 2
6 triangles

Diagram 3

How many triangles are there in Diagram 3?

Answer(d)………………………[2]

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