UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

9910953725

MATHEMATICS **0580/03, 0581/03**

Paper 3 (Core) **May/June 2007**

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.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
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.

At the end of the examination, fasten all your work securely together.
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.

For Examiner's Use

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

1 **(a)** Find the value of

(i) 5^0,

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

(ii) the square root of 64,

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

(iii) the cube root of 64,

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

(iv) the integer closest in value to $(1.8)^3$.

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

(b) Write down

(i) a common factor of 15 and 27, which is greater than 1,

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

(ii) a common multiple of 10 and 12.

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

(c) **(i)** Two of the factors of 2007 are square numbers. One of these is 1.

Find the other square number.

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

(ii) Write down the two factors of 2007 which are prime.

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

Exam Use

2 Marguerite earns \$336 per month.
She divides her earnings between bills, food, savings and personal spending.

(a) Her bills take $\frac{2}{7}$ of her earnings.

Show that \$240 is left for her other items.
Answer(a)

[2]

(b) She divides the \$240 between food, savings and personal spending in the ratio 5 : 3 : 4.
Calculate how much she spends on food.

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

(c) She saves the same amount each month.
Show that she saves \$720 in one year.
Answer(c)

[2]

(d) She invests the \$720 in a bank which pays 6% per year **compound** interest.
How much will this be worth after 2 years?

Answer(d) \$ ..... [3]

3 **(a)** Kinetic energy, E, is related to mass, m, and velocity, v, by the formula

$$E = \frac{1}{2}mv^2.$$

(i) Calculate E when $m = 5$ and $v = 12$.

Answer(a)(i) $E =$ ..... [2]

(ii) Calculate v when $m = 8$ and $E = 225$.

Answer(a)(ii) $v =$ ..... [2]

(iii) Make m the subject of the formula.

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

(b) Factorise completely $xy^2 - x^2y$.

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

(c) Solve the equation $3(x - 5) + 2(14 - 3x) = 7$.

Answer(c) $x =$ ..... [3]

(d) Solve the simultaneous equations

$$4x + y = 13,$$
$$2x + 3y = 9.$$

Answer(d) $x =$ .....

$y =$ ..... [3]

4 **(a)** The table shows corresponding values of x and y for the function

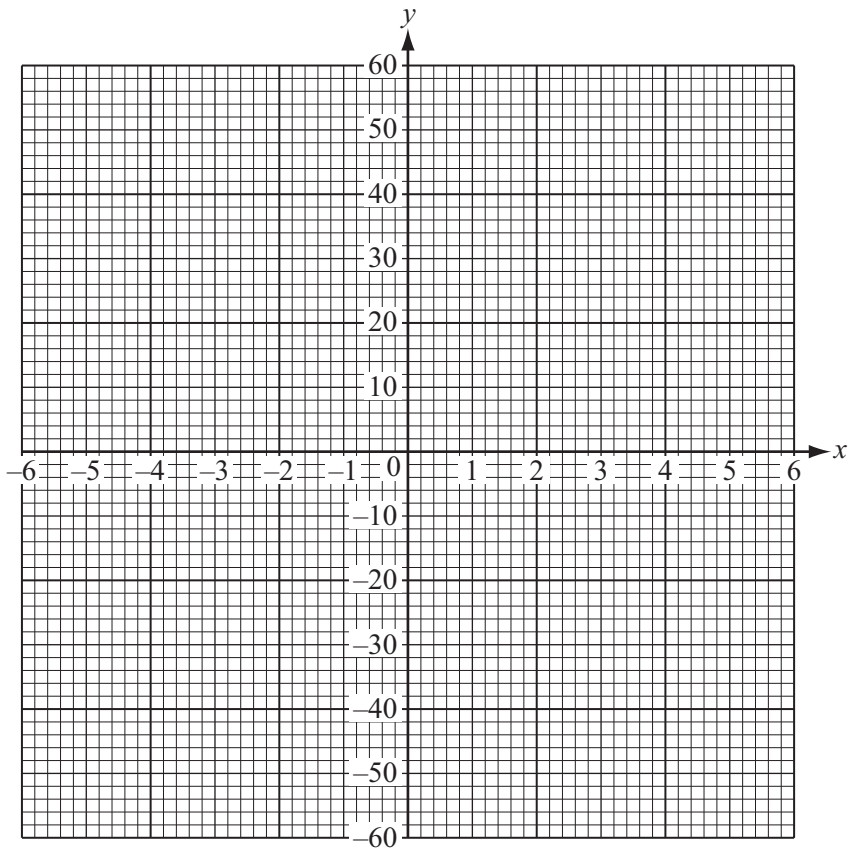
$$y = \frac{60}{x} \quad (x \neq 0).$$

x	−6	−5	−4	−3	−2	−1	1	2	3	4	5	6
y		−12	−15		−30		60				12	10

[2]

(i) Fill in the missing values of y in the table above.

(ii) Plot the points on the grid below and draw the graph for $-6 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 6$.



[4]

(b) Write down the order of rotational symmetry of the graph.

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

(c) Draw the lines of symmetry of the graph on the grid. [2]

(d) One line of symmetry intersects the graph at two points.

(i) Write down the co-ordinates of these two points.

Answer(d)(i) (..... , ...) and (..... , ...) [2]

(ii) Write down the equation of this line of symmetry.

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

(e) Find the gradient of the other line of symmetry.

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

5 A bag contains 24 discs.
10 discs are red, 9 discs are green and 5 discs are yellow.

(a) The number of discs of each colour can be shown by three sectors on a pie chart.
The sector angle for the red discs is 150°.

Work out the sector angle for

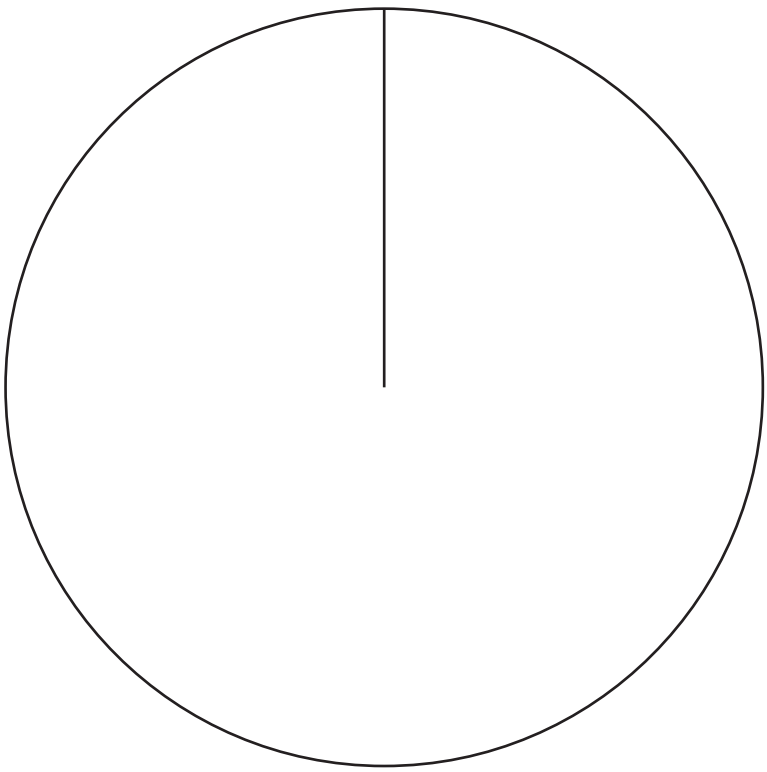
(i) the green discs,

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

(ii) the yellow discs.

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

(iii) Complete the pie chart below and label the sectors.



[2]

(b) A disc is chosen at random.

Find, **as a fraction**, the probability of each of the following events.

(i) Event A: the disc is red.

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

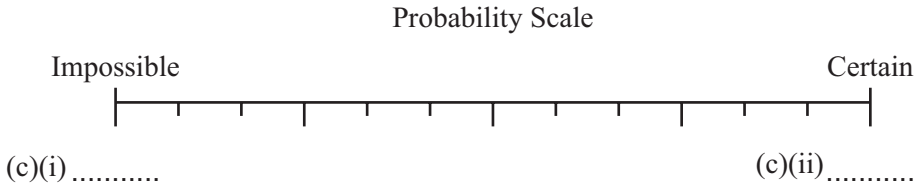
(ii) Event B: the disc is red or yellow.

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

(iii) Event C: the disc is **not** yellow.

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

(c)



The diagram shows a horizontal probability scale.

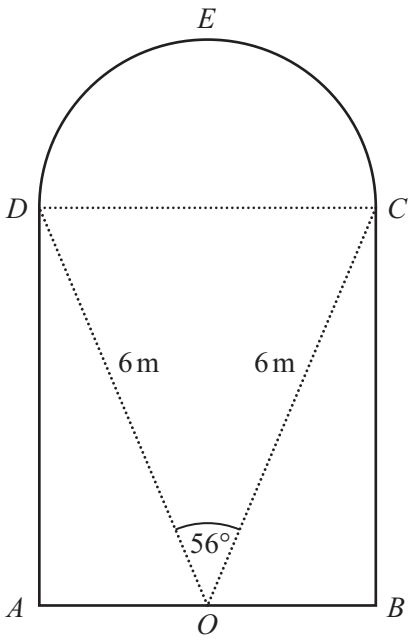
Write on the dotted lines in the diagram, the probability of

(i) an impossible event, [1]

(ii) a certain event. [1]

(d) Using the notation, A, B and C, mark the positions of your three answers in **part (b)** on the Probability Scale diagram in **part (c)**. [3]

6



NOT TO SCALE

ABCED is the cross-section of a tunnel.

ABCD is a rectangle and *DEC* is a semi-circle. *O* is the mid-point of *AB*.

OD = *OC* = 6 m and angle *DOC* = 56°.

(a) **(i)** Show that angle *COB* = 62°.

Answer(a)(i)

[1]

(ii) Calculate the length of *OB*.

Answer(a)(ii) *OB* = ... m [2]

(iii) Write down the width of the tunnel, *AB*.

Answer(a)(iii) *AB*= ..... m [1]

(iv) Calculate the length of *BC*.

Answer(a)(iv) *BC* = ... m [2]

(b) Calculate the area of

(i) the rectangle *ABCD*,

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

(ii) the semi-circle *DEC*,

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

(iii) the cross-section of the tunnel.

Answer(b)(iii) ..... m^2 [1]

(c) The tunnel is 500 metres long.

(i) Calculate the volume of the tunnel.

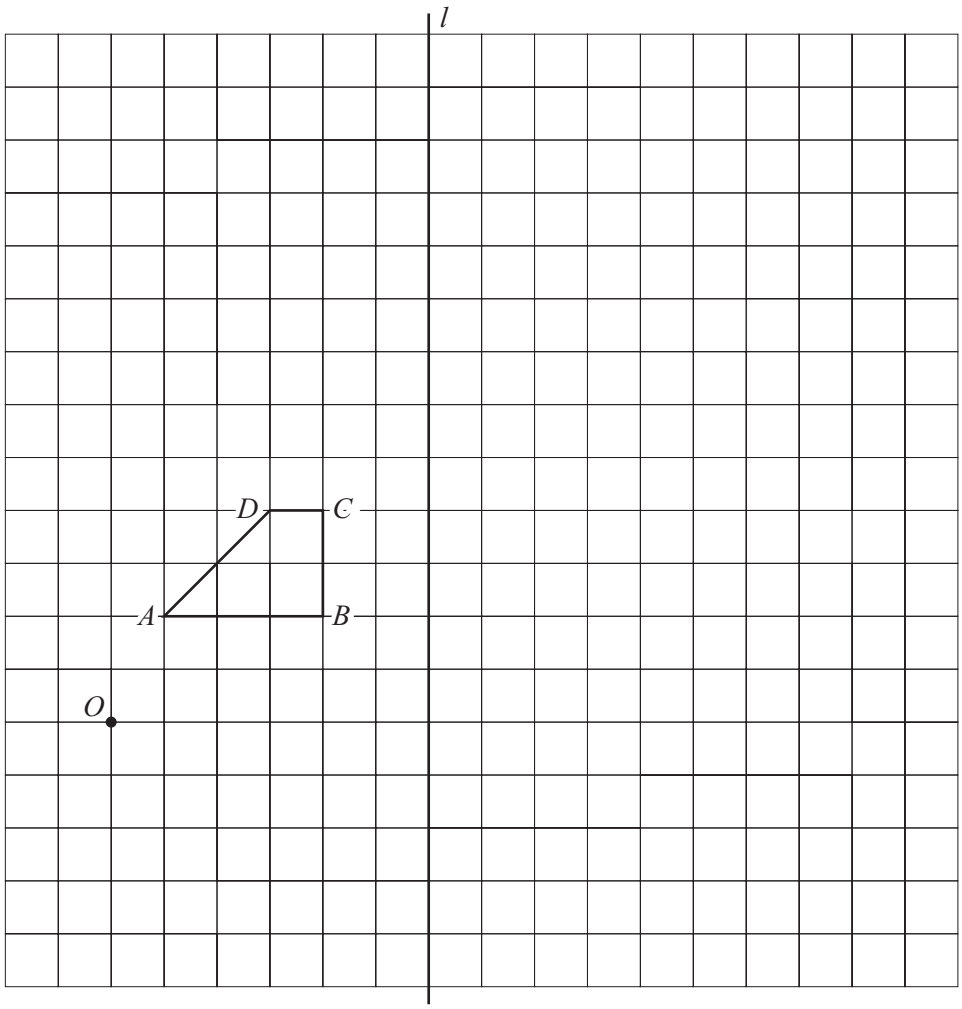
Answer(c)(i) ..... m^3 [2]

(ii) A car travels through the tunnel at a constant speed of 60 kilometres per hour.

How many seconds does it take to go through the tunnel?

Answer(c)(ii) ..... s [3]

7



A quadrilateral *ABCD*, a line *l* and a point *O* are shown on the grid above.

(a) Write down the mathematical name for the quadrilateral *ABCD*.

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

(b) On the grid above, draw the images of the quadrilateral *ABCD* under the following transformations.

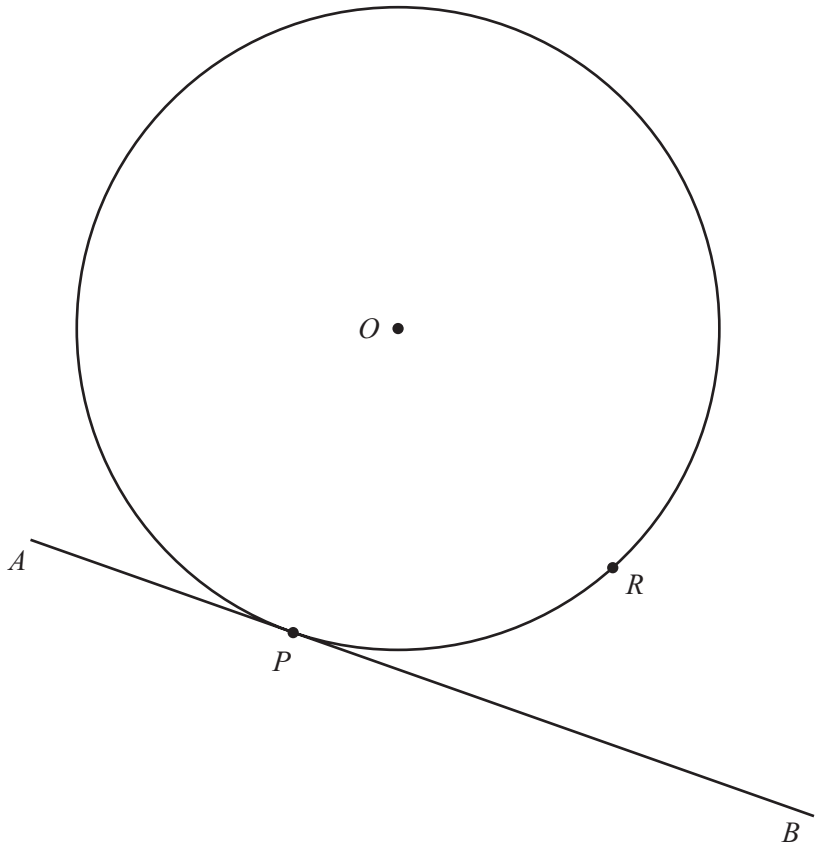
(i) Translation by the vector $\begin{pmatrix} 9 \\ -3 \end{pmatrix}$. Label this image *P*. [2]

(ii) Reflection in the line *l*. Label this image *Q*. [2]

(iii) Rotation, centre *A,* through 90° anti-clockwise. Label this image *R*. [2]

(iv) Enlargement, centre *O* and scale factor 3. Label this image *S*. [3]

8



The diagram shows a circular garden, centre O. A straight path AB touches the circle at P.

(a) **(i)** Draw on the diagram the **diameter** PQ and label the point Q. [1]

(ii) Without measuring, write down the size of angle APQ.

Answer(a)(ii) *Angle APQ*= ..... [1]

(iii) The point R is marked on the circumference of the circle. Draw the lines PR and QR. [1]

(iv) Write down the reason why the angle PRQ is 90°.

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

(b) Showing all your construction lines, use a straight edge and compasses only to construct

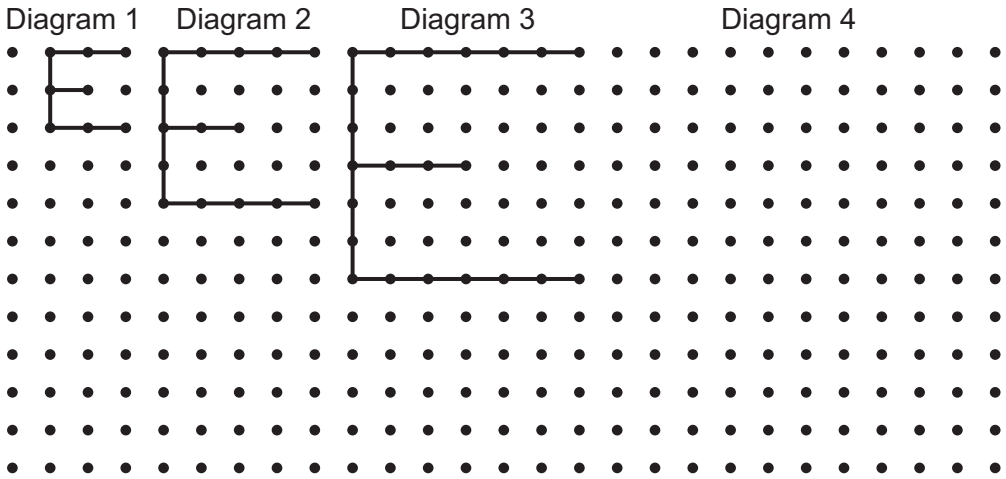
(i) the perpendicular bisector of QR, [2]

(ii) the bisector of angle PRQ. [2]

(c) Shade the region of the garden between PQ and QR which is closer to R than to Q and closer to RQ than to RP. [2]

Question 9 is on the next page.

9 In the pattern below each diagram shows a letter E formed by joining dots.



(a) Draw the next letter E in the pattern. [1]

(b) Complete the table showing the number of dots in each letter E.

Diagram	1	2	3	4	5
Dots	8	15			

[3]

(c) How many dots make up the letter E in

(i) Diagram 10,

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

(ii) Diagram *n*?

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

(d) The letter E in Diagram *n* has 113 dots.

Write down an equation in *n* and use it to find the value of *n*.

Answer(d) $n =$ ..... [3]