UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

MATHEMATICS **0580/02, 0581/02**

Paper 2 (Extended) **May/June 2007**

1 hour 30 minutes

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.

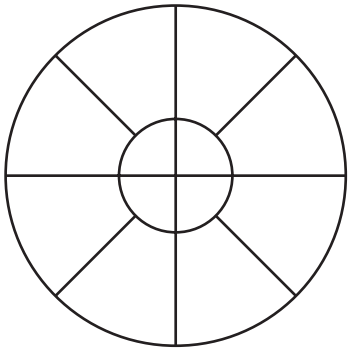
At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for the paper is 70.

For Examiner's Use

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

For Examiner's Use

1



For the diagram above write down

(a) the order of rotational symmetry,

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

(b) the number of lines of symmetry.

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

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2 **(a)** Use your calculator to work out

$$\frac{1 \quad (\tan 40°)^2}{2(\tan 40°)}.$$

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

(b) Write your answer to **part (a)** in standard form.

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

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3 Xsara throws a ball three times at a target.
Each time she throws the ball, the probability that she hits the target is 0.2.
Calculate the probability that she does **not** hit the target in any of the three throws.

Answer ..... [2]

---

4 Write the following in order of size, **smallest** first.

cos100° sin100° tan100°

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

5 A tin of soup has the following information on the label.

200 grams of soup contains		
Protein	Carbohydrate	Fat
4 g	8.7 g	5.8 g

(a) What fraction of the soup is Protein? Give your answer in its simplest form.

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

(b) What percentage of the soup is Carbohydrate?

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

6 Carmen spends 5 minutes, correct to the nearest minute, preparing one meal.
She spends a total time of T minutes preparing 30 meals.
Between what limits does T lie?

Answer ..... $\leqslant T <$ ..... [2]

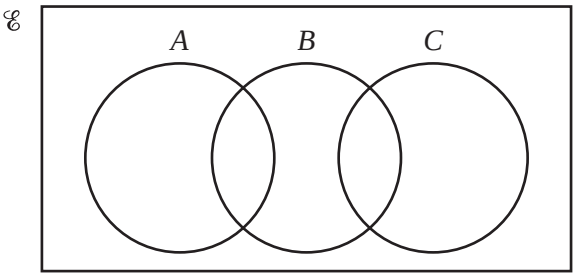
7 $M = \begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$ $M^2 = \begin{pmatrix} 2 & 3 \\ 3 & 5 \end{pmatrix}$ $M^3 = \begin{pmatrix} 5 & 8 \\ 8 & 13 \end{pmatrix}$

Find M^4.

Answer $M^4 = \begin{pmatrix} & \\ & \end{pmatrix}$ [2]

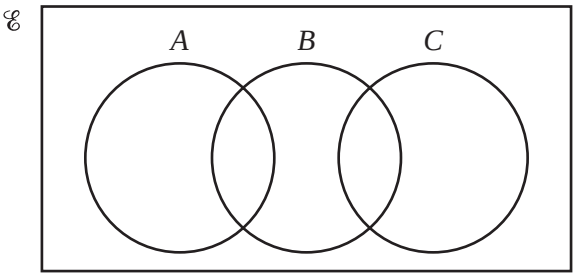
8 On the Venn diagrams shade the regions

(a) $A' \cap C'$,



[1]

(b) $(A \cup C) \cap B$.



[1]

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9 Write down

(a) an irrational number,

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

(b) a prime number between 60 and 70.

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

---

10 Write as a fraction in its simplest form

$$\frac{x}{4}\frac{3}{}+\frac{4}{x}\frac{}{3}.$$

Answer ..... [3]

---

11 $\mathbf{A} = \begin{pmatrix} x & 8 \\ 2 & x \end{pmatrix}$.

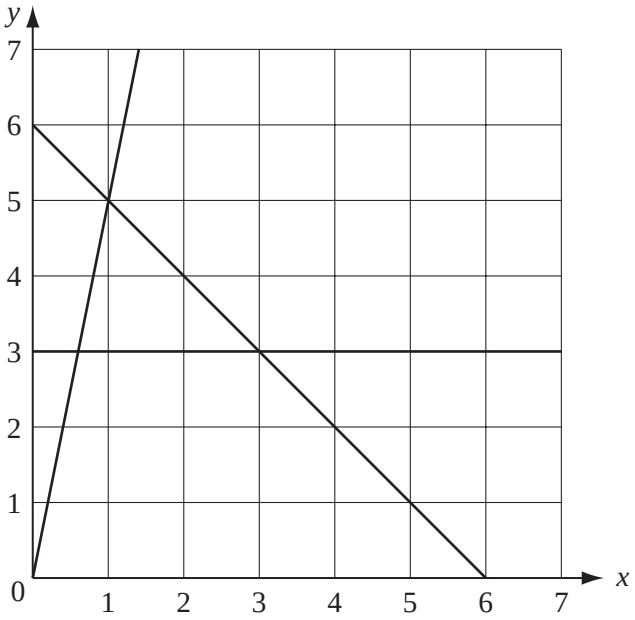
(a) Find $|\mathbf{A}|$, the determinant of **A**, in terms of x.

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

(b) Find the values of x when $|\mathbf{A}| = 9$.

Answer(b) $x =$ ..... or $x =$ ..... [2]

12



By shading the **unwanted** parts of the grid above, find and label the region R which satisfies the following three inequalities

$y \geqslant 3$, $y \geqslant 5x$ and $x + y \leqslant 6$. [3]

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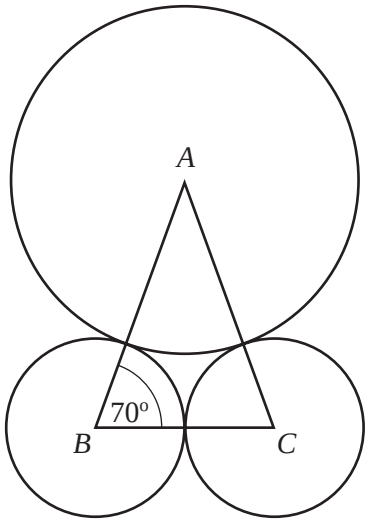
13 The quantity y varies as the cube of $(x+2)$.
$y = 32$ when $x = 0$.
Find y when $x = 1$.

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

14



NOT TO SCALE

The diagram shows three touching circles.
A is the centre of a circle of radius x centimetres.
B and C are the centres of circles of radius 3.8 centimetres. Angle $ABC = 70°$.
Find the value of x.

Answer $x =$ ..... [3]

---

15 Two unbiased spinners are used in a game.
One spinner is numbered from 1 to 6 and the other is numbered from 1 to 3.
The scores on each spinner are **multiplied** together. The table below shows the possible outcomes.

First Spinner

Second Spinner	1	2	3	4	5	6
1	**1**	**2**	**3**	**4**	**5**	**6**
2	**2**	**4**	**6**	**8**	**10**	**12**
3	**3**	**6**	**9**	**12**	**15**	**18**

(a) Find the probability that the outcome is even.

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

(b) When the outcome is even, find the probability that it is also greater than 11.

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

For Examiner's Use

16 The function f(x) is given by

$$f(x) = 3x - 1.$$

Find, in its simplest form,

(a) $f^{-1}f(x)$,

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

(b) $ff(x)$.

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

---

17 **(a)** $\sqrt{32} = 2^p$. Find the value of p.

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

(b) $\sqrt[3]{\frac{1}{8}} = 2^q$. Find the value of q.

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

---

18 The equation of a straight line can be written in the form $3x + 2y - 8 = 0$.

(a) Rearrange this equation to make y the subject.

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

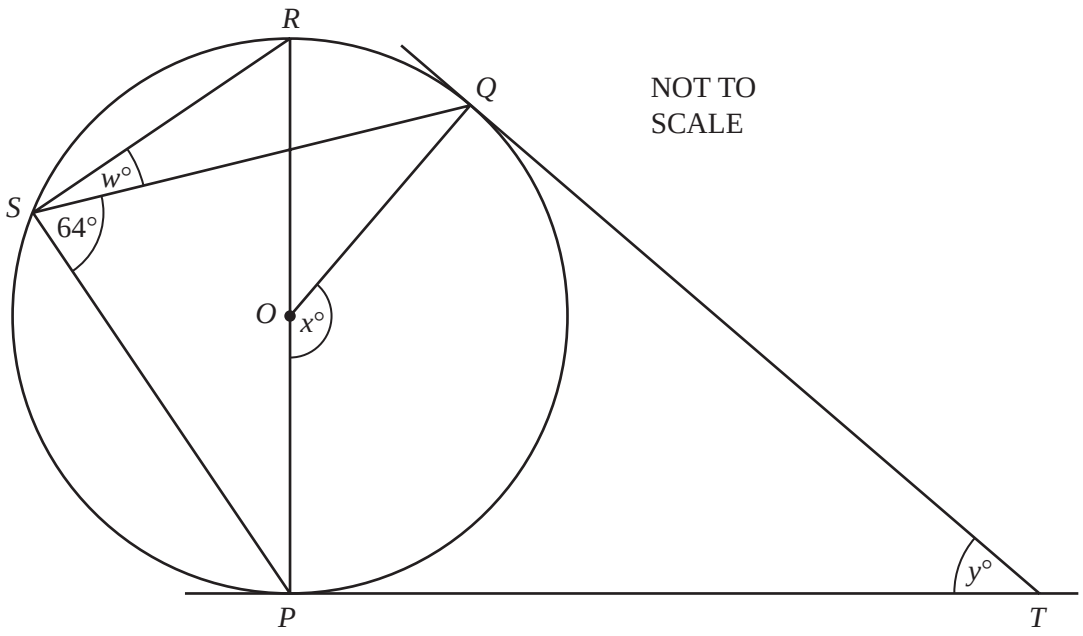
(b) Write down the gradient of the line.

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

(c) Write down the co-ordinates of the point where the line crosses the y axis.

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

19



P, *Q*, *R* and *S* lie on a circle, centre *O*.
TP and *TQ* are tangents to the circle.
PR is a diameter and angle *PSQ* = 64°.

(a) Work out the values of *w* and *x*.

Answer(a) $w =$ ..... [1]

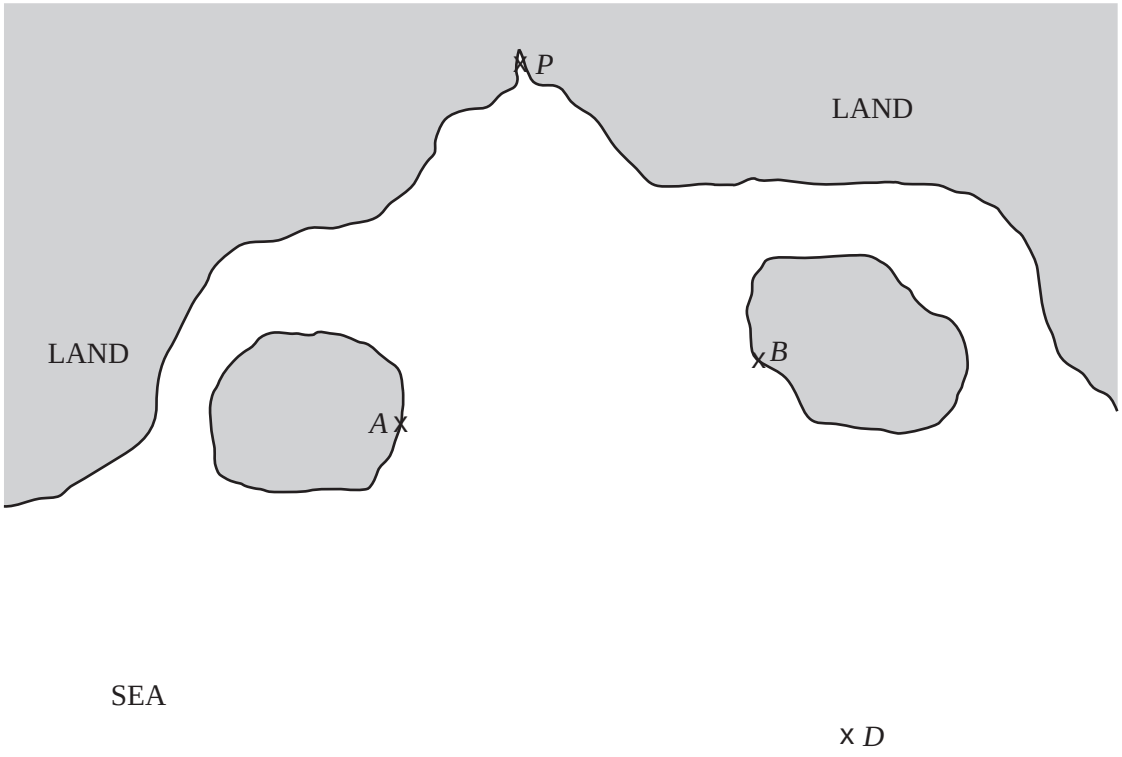
$x =$ ..... [1]

(b) **Showing all your working**, find the value of *y*.

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

20

For Examiner's Use



The diagram shows a map of part of a coastline.
1 centimetre represents 40 metres.

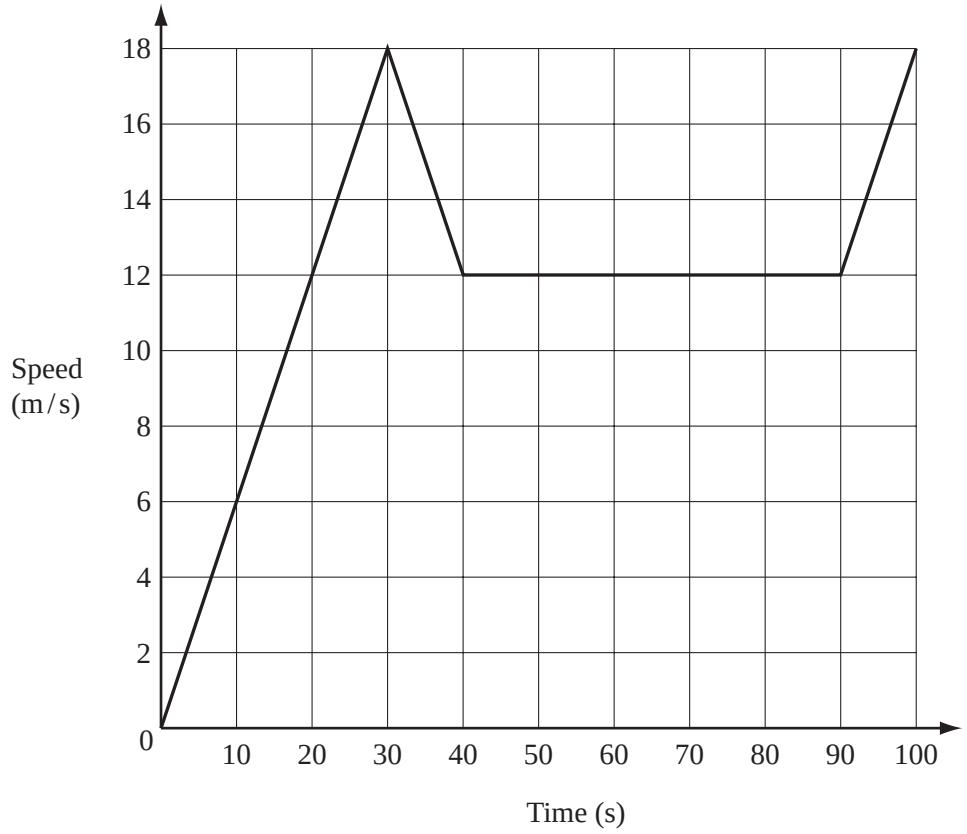
(a) A ferry leaves a port *P* and travels between two islands so that it is always equidistant from *A* and *B*.
Using a straight edge and compasses only, draw this locus. [2]

(b) For safety reasons the ferry must be at least 120 metres from a ship at *D*.
Draw the locus of the points which form the boundary of safety around *D*. [1]

(c) When the ferry is 120 metres from *D* it must change direction.
How far is the ferry from the port *P* then?

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

21



The diagram shows part of a journey by a truck.

(a) The truck accelerates from rest to 18 m/s in 30 seconds.
Calculate the acceleration of the truck.

Answer(a) ..... m/s^2 [1]

(b) The truck then slows down in 10 seconds for some road works and travels through the road works at 12 m/s.
At the end of the road works it accelerates back to a speed of 18 m/s in 10 seconds.
Find the **total** distance travelled by the truck in the 100 seconds.

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

22

NORTH EASTERN BANK SAVINGS ACCOUNT 5% Per Year Simple Interest	SOUTH WESTERN BANK SAVINGS ACCOUNT 4.9% Per Year Compound Interest

Kalid and his brother have $2000 each to invest for 3 years.

(a) North Eastern Bank advertises savings with **simple** interest at 5% per year.
Kalid invests his money in this bank.
How much money will he have at the end of 3 years?

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

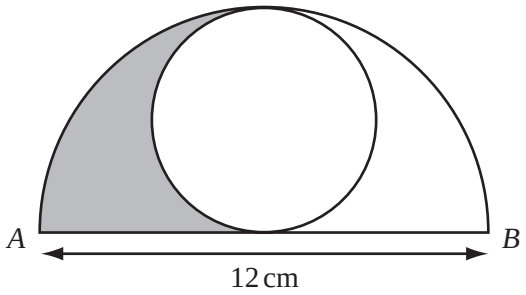
(b) South Western Bank advertises savings with **compound** interest at 4.9% per year.
Kalid's brother invests his money in this bank.
At the end of 3 years, how much **more** money will he have than Kalid?

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

Question 23 is on the next page.

[Turn over

23



NOT TO SCALE

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The largest possible circle is drawn inside a semicircle, as shown in the diagram. The distance *AB* is 12 centimetres.

(a) Find the shaded area.

Answer(a) ..... cm^2 [4]

(b) Find the perimeter of the shaded area.

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