Centre Number	Candidate Number	Name

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/02
0581/02

Paper 2 (Extended)

May/June 2004

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

1 hour 30 minutes

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 70.
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.

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.

For Examiner's Use

This document consists of **11** printed pages and **1** blank page.

1 A train left Sydney at 23 20 on December 18th and arrived in Brisbane at 02 40 on December 19th. How long, in hours and minutes, was the journey?

Answer ..... h ..... min [1]

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2 Use your calculator to find the value of

$$\frac{6\sin 50^\circ}{\sin 25^\circ}.$$

Answer ..... [1]

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3 Write the numbers 0.5^2, $\sqrt{0.5}$, 0.5^3 in order with the **smallest** first.

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

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4 Simplify $\frac{2}{3}p^{12} \times \frac{3}{4}p^{8}$.

Answer ..... [2]

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5 Solve the equation $\frac{x}{4} - 8 = -2$.

Answer $x =$ ..... [2]

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6 The population, P, of a small island was 6380, correct to the nearest 10.
Complete the statement about the limits of P.

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

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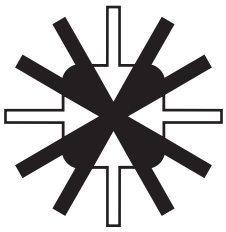
7 Work out the value of

$$\frac{-\frac{1}{2}-\frac{3}{8}}{-\frac{1}{2}+\frac{3}{8}}.$$

Answer ..... [2]

8



For the shape above, write down

(a) the number of lines of symmetry,

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

(b) the order of rotational symmetry.

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

9 Sara has \$3000 to invest for 2 years.
She invests the money in a bank which pays simple interest at the rate of 7.5 % per year.
Calculate how much interest she will have at the end of the 2 years.

Answer \$ ..... [2]

10 The area of a small country is 78 133 square kilometres.

(a) Write this area correct to 1 significant figure.

Answer(a) ..... km^2 [1]

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

Answer(b) ..... km^2 [1]

11 Solve the simultaneous equations

$$\tfrac{1}{2}x + y = 5\,,$$

$$x - 2y = 6\,.$$

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

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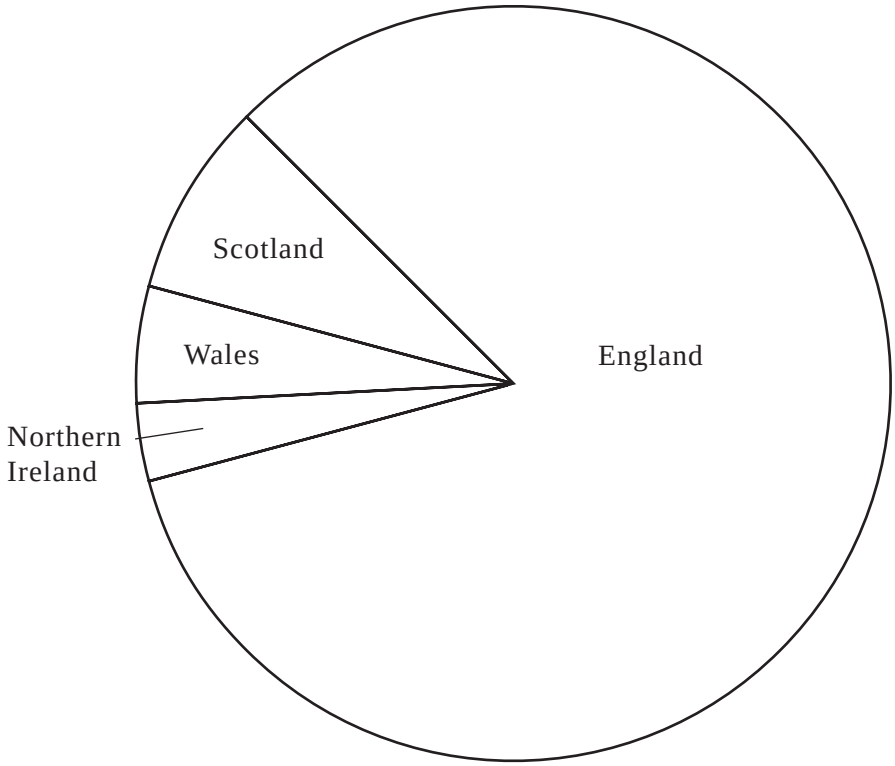
12 The populations of the four countries of the United Kingdom, in the year 2000, are shown on the pie chart below.



Taking measurements from the pie chart, complete the table.

Country	Population (millions)
England	
Scotland	
Wales	
Northern Ireland	2

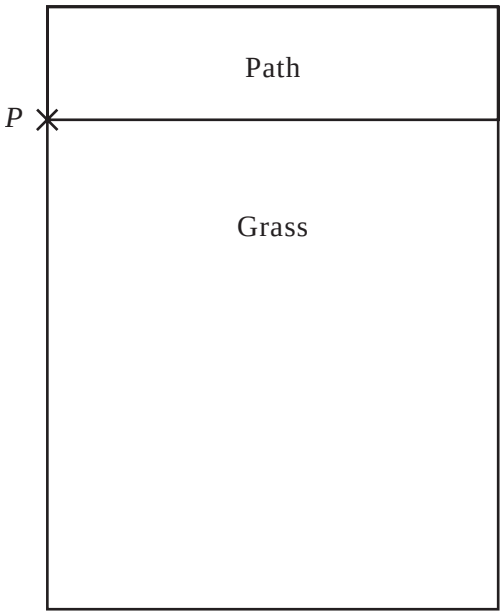
[3]

13 Make d the subject of the formula

$$c = kd^2 + e\,.$$

Answer $d =$ ..... [3]

14



The diagram, drawn to a scale of 1 cm to 1 m, shows a garden made up of a path and some grass. A goat is attached to a post, at the point P, by a rope of length 4 m.

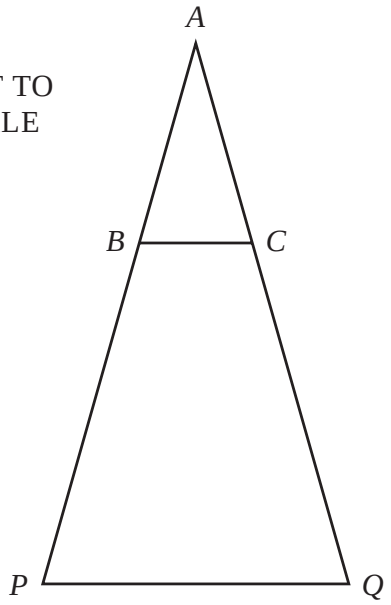
(a) Draw the locus of all the points in the **garden** that the goat can reach when the rope is tight. [1]

(b) Calculate the area of the **grass** that the goat can eat.

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

15

NOT TO SCALE

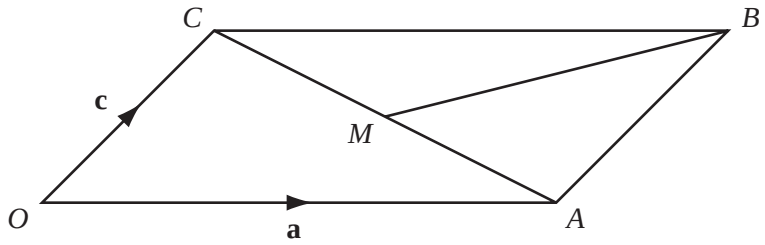


The area of triangle APQ is 99 cm^2 and the area of triangle ABC is 11 cm^2. BC is parallel to PQ and the length of PQ is 12 cm.

Calculate the length of BC.

Answer BC = ... cm [3]

16



$OABC$ is a parallelogram. $\overrightarrow{OA}$ = **a**, $\overrightarrow{OC}$ = **c** and M is the mid-point of CA.
Find in terms of **a** and **c**

(a) $\overrightarrow{OB}$,

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

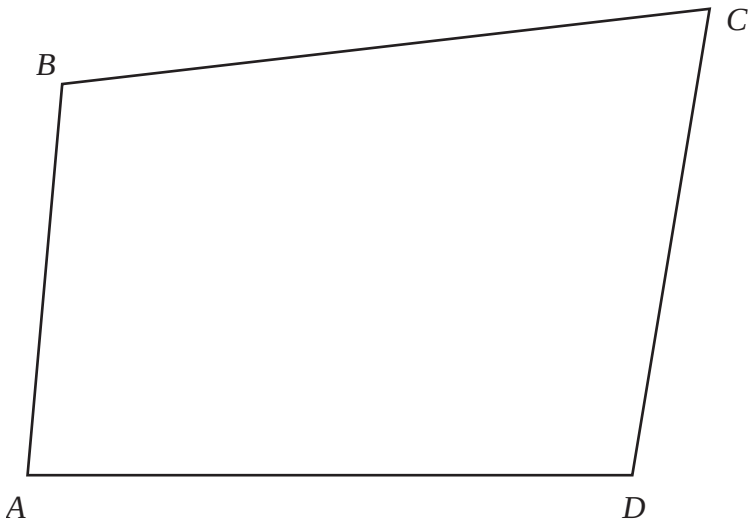
(b) $\overrightarrow{CA}$,

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

(c) $\overrightarrow{BM}$.

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

17



In this question show clearly all your construction arcs.

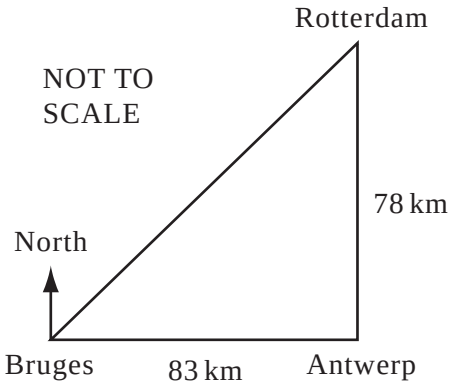
(a) Using a straight edge and compasses only, construct on the diagram above,

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

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

(b) Shade the region, inside the quadrilateral, which is nearer to D than B **and** nearer to DC than DA. [1]

18



Antwerp is 78 km due South of Rotterdam and 83 km due East of Bruges, as shown in the diagram.

Calculate

(a) the distance between Bruges and Rotterdam,

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

(b) the bearing of Rotterdam from Bruges, correct to the nearest degree.

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

19 $f(x) = \frac{x+1}{2}$ and $g(x) = 2x + 1$.

(a) Find the value of $gf(9)$.

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

(b) Find $gf(x)$, giving your answer in its simplest form.

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

(c) Solve the equation $g^{-1}(x) = 1$.

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

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20 **(a)** Factorise completely $12x^2 - 3y^2$.

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

(b) **(i)** Expand $(x-3)^2$.

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

(ii) $x^2 - 6x + 10$ is to be written in the form $(x-p)^2 + q$.
Find the values of p and q.

Answer(b)(ii) p = ... q = ... [2]

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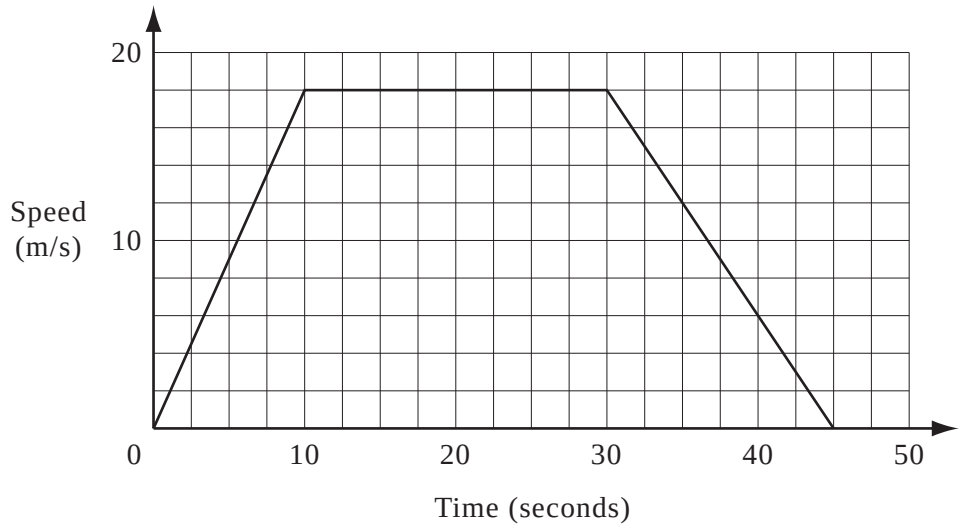
21 A cyclist is training for a competition and the graph shows one part of the training.



(a) Calculate the acceleration during the first 10 seconds.

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

(b) Calculate the distance travelled in the first 30 seconds.

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

(c) Calculate the average speed for the entire 45 seconds.

Answer(c) ..... m/s [3]

22 $\mathbf{A} = (5 \ \ -8)$ $\mathbf{B} = \begin{pmatrix} 2 & 6 \\ 5 & -4 \end{pmatrix}$ $\mathbf{C} = \begin{pmatrix} 4 & 6 \\ 5 & -2 \end{pmatrix}$ $\mathbf{D} = \begin{pmatrix} 4 \\ -2 \end{pmatrix}$

(a) Which one of the following matrix calculations is **not** possible?

(i) AB **(ii) AD** **(iii) BA** **(iv) DA**

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

(b) Calculate **BC**.

Answer(b) **BC** = $\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(c) Use your answer to **part (b)** to write down $\mathbf{B}^{-1}$, the inverse of **B**.

Answer(c) $\mathbf{B}^{-1}$ = $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

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