UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6914173111

MATHEMATICS **0580/23**

Paper 2 (Extended) **May/June 2013**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

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 70.

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

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1 Sheila can pay her hotel bill in Euros (€) or Pounds (£).
The bill was €425 or £365 when the exchange rate was £1 = €1.14 .

In which currency was the bill cheaper?
Show all your working.

Answer ..... [2]

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2 The Ocean View Hotel has 300 rooms numbered from 100 to 399.
A room is chosen at random.

Find the probability that the room number ends in zero.

Answer ..... [2]

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3 The time in Lisbon is the same as the time in Funchal.
A plane left Lisbon at 08 30 and arrived in Funchal at 10 20.
It then left Funchal at 12 55 and returned to Lisbon.
The return journey took 15 minutes more.

What time did the plane arrive in Lisbon?

Answer ..... [2]

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4 Use a calculator to find

(a) $\sqrt{5\frac{5}{24}}$,

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

(b) $\frac{\cos 40°}{7}$.

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

---

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

$(1.5)^{\frac{2}{3}}$ $\left(\frac{2}{3}\right)^{1.5}$ $\left(\frac{2}{3}\right)^{-1.5}$ $\left(-\frac{2}{3}\right)^{\frac{2}{3}}$

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

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6 The volumes of two similar cones are $36\pi\,\text{cm}^3$ and $288\pi\,\text{cm}^3$.
The base radius of the smaller cone is 3 cm.

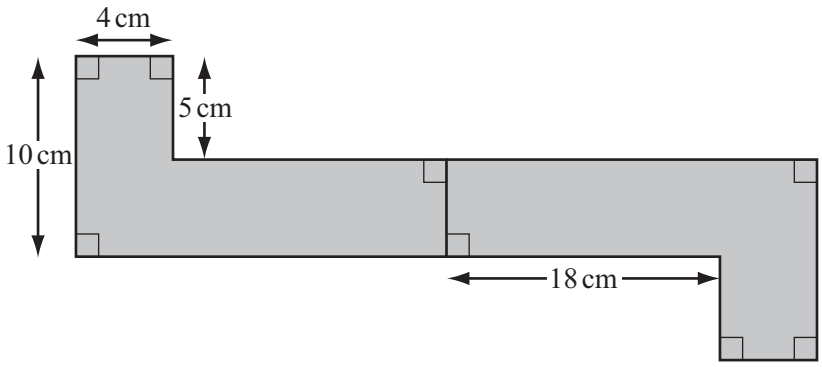
Calculate the base radius of the larger cone.

Answer ..... cm [3]

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NOT TO SCALE

The shaded shape has rotational symmetry of order 2.

Work out the shaded area.

Answer ..... cm^2 [3]

---

8 The mass, m, of a sphere varies directly with the **cube** of its radius, r.
$m = 160$ when $r = 2$.

Find m when $r = 5$.

Answer $m =$ ..... [3]

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9 Calculate, giving your answers in standard form,

(a) $2 \times (5.5 \times 10^4)$,

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

(b) $(5.5 \times 10^4) - (5 \times 10^4)$.

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

---

10 Find the value of $2x + y$ for the simultaneous equations.

$$3x + 5y = 48$$
$$2x - y = 19$$

Answer $2x + y =$ ..... [4]

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11 The sum of the prime numbers less than 8 is equal to 17.

(a) Find the sum of the prime numbers less than 21.

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

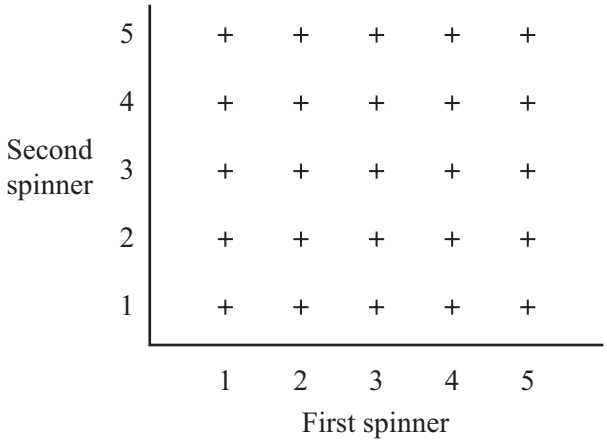
(b) The sum of the prime numbers less than x is 58.

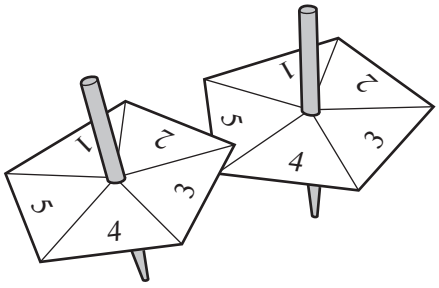
Find an integer value for x.

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

---

12 Two spinners have sections numbered from 1 to 5.
Each is spun once and each number is equally likely.
The possibility diagram is shown below.





Find the probability that

(a) both spinners show the same number,

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

(b) the sum of the numbers shown on the two spinners is 7.

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

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13 Write as a single fraction in its simplest form.

$$\frac{x+3}{x-3} - \frac{x-1}{x+1}$$

Answer ..... [4]

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14 **(a)** Solve $3n + 23 < n + 41$.

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

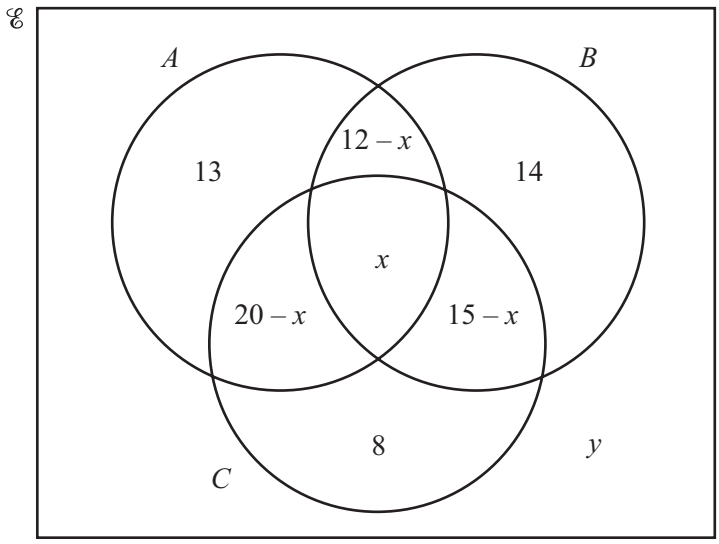
(b) Factorise completely $ab + bc + ad + cd$.

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

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The Venn diagram shows the number of elements in sets A, B and C.

(a) $n(A \cup B \cup C) = 74$

Find x.

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

(b) $n(\mathscr{E}) = 100$

Find y.

Answer(b) $y =$ ..... [1]

(c) Find the value of $n((A \cup B)' \cap C)$.

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

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16 $f(x) = x + \frac{2}{x} - 3, \ x \neq 0$ $g(x) = \frac{x}{2} - 5$

Find

(a) fg(18),

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

(b) $g^{-1}(x)$.

Answer(b) $g^{-1}(x) =$ ..... [2]

---

17 $\mathbf{M} = \begin{pmatrix} 2 & 3 \\ 3 & 6 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 2 & 1 & 5 \\ 1 & 7 & 2 \end{pmatrix}$

(a) Work out **MN**.

Answer(a) [2]

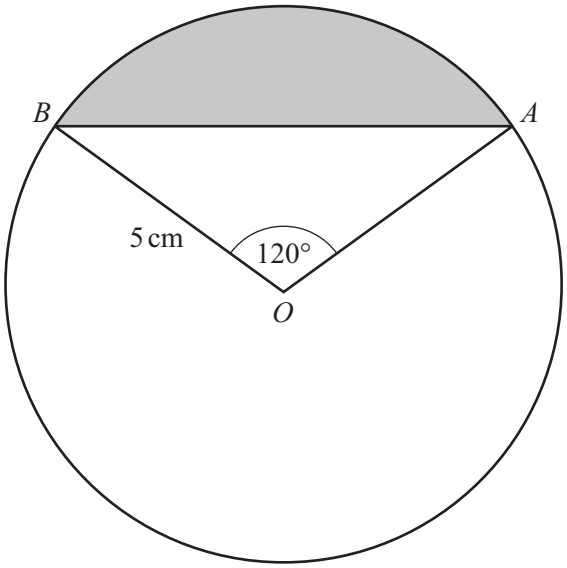
(b) Find $\mathbf{M}^{-1}$, the inverse of **M**.

Answer(b) [2]

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[Turn over

18



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A and *B* lie on a circle centre *O*, radius 5 cm.
Angle *AOB* = 120°.

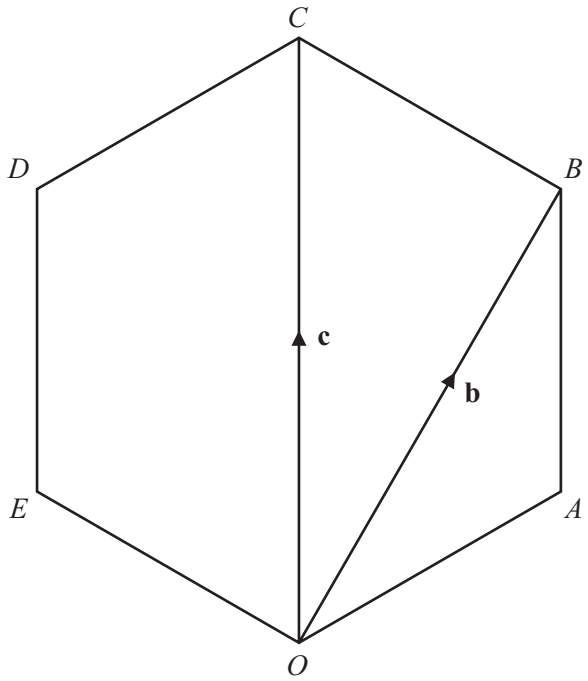
Find the area of the shaded segment.

Answer ..... cm^2 [4]

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OABCDE is a regular polygon.

(a) Write down the geometrical name for this polygon.

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

(b) O is the origin. $\overrightarrow{OB} = \mathbf{b}$ and $\overrightarrow{OC} = \mathbf{c}$.

Find, in terms of **b** and **c**, in their simplest form,

(i) $\overrightarrow{BC}$,

Answer(b)(i) $\overrightarrow{BC}$ = ... [1]

(ii) $\overrightarrow{OA}$,

Answer(b)(ii) $\overrightarrow{OA}$ = ... [2]

(iii) the position vector of E.

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

Question 20 is printed on the next page.

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[Turn over

20 (a)

$$y = \sqrt{8 + \frac{4}{x}}$$

Find y when $x = 2$.
Give your answer correct to 4 decimal places.

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

(b) Rearrange $y = \sqrt{8 + \frac{4}{x}}$ to make x the subject.

Answer(b) $x =$ ..... [4]

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