



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

--	--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--



**MATHEMATICS**

**0580/23**

Paper 2 (Extended)

**May/June 2013**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

Additional Materials:

Electronic calculator

Geometrical instruments

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  $\pi$ , 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.



- 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.

For  
Examiner's  
Use

Answer ..... [2]

---

- 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]

---

- 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]

---

4 Use a calculator to find

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

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

(b)  $\frac{\cos 40^\circ}{7}$ .

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

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

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

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

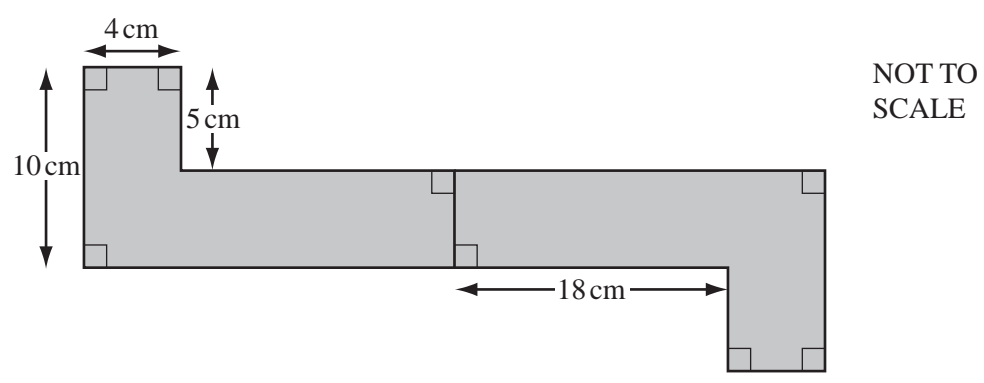
6 The volumes of two similar cones are  $36\pi \text{ cm}^3$  and  $288\pi \text{ cm}^3$ .  
The base radius of the smaller cone is 3 cm.

Calculate the base radius of the larger cone.

Answer ..... cm [3]

For  
Examiner's  
Use

7



The shaded shape has rotational symmetry of order 2.

Work out the shaded area.

Answer ..... cm<sup>2</sup> [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]

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]

---

For  
Examiner's  
Use

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]

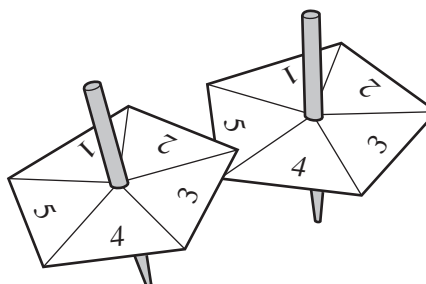
(b) The sum of the prime numbers less than  $x$  is 58.

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.

Second spinner	5	+	+	+	+	+
	4	+	+	+	+	+
	3	+	+	+	+	+
	2	+	+	+	+	+
	1	+	+	+	+	+
		1	2	3	4	5
		First spinner				



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]

13 Write as a single fraction in its simplest form.

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

For  
Examiner's  
Use

Answer ..... [4]

---

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

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

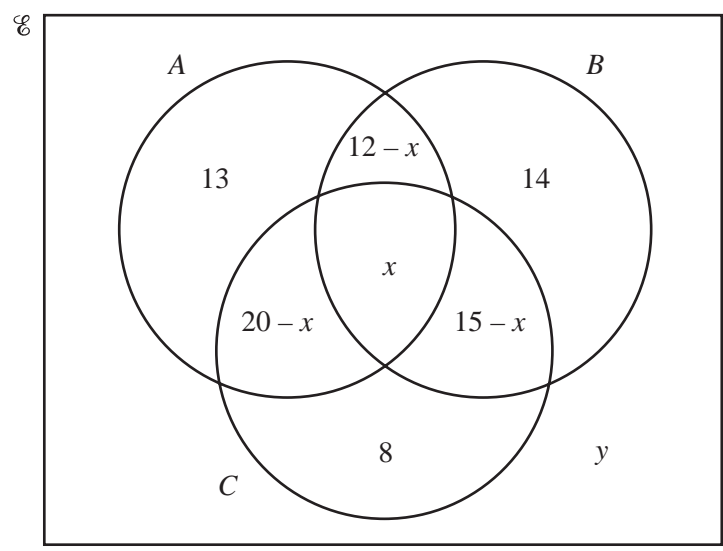
(b) Factorise completely  $ab + bc + ad + cd$ .

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

---

15

For  
Examiner's  
Use



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)  $x = \dots\dots\dots$  [2]

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

Find  $y$ .

Answer(b)  $y = \dots\dots\dots$  [1]

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

Answer(c)  $\dots\dots\dots$  [1]



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

$g(x) = \frac{x}{2} - 5$

For  
Examiner's  
Use

Find

(a)  $fg(18)$ ,

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

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

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

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

(a) Work out  $MN$ .

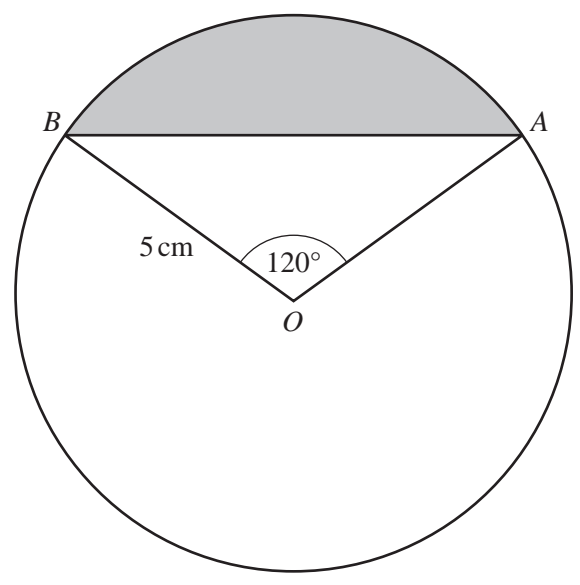
Answer(a) ..... [2]

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

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

18

For  
Examiner's  
Use

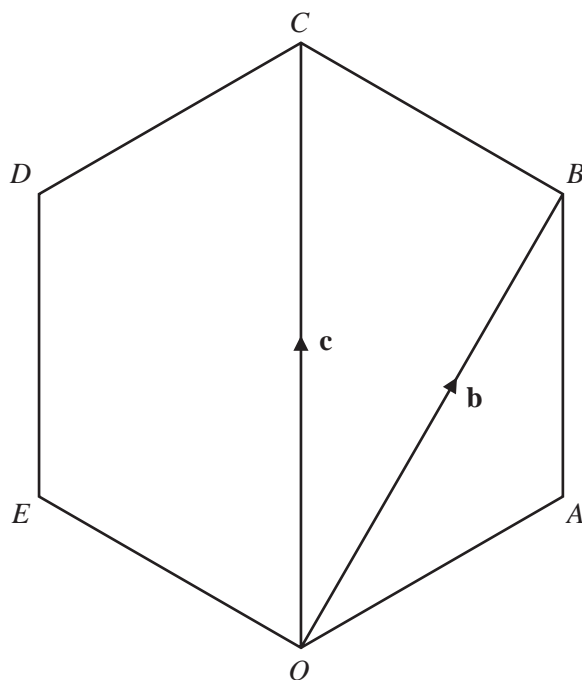


NOT TO  
SCALE

$A$  and  $B$  lie on a circle centre  $O$ , radius 5 cm.  
Angle  $AOB = 120^\circ$ .

Find the area of the shaded segment.

Answer .....  $\text{cm}^2$  [4]



$OABCDE$  is a regular polygon.

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

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

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

Find, in terms of  $\mathbf{b}$  and  $\mathbf{c}$ , in their simplest form,

(i)  $\vec{BC}$ ,

Answer(b)(i)  $\vec{BC} = \dots\dots\dots$  [1]

(ii)  $\vec{OA}$ ,

Answer(b)(ii)  $\vec{OA} = \dots\dots\dots$  [2]

(iii) the position vector of  $E$ .

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

Question 20 is printed on the next page.

20 (a)

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

Find  $y$  when  $x = 2$ .

Give your answer correct to 4 decimal places.

For  
Examiner's  
Use

*Answer(a)*  $y = \dots\dots\dots$  [2]

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

*Answer(b)*  $x = \dots\dots\dots$  [4]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.