UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

Paper 2 (Extended)

0580/02 0581/02

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

May/June 2006

1hour 30 minutes

Candidate Name

Centre Number

Candidate Number

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.
DO **NOT** WRITE IN THE BARCODE.
DO **NOT** WRITE IN THE GREY AREAS BETWEEN THE PAGES.

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.

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The total number of 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. Given answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

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

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1 The planet Neptune is 4 496 000 000 kilometres from the Sun.
Write this distance in standard form.

Answer ..... km [1]

2 Write down the next prime number after 89.

Answer ..... [1]

3 The table gives the average surface temperature (°C) on the following planets.

Planet	Earth	Mercury	Neptune	Pluto	Saturn	Uranus
Average temperature	15	350	−220	−240	−180	−200

(a) Calculate the range of these temperatures.

Answer(a) ..... °C [1]

(b) Which planet has a temperature 20 °C lower than that of Uranus?

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

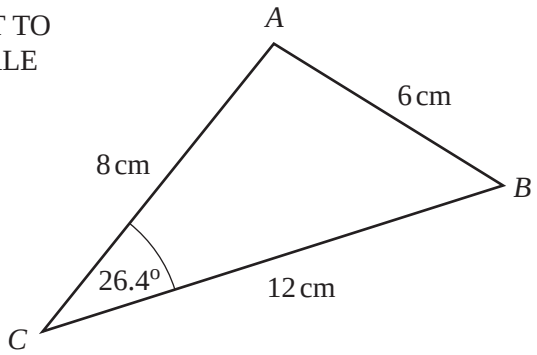
4 Work out

$$\frac{2\tan 30^\circ}{1-(\tan 30^\circ)^2}.$$

Answer ..... [2]

5 In triangle ABC, $AB = 6$ cm, $AC = 8$ cm and $BC = 12$ cm. Angle $ACB = 26.4°$.
Calculate the area of the triangle ABC.

NOT TO SCALE



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

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6 Write as a single fraction in its simplest form

$$\frac{5}{x} - \frac{4}{x+1}.$$

Answer ..... [2]

7 Sima drinks 2.5 litres of water each day.
A full glass holds 125 millilitres of water.
How many full glasses of water does Sima drink each day?

Answer ..... [2]

8 Write the following in order of size, smallest first.

$$\frac{\pi}{4} \qquad \frac{1}{\sqrt{2}} \qquad \frac{3}{4} \qquad \sin 47°$$

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

9 The distance between Singapore and Sydney is 6300 km correct to the nearest 100 km.
A businessman travelled from Singapore to Sydney and then back to Singapore.
He did this six times in a year.
Between what limits is the total distance he travelled?

Answer ..... km $\leqslant$ total distance travelled < ..... km [2]

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10 For the sequence $5\frac{1}{2}$, 7, $8\frac{1}{2}$, 10, $11\frac{1}{2}$, …

(a) find an expression for the nth term,

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

(b) work out the 100th term.

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

---

11 $f(x) = \frac{x+3}{x}$, $x \neq 0$.

(a) Calculate $f(\frac{1}{4})$.

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

(b) Solve $f(x) = \frac{1}{4}$.

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

---

12 Solve the simultaneous equations

$$0.4x + 2y = 10,$$
$$0.3x + 5y = 18.$$

Answer $x =$.....

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

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13 Solve the equation

$$\frac{x-2}{4} = \frac{2x+5}{3}.$$

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

---

14 A company makes two models of television.
Model *A* has a rectangular screen that measures 44 cm by 32 cm.
Model *B* has a larger screen with these measurements increased in the ratio 5:4.

(a) Work out the measurements of the larger screen.

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

(b) Find the **fraction** $\frac{\text{model } A \text{ screen area}}{\text{model } B \text{ screen area}}$ in its simplest form.

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

---

15 Angharad had an operation costing \$500.
She was in hospital for x days.
The cost of nursing care was \$170 for each day she was in hospital.

(a) Write down, in terms of x, an expression for the total cost of her operation and nursing care.

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

(b) The total cost of her operation and nursing care was \$2370.
Work out how many days Angharad was in hospital.

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

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16 In 2004 Colin had a salary of \$7200.

(a) This was an increase of 20% on his salary in 2002.
Calculate his salary in 2002.

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

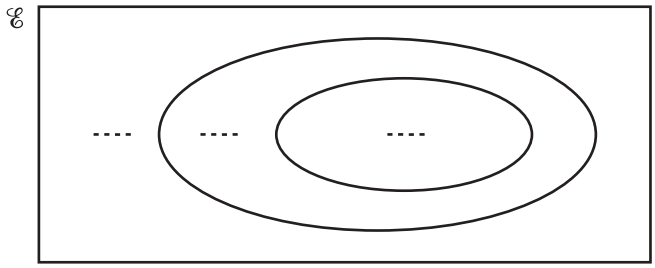
(b) In 2006 his salary increased to \$8100.
Calculate the percentage increase from 2004 to 2006.

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

---

17 n(A) = 18, n(B) = 11 and n($A \cup B$)′ = 0.

(a) Label the Venn diagram to show the sets A and B where n($A \cup B$) = 18.
Write down the number of elements in each region.



[2]

(b) Draw another Venn diagram to show the sets A and B where n($A \cup B$) = 29.
Write down the number of elements in each region.

[2]

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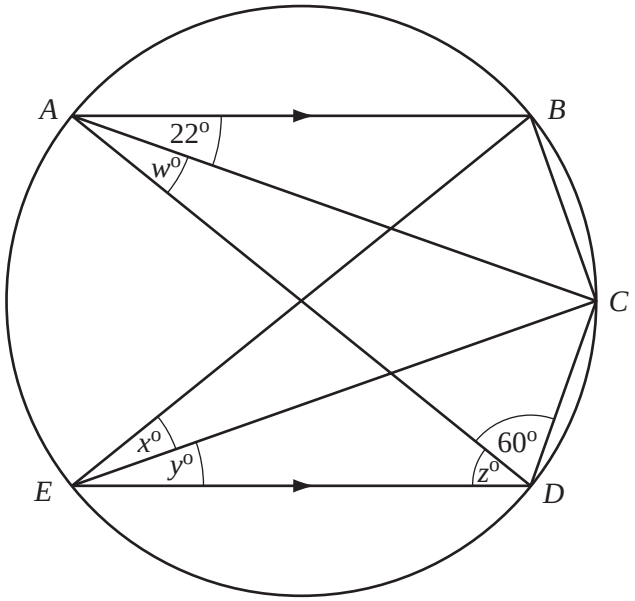

NOT TO SCALE

AD is a diameter of the circle *ABCDE*.
Angle *BAC* = 22° and angle *ADC* = 60°.
AB and *ED* are parallel lines.
Find the values of *w*, *x*, *y* and *z*.

Answer w= .....

x= .....

y= .....

z= ..... [4]

---

19 Factorise

(a) $4x^2 - 9$,

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

(b) $4x^2 - 9x$,

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

(c) $4x^2 - 9x + 2$.

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

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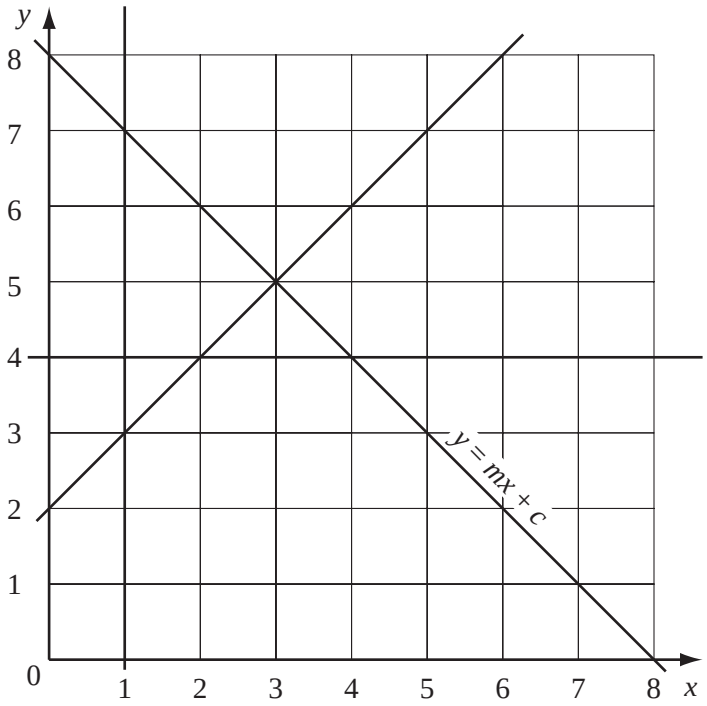

(a) One of the lines in the diagram is labelled $y = mx + c$.
Find the values of m and c.

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

c=..... [1]

(b) Show, by shading all the **unwanted** regions on the diagram, the region defined by the inequalities

$$x \geqslant 1, \quad y \leqslant mx + c, \quad y \geqslant x+2 \quad \text{and} \quad y \geqslant 4.$$

Write the letter **R** in the region required. [2]

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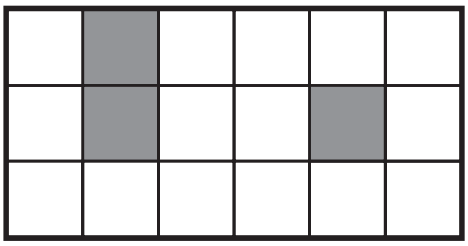
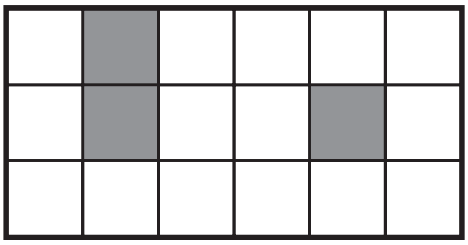
21 **(a)** Shade **one** square in each diagram so that there is

(i) one line of symmetry,



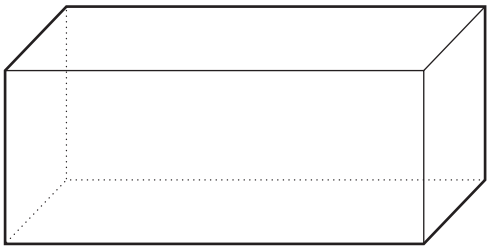
[1]

(ii) rotational symmetry of order 2.



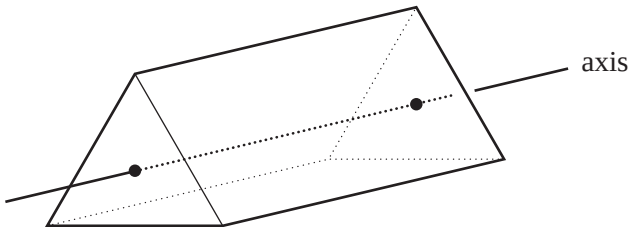
[1]

(b) On the diagram below, sketch one of the **planes** of symmetry of the cuboid.



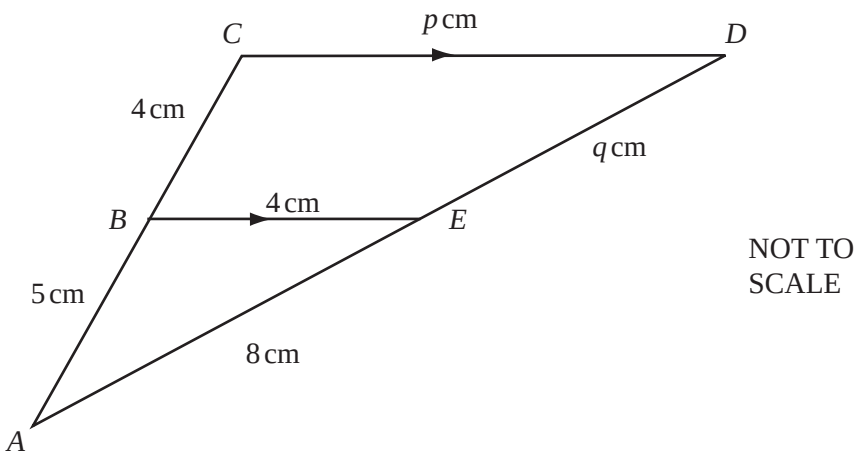
[1]

(c) Write down the order of rotational symmetry of the equilateral triangular prism about the axis shown.



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

22 (a)



In the diagram triangles *ABE* and *ACD* are similar.
BE is parallel to *CD*.
AB = 5 cm, *BC* = 4 cm, *BE* = 4 cm, *AE* = 8 cm, *CD* = *p* cm and *DE* = *q* cm.
Work out the values of *p* and *q*.

Answer(a) $p =$ .....

$q =$ ..... [4]

(b) A spherical balloon of radius 3 metres has a volume of 36π cubic metres.
It is further inflated until its radius is 12 m.
Calculate its new volume, leaving your answer in terms of π.

Answer(b) ..... m^3 [2]

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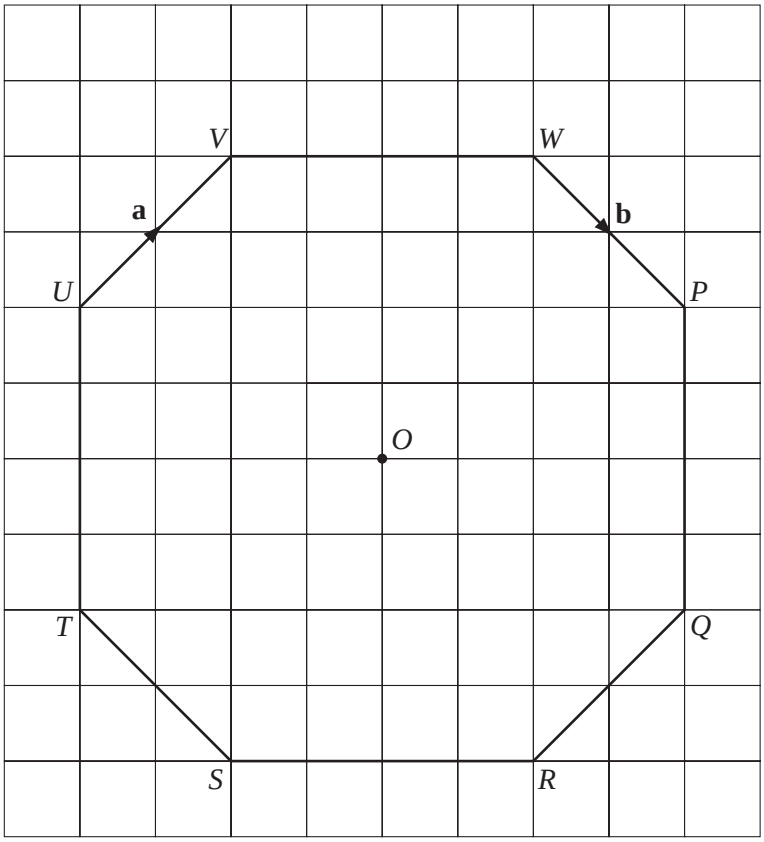

The origin O is the centre of the octagon $PQRSTUVW$.
$\overrightarrow{UV} = \mathbf{a}$ and $\overrightarrow{WP} = \mathbf{b}$.

(a) Write down in terms of **a** and **b**

(i) $\overrightarrow{VW}$,

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

(ii) $\overrightarrow{TU}$,

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

(iii) $\overrightarrow{TP}$,

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

(iv) the position vector of the point P.

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

(b) In the diagram, 1 centimetre represents 1 unit.
Write down the value of $|\mathbf{a} - \mathbf{b}|$.

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

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