UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

2691337409

MATHEMATICS **0580/21, 0581/21**

Paper 2 (Extended) **May/June 2008**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
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 soft 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.
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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.

For Examiner's Use

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

For Examiner's Use

1 Write down the next two prime numbers after 47.

Answer ..... and ..... [2]

2 Simplify $\frac{x}{3} + \frac{5x}{9} - \frac{5x}{18}$.

Answer ..... [2]

3 Lin scored 18 marks in a test and Jon scored 12 marks.
Calculate Lin's mark as a percentage of Jon's mark.

Answer ..... % [2]

4 **(a)** The formula for the nth term of the sequence

$$1,\ 5,\ 14,\ 30,\ 55,\ 91, \ldots \quad \text{is} \quad \frac{n(n+1)(2n+1)}{6}.$$

Find the 20th term.

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

(b) The nth term of the sequence 10, 17, 26, 37, 50, ... is $(n+2)^2 + 1$.

Write down the formula for the nth term of the sequence 17, 26, 37, 50, 65, …

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

For Examiner's Use

5 A holiday in Europe was advertised at a cost of €245.
The exchange rate was \$1 = €1.06.
Calculate the cost of the holiday in dollars, giving your answer correct to the nearest cent.

Answer \$ ..... [2]

---

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

$\frac{399}{401}$ $\frac{698}{701}$ $\frac{598}{601}$

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

---

7 Write the number 1045.2781 correct to

(a) 2 decimal places,

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

(b) 2 significant figures.

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

---

8 Simplify $(27x^3)^{\frac{2}{3}}$.

Answer ..... [2]

For Examiner's Use

9 A straight line passes through two points with co-ordinates (6, 8) and (0, 5).
Work out the equation of the line.

Answer ..... [3]

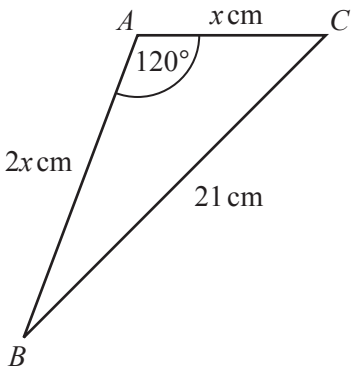
10 A cylindrical glass has a radius of 3 centimetres and a height of 7 centimetres.
A large cylindrical jar full of water is a similar shape to the glass.
The glass can be filled with water from the jar exactly 216 times.
Work out the radius and height of the jar.

Answer radius ..... cm

height ..... cm [3]

11

NOT TO SCALE



In triangle ABC, $AB = 2x$ cm, $AC = x$ cm, $BC = 21$ cm and angle $BAC = 120°$.
Calculate the value of x.

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

12 $\mathscr{E} = \{1,2,3,4,5,6,7,9,11,16\}$ $P = \{2,3,5,7,11\}$ $S = \{1,4,9,16\}$ $M = \{3,6,9\}$

For Examiner's Use

(a) Draw a Venn diagram to show this information.

[2]

(b) Write down the value of $n(M' \cap P)$.

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

---

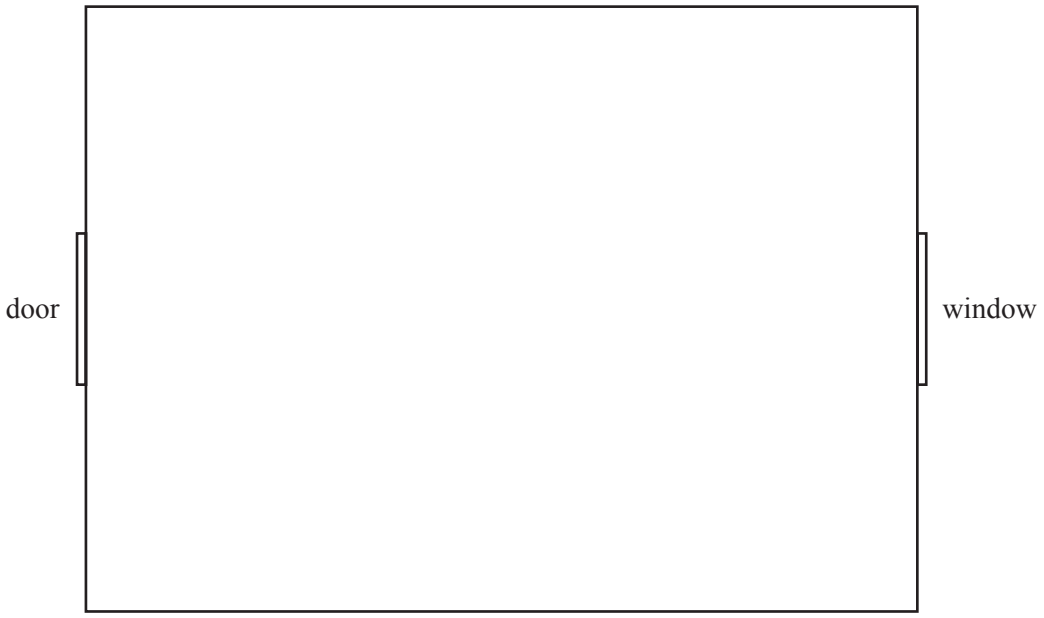
13 Solve the inequality

$$\frac{2x-5}{8} > \frac{x+4}{3}.$$

Answer ..... [3]

For Examiner's Use

14 Sitora has two plants in her school classroom.
Plant A needs a lot of light and must not be more than 2.5 metres from the window.
Plant B needs very little light and must be further from the window than from the door.
For each plant, draw accurately the boundary of the region in which it can be placed.
In the diagram, 1 centimetre represents 1 metre.



[3]

15 Work out

$$\begin{pmatrix} 2 & 1 & 2 \\ 1 & 5 & 0 \\ 3 & -2 & 4 \end{pmatrix}\begin{pmatrix} 4 \\ -3 \\ -8 \end{pmatrix}.$$

Answer ..... [3]

For Examiner's Use

16 Find the co-ordinates of the point of intersection of the straight lines

$$2x + 3y = 11,$$
$$3x - 5y = -12.$$

Answer (..... , ...) [3]

---

17 A student played a computer game 500 times and won 370 of these games.
He then won the next x games and lost none.
He has now won 75% of the games he has played.
Find the value of x.

Answer $x =$ ..... [4]

---

18 $f(x) = x^3 - 3x^2 + 6x - 4$ and $g(x) = 2x - 1$.

Find

(a) $f(-1)$,

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

(b) $gf(x)$,

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

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

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

For Examiner's Use

19

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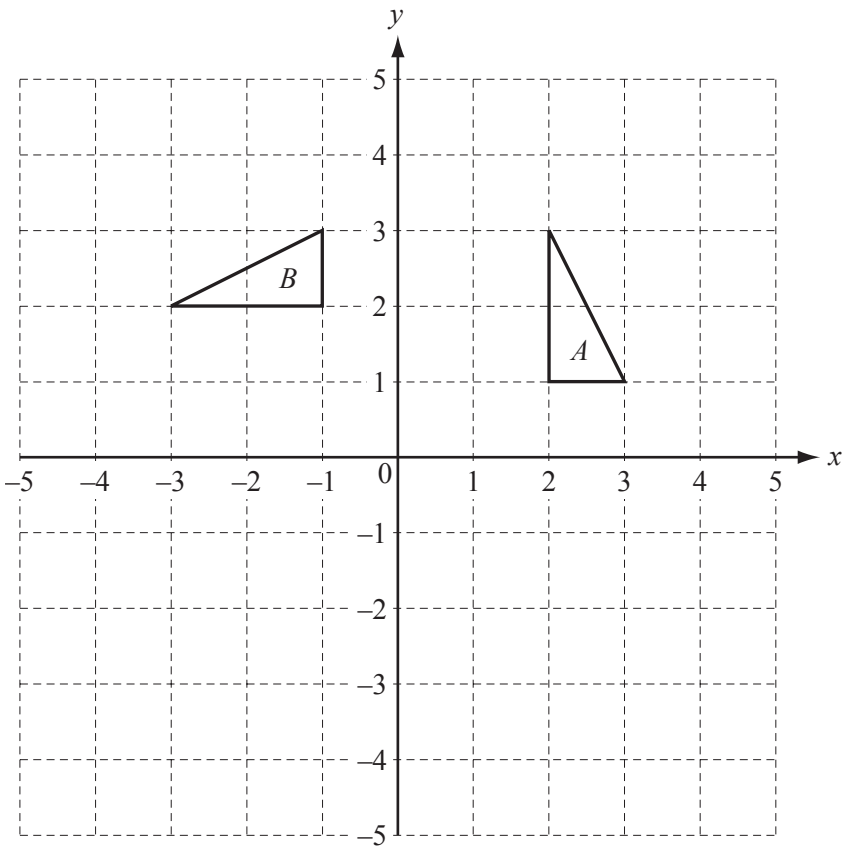


(a) A transformation is represented by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$.

(i) **On the grid above**, draw the image of triangle *A* after this transformation.

[2]

(ii) Describe fully this transformation.

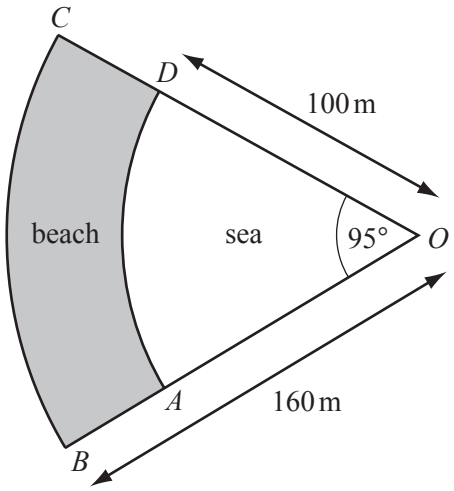
Answer(a)(ii) ..... [2]

(b) Find the 2 by 2 matrix representing the transformation which maps triangle *A* onto triangle *B*.

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

20 The shaded area shows a beach.
AD and *BC* are circular arcs, centre *O*.
OB = 160 m, *OD* = 100 m and angle *AOD* = 95°.

NOT TO SCALE



For Examiner's Use

(a) Calculate the area of the beach *ABCD* in square metres.

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

(b) The beach area is covered in sand to a depth of 1.8 m.

Calculate the volume of the sand in cubic metres.

Answer(b) ..... m^3 [1]

(c) Write both the following answers in standard form.

(i) Change your answer to **part(b)** into cubic **millimetres**.

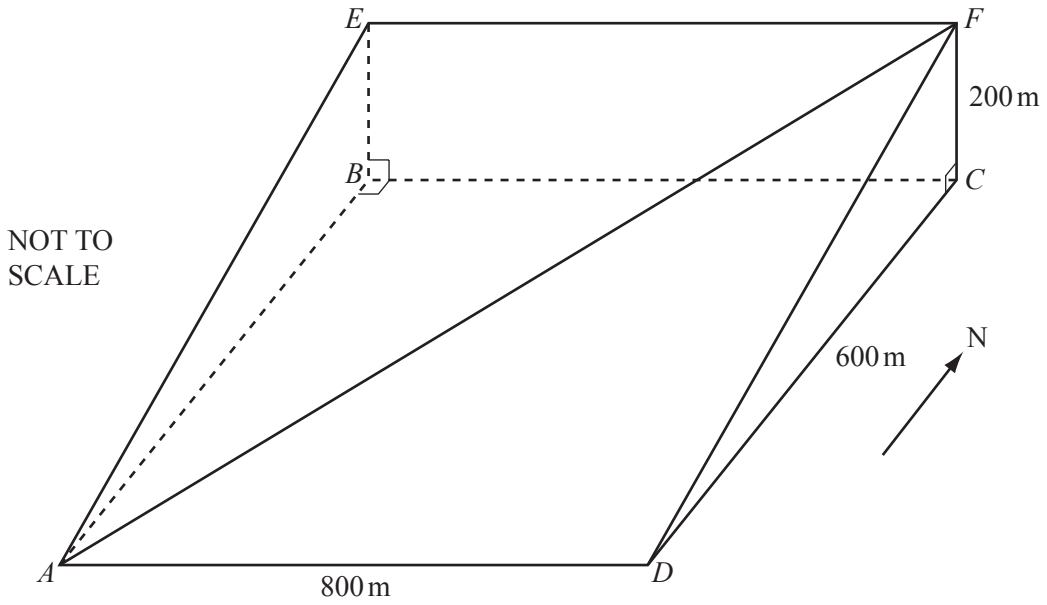
Answer(c)(i) ..... mm^3 [1]

(ii) Each grain of sand has a volume of 2 mm^3 correct to the nearest mm^3.

Calculate the maximum possible number of grains of sand on the beach.

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

21



ABCD, *BEFC* and *AEFD* are all rectangles.
ABCD is horizontal, *BEFC* is vertical and *AEFD* represents a hillside.
AF is a path on the hillside.
AD = 800 m, *DC* = 600 m and *CF* = 200 m.

(a) Calculate the angle that the path *AF* makes with *ABCD*.

Answer(a) ..... [5]

(b) In the diagram *D* is due south of *C*.
Jasmine walks down the path from *F* to *A* in bad weather. She cannot see the path ahead.
The compass bearing she must use is the bearing of *A* from *C*.
Calculate this bearing.

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

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Answer ..... [2]

3 Lin scored 21 marks in a test and Jon scored 15 marks.
Calculate Lin's mark as a percentage of Jon's mark.

Answer ..... % [2]

4 **(a)** The formula for the nth term of the sequence

$$1,\ 5,\ 14,\ 30,\ 55,\ 91,\ \ldots \text{ is } \frac{n(n+1)(2n+1)}{6}.$$

Find the 15th term.

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

(b) The nth term of the sequence 17, 26, 37, 50, 65,... is $(n + 3)^2 + 1$.

Write down the formula for the nth term of the sequence 26, 37, 50, 65, 82,…

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

For Examiner's Use

5 A holiday in Europe was advertised at a cost of €330.
The exchange rate was \$1 = €1.07.
Calculate the cost of the holiday in dollars, giving your answer correct to the nearest cent.

Answer \$ ..... [2]

---

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

$\frac{399}{401}$ $\frac{598}{601}$ $\frac{698}{701}$

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7 Write the number 2045.4893 correct to

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8 Simplify $(16x^4)^{\frac{3}{4}}$.

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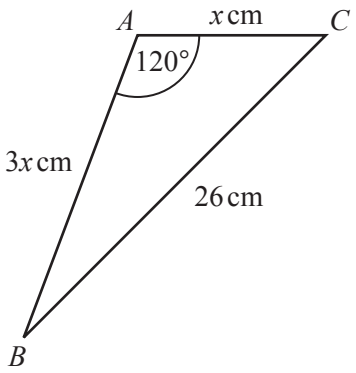

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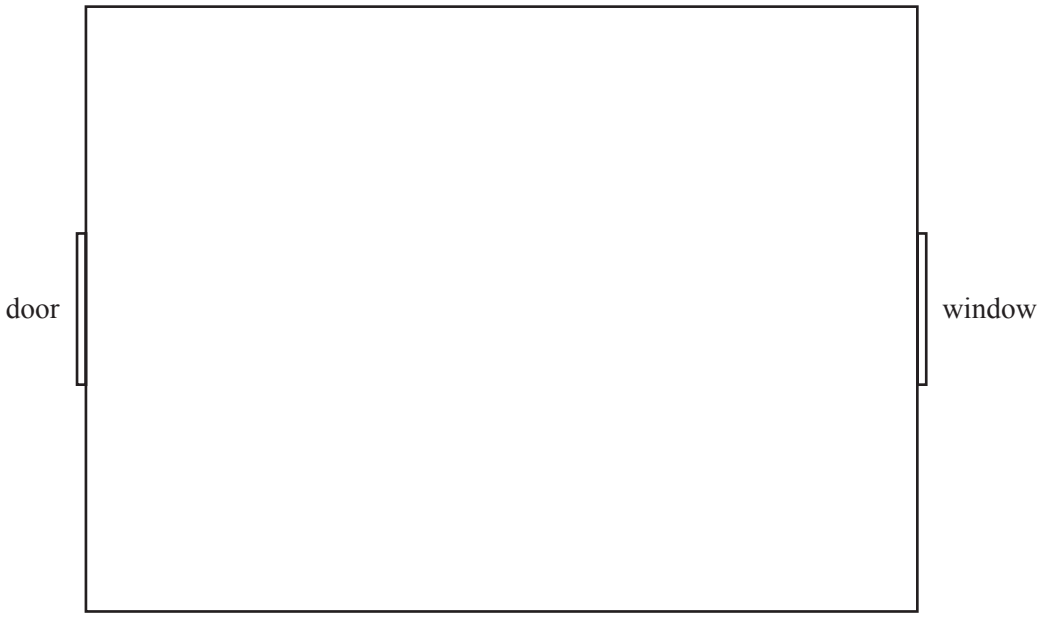

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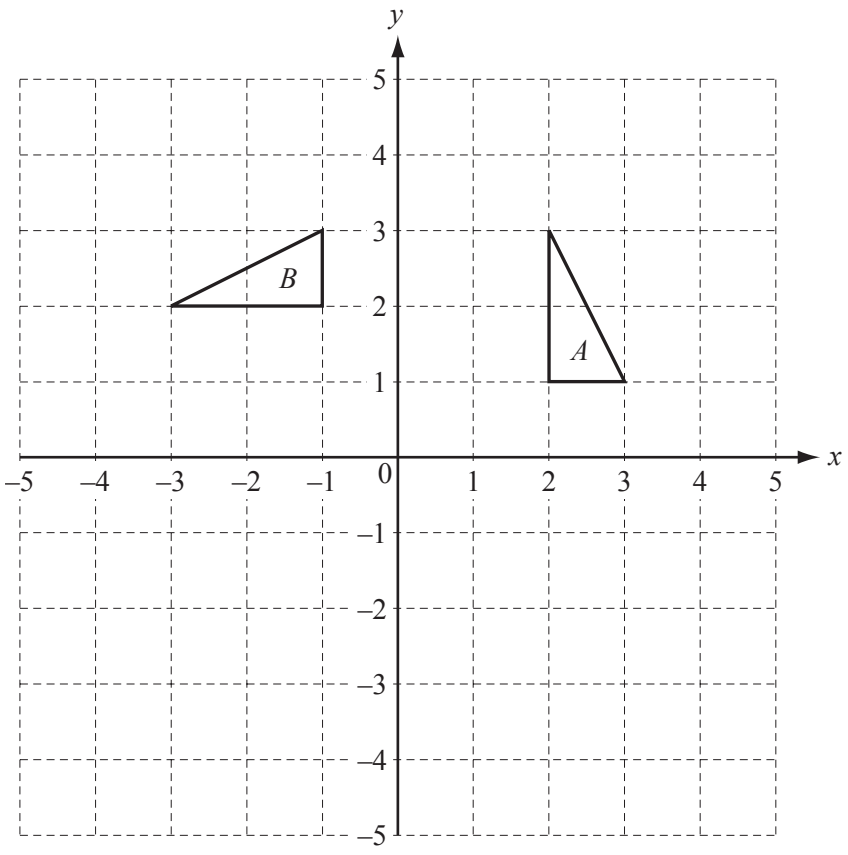

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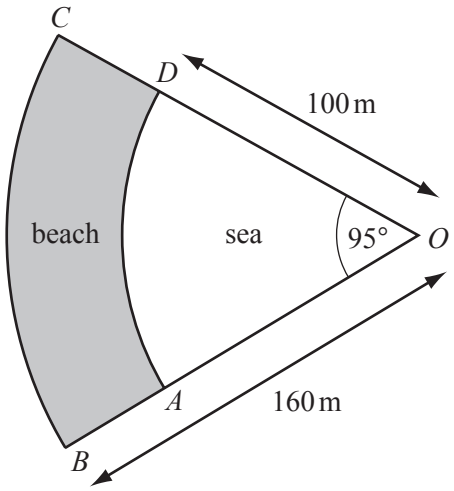

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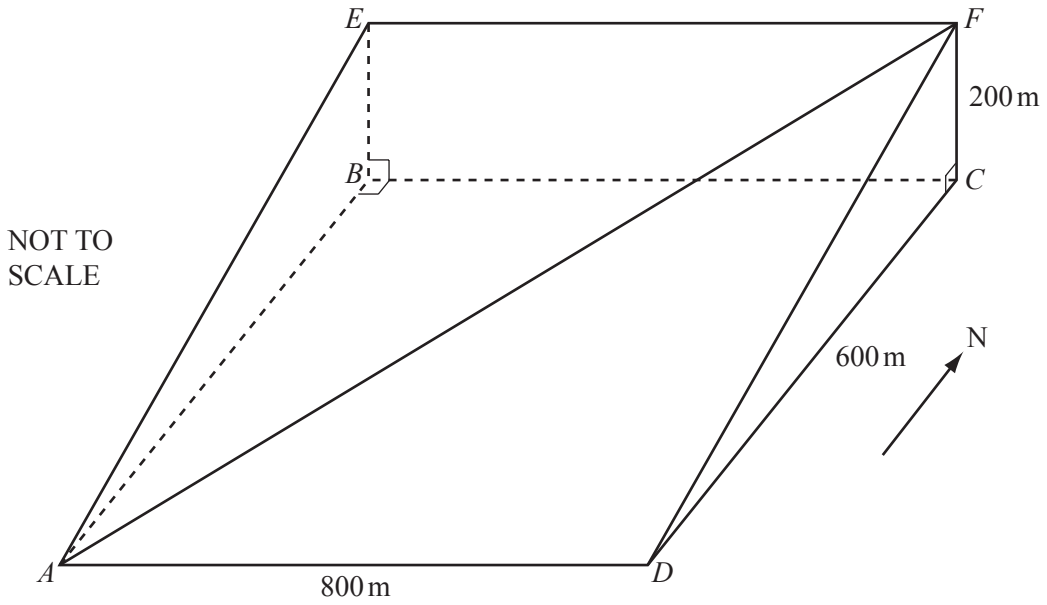

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