UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

Paper 3 (Core)

0580/03 0581/03

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

May/June 2005

2 hours

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.

For Examiner's Use

The total number of marks for this paper is 104.
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 **15** printed pages and **1** blank page.

For Examiner's Use

1 Juana is travelling by plane from Spain to England.

(a) Her case weighs 17.2 kilograms.
The maximum weight allowed is 20 kilograms.
By how much is the weight of her case below the maximum allowed?

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

(b) She changes 150 euros (€) into pounds (£).
The exchange rate is €1 = £0.71.
Calculate how much she receives.

Answer (b) £ ..... [1]

(c) She travels from her home to the airport by train.
She catches a train at 09 55 and the journey takes 45 minutes.

(i) Write down the time she arrives at the airport.

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

(ii) She has to wait until 12 10 to get on her plane.
Work out how long she has to wait.

Answer (c)(ii) ..... h ..... min [1]

(d) The plane takes off at 12 40 Spanish time, which is 11 40 English time.
The flight takes $2\frac{1}{4}$ hours.
What is the time in England when she arrives?

Answer (d) ..... [1]

(e) The plane has seats for 420 passengers.
15% of the seats are empty.
How many passengers are on the plane?

Answer (e) ..... [3]

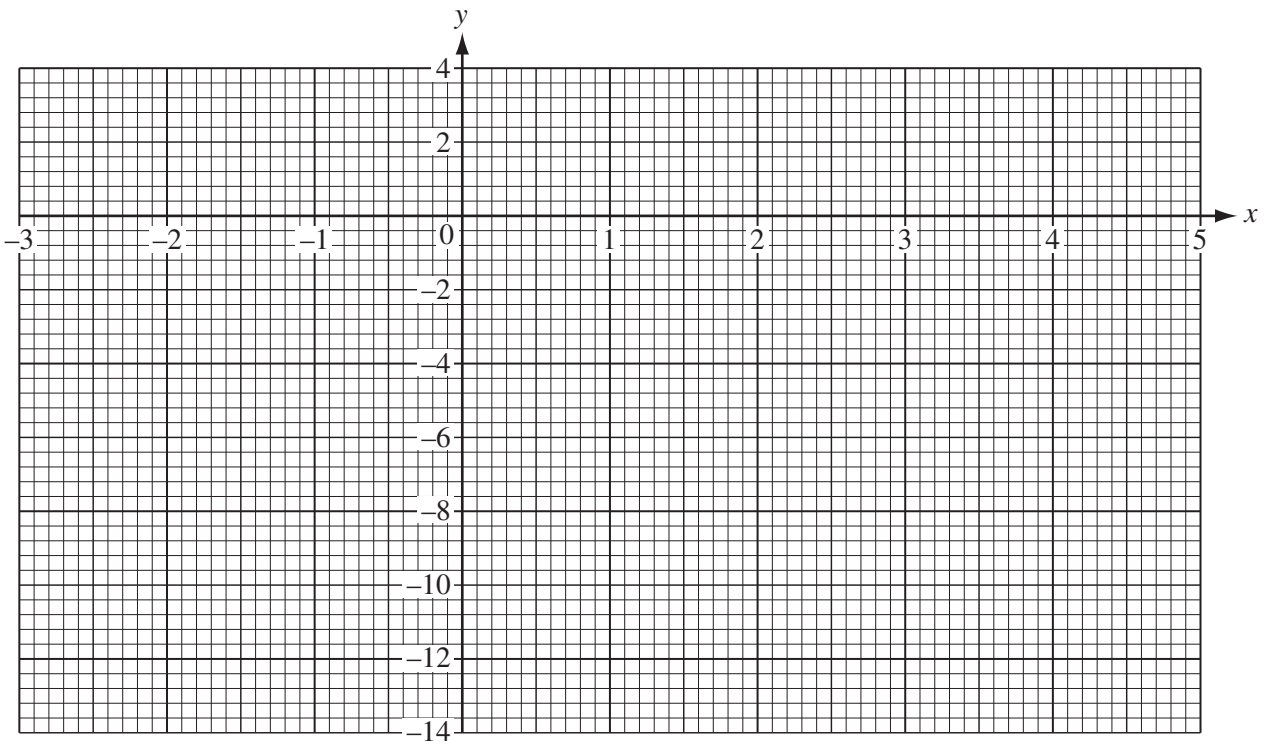
For Examiner's Use

2 **(a)** Complete the table of values for $y = 1 + 2x - x^2$.

x	-3	-2	-1	0	1	2	3	4	5
y	-14	-7				1	-2		-14

[3]

(b) Draw the graph of $y = 1 + 2x - x^2$ on the grid below.



[4]

(c) Use your graph to find the solutions to the equation $1 + 2x - x^2 = 0$.

Answer (c) $x =$ .....

or $x =$ ..... [2]

(d) **(i)** On the grid, draw the line of symmetry of the graph. [1]

(ii) Write down the equation of this line of symmetry.

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

3

For Examiner's Use

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Minimum temperature °C	4	6	0	−2	−4	2	
Maximum temperature °C	8	10	5	7	2	7	

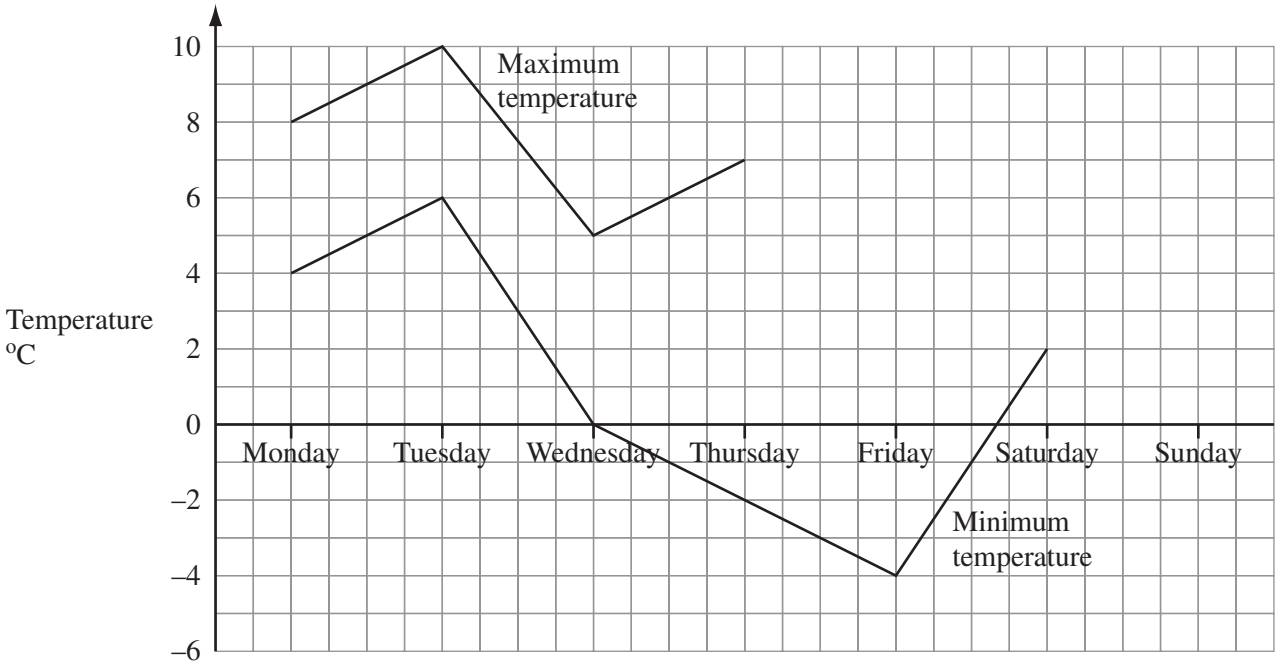
The table shows the minimum and maximum temperatures on six days of a week.

(a) (i) On Sunday the minimum temperature was 5 °C lower than on Saturday.
The maximum temperature was 2 °C higher than on Saturday.
Use this information to complete the table. [2]

(ii) Find the difference between the minimum and maximum temperatures on Thursday.

Answer(a)(ii) ..... °C [1]

(b) Use the table to complete the graphs below for all seven days.



[2]

For Examiner's Use

(c) Use your graphs to find

(i) on how many days the temperature fell below −1 °C,

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

(ii) which day had the largest difference between minimum and maximum temperatures.

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

(d) The formula for changing degrees Celsius (C) to degrees Fahrenheit (F) is

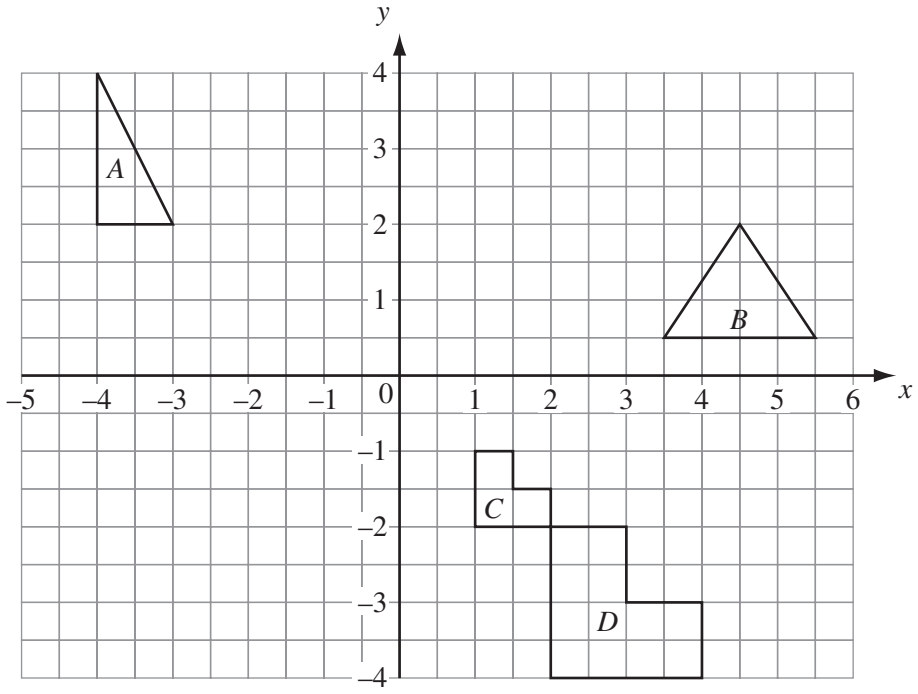
$$F = \frac{9C}{5} + 32 .$$

Use the formula to change 6 degrees Celsius to degrees Fahrenheit.
Show all your working.

Answer(d) ..... [2]

4

For Examiner's Use



(a) A translation is given by $\begin{pmatrix} 6 \\ 3 \end{pmatrix} + \begin{pmatrix} -3 \\ -4 \end{pmatrix}$.

(i) Write this translation as a single column vector.

Answer(a)(i) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

(ii) On the grid, draw the translation of triangle *A* using this vector. [2]

(b) Another translation is given by $-2\begin{pmatrix} 1 \\ -1 \end{pmatrix}$

(i) Write this translation as a single column vector.

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

(ii) On the grid, draw the translation of triangle *B* using this vector. [2]

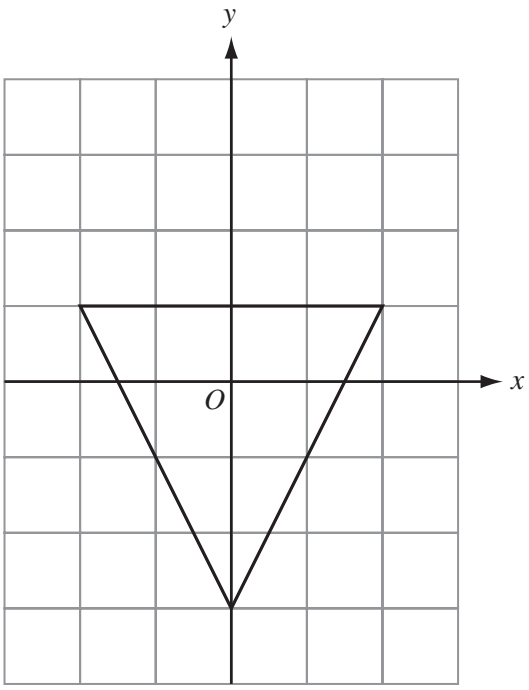
(c) Describe fully the single transformation that maps shape *C* onto shape *D*.

Answer(c) .....

..... [3]

(d)

For Examiner's Use



The triangle in the diagram above is isosceles.

(i) How many lines of symmetry does this triangle have?

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

(ii) Write down the order of rotational symmetry of this triangle.

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

(iii) On the grid above, draw the rotation of this triangle about O through 180^{o}. [2]

(iv) Describe fully another single transformation that maps this triangle onto your answer for part **(d)(iii)**.

Answer(d)(iv) .....

..... [2]

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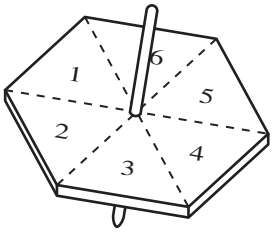
For Examiner's Use



(a) Asif tests a six-sided spinner.

The results of 60 spins are shown below.

3	3	6	5	6	1	2	6	5	2
3	4	4	4	3	4	6	5	2	1
6	3	6	4	1	5	3	6	2	6
6	6	3	6	1	6	6	5	1	6
1	6	2	5	3	6	4	2	3	5
1	4	4	1	5	4	6	6	2	3

(i) Use these results to complete the frequency table.

Number	Frequency
1	
2	
3	
4	
5	
6	

[3]

(ii) Write down the mode.

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

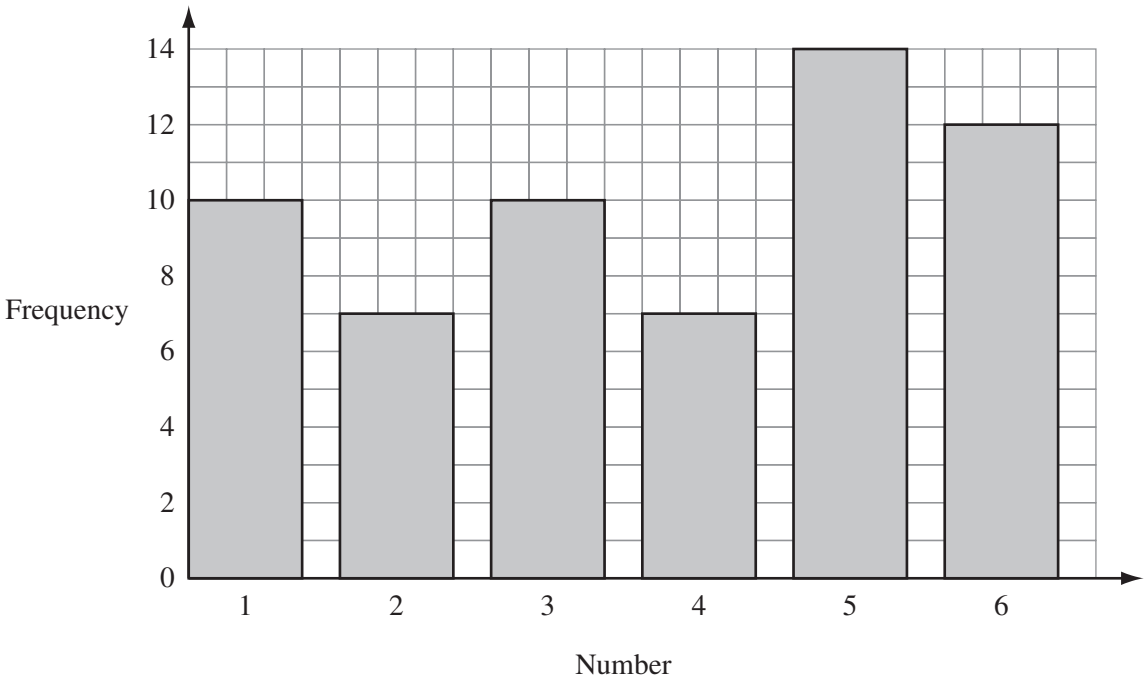
(iii) Find the median.

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

(iv) Calculate the mean.
Give your answer correct to one decimal place.

Answer(a)(iv) ..... [3]

(b) Asif tests a **different** six-sided spinner.
He draws a bar chart to show the results.



(i) How many times did he spin this spinner?

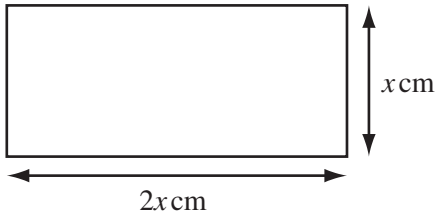
Answer(b)(i) ..... [2]

(ii) Calculate the mean score for this spinner.

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

For Examiner's Use

6 (a)



NOT TO SCALE

The perimeter of the rectangle in the diagram above is 36 centimetres.

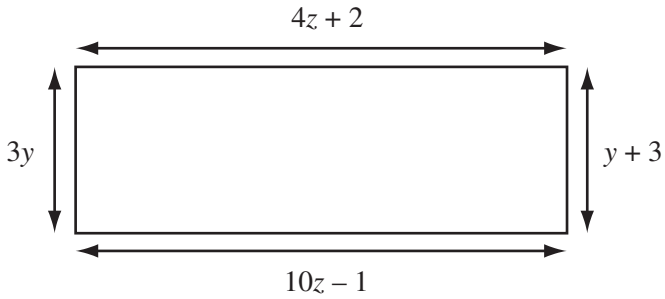
(i) Find the value of x.

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

(ii) Using this value of x, calculate the area of the rectangle.

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

(b)



NOT TO SCALE

The diagram above shows another rectangle.

(i) In this rectangle $3y = y + 3$.
Solve the equation to find y.

Answer(b)(i) $y =$ ..... [2]

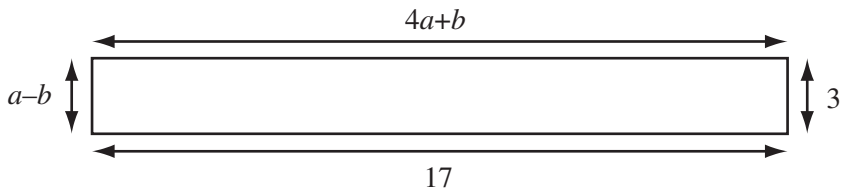
(ii) Write down an equation in z.

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

(iii) Solve the equation in part **(b)(ii)** to find z.

Answer(b)(iii) $z =$ ..... [3]

(c)



NOT TO SCALE

For Examiner's Use

The diagram above shows another rectangle.

(i) Write down two equations in a and b.

Answer(c)(i) .....

..... [2]

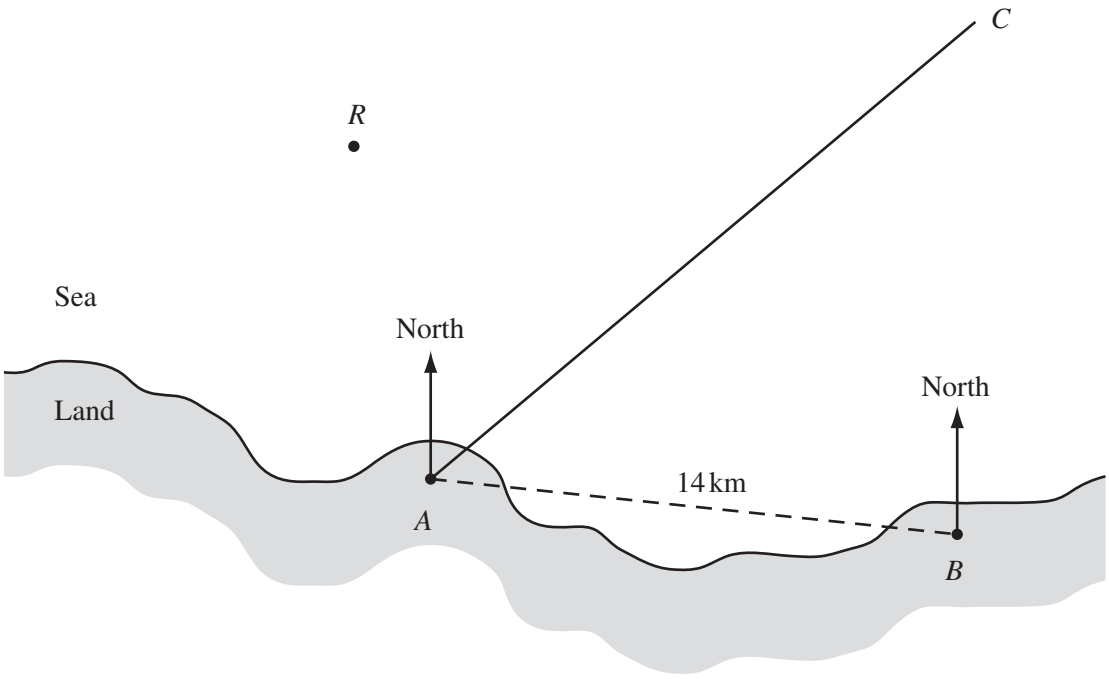
(ii) Solve these two equations simultaneously to find a and b.

Answer(c)(ii) a = ...

b = ... [3]

7

For Examiner's Use



At midday, a ship is somewhere along the line from *A* to *C*.

(a) By measuring an angle, write down the three figure bearing of the ship from *A*.

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

(b) The coastguard at *B* sees the ship on a bearing of 350°.

(i) On the diagram draw accurately the line showing a bearing of 350° from *B*. [1]

(ii) On the diagram mark the position of the ship, *S*. [1]

(c) **(i)** Measure the length, in centimetres, of the line *AB* on the diagram.

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

(ii) The distance from *A* to *B* is 14 kilometres.
Calculate the scale of the drawing.
Give your answer in the form 1:*n*.

Answer(c)(ii) 1: ..... [2]

For Examiner's Use

(d) The ship is sailing straight for the rocks, *R*.
There is a lighthouse at *A*.
The range of the light from the lighthouse is 10 kilometres.

(i) Using your scale, draw the locus of points that are 10 kilometres from *A*. [2]

(ii) Draw the line *SR* on the diagram.
How far is the ship from the rocks when the light from the lighthouse is first seen on the ship?

Answer(d)(ii) ..... km [2]

(e) If the ship does not alter course it will hit the rocks at 12 40.
A lifeboat sets off from the coastguard station, *B*, at 12 00 and sails straight towards the rocks.

(i) Measure and calculate the distance, in kilometres, from the coastguard station, *B*, to the rocks, *R*.

Answer(e)(i) ..... km [2]

(ii) Calculate the speed, in kilometres per hour, at which the lifeboat must sail to reach the rocks by 12 40.

Answer(e)(ii) ..... km/h [3]

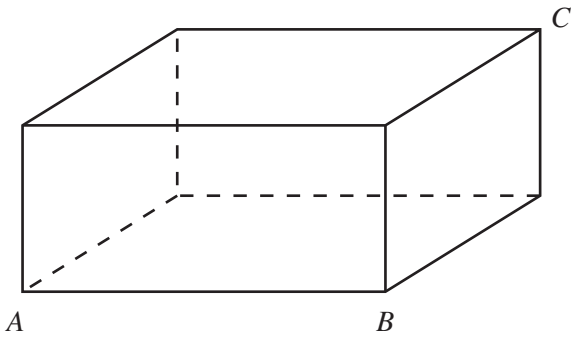
(iii) A knot is 1 nautical mile per hour.
One nautical mile is equal to 1.85 kilometres.
Calculate the speed found in part **(e)(ii)** in knots.

Answer(e)(iii) ..... knots [2]

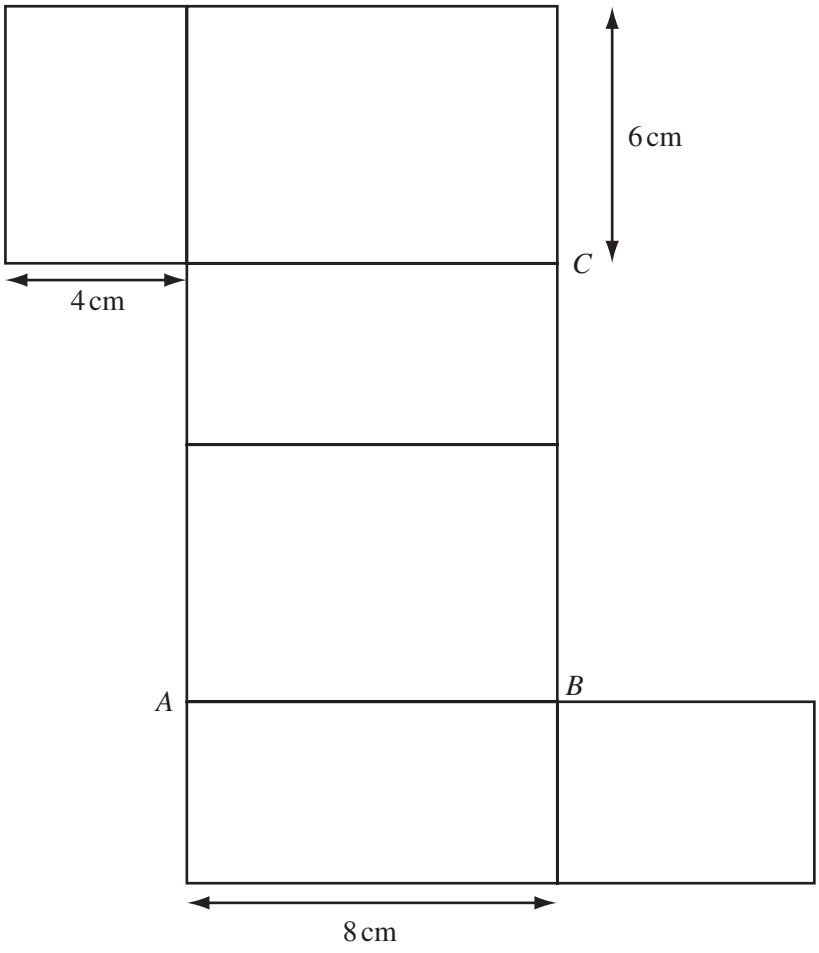
[Turn over

8

For Examiner's Use



NOT TO SCALE



NOT TO SCALE

The diagram above shows a cuboid and its net.

(a) Calculate the total surface area of the cuboid.

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

For Examiner's Use

(b) Calculate the volume of the cuboid.

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

(c) An ant walks directly from *A* to *C* on the surface of the cuboid.

(i) Draw a straight line on the net to show this route. [1]

(ii) **Calculate** the length of the ant's journey.

Answer(c)(ii) ..... cm [3]

(iii) **Calculate** the size of angle *CAB* on the net.

Answer(c)(iii) Angle *CAB* = ... [3]

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