UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

4932585116

MATHEMATICS **0580/33**

Paper 3 (Core) **October/November 2013**

2 hours

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 104.

This document consists of **16** printed pages.

For Examiner's Use

1 Adam owns a farm.

(a) He plans to keep twenty hens.
He works out what he thinks this will cost.

Complete the following table.

Item	Cost ($)
Equipment	500
20 hens costing $12 each	
3 years supply of feed costing $25 per month	
TOTAL	

[3]

(b) The equipment actually costs $600.

The ratio of costs is equipment : hens : feed = 5 : 3 : 9 .

(i) Show that the total cost is now $2040.

Answer(b)(i)

[2]

(ii) Adam actually buys more than 20 hens, each costing $12.

How many hens does he buy?

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

For Examiner's Use

(c) Adam makes \$2920 from selling his hens' eggs.

Calculate his percentage profit on the \$2040.

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

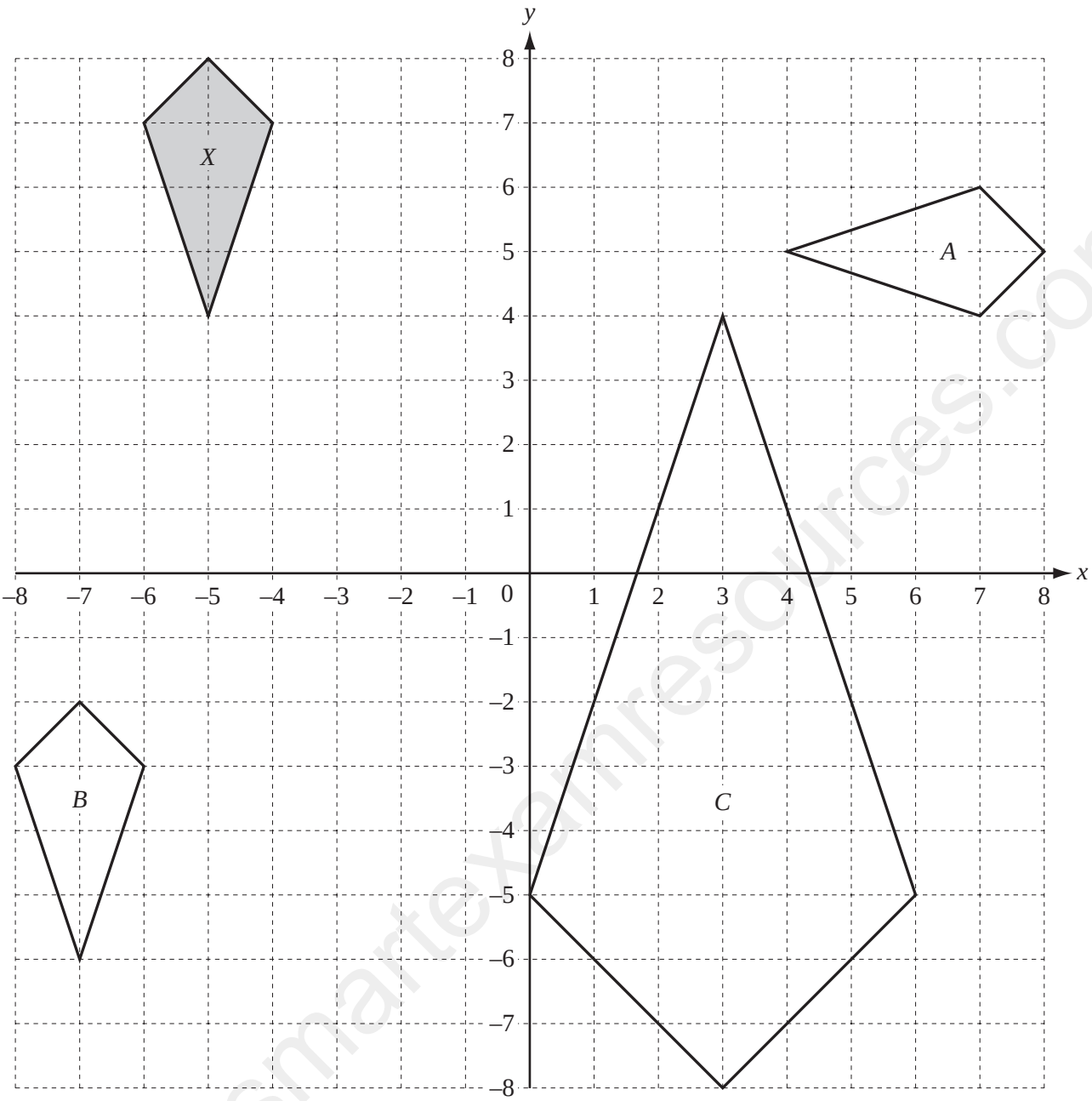
(d) Adam borrows \$1500 for 3 years at a rate of 5.5% per year compound interest.

Calculate the interest he will pay, correct to the nearest cent.

Answer(d) \$ ..... [3]

For Examiner's Use

2 The diagram shows four quadrilaterals drawn on a 1 cm^2 grid.



(a) Write down the mathematical name of the quadrilateral *X*.

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

For Examiner's Use

(b) Describe fully the **single** transformation that maps quadrilateral *X* onto quadrilateral

(i) *A*,

Answer(b)(i) .....

..... [3]

(ii) *B*,

Answer(b)(ii) .....

..... [2]

(iii) *C*.

Answer(b)(iii) .....

..... [3]

(c) (i) Calculate the length of the longest side of quadrilateral *X*.
Show that your answer rounds to 3.16 cm, correct to 3 significant figures.

Answer(c)(i)

[2]

(ii) Calculate the perimeter of quadrilateral *X*.

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

(iii) Find the perimeter of quadrilateral *C*.

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

For Examiner's Use

3 **(a)** Using only the integers from 1 to 50, find

(i) a multiple of both 4 and 7,

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

(ii) a square number that is odd,

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

(iii) an even prime number,

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

(iv) a prime number which is one less than a multiple of 5.

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

(b) Find the value of

(i) $(\sqrt{5})^2$,

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

(ii) $2^{-3} \times 6^3$.

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

For Examiner's Use

4 **(a)** A regular polygon has 9 sides.
For this polygon, calculate

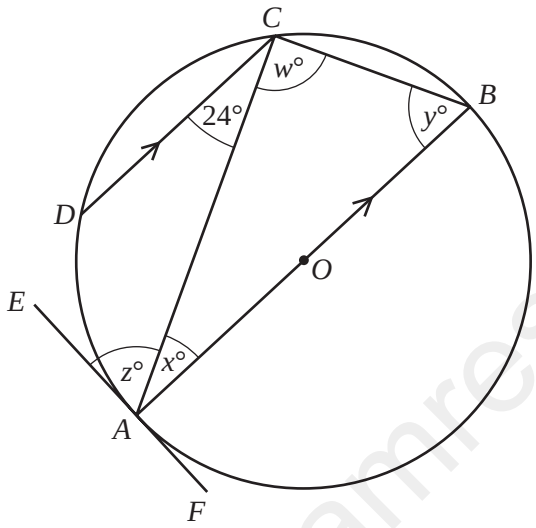
(i) the size of one exterior angle,

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

(ii) the size of one interior angle.

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

(b)



NOT TO SCALE

In the diagram, *A*, *B*, *C* and *D* are points on the circumference of a circle, centre *O*.
AB is the diameter and *EF* is a tangent to the circle at *A*.
AB is parallel to *DC* and angle *ACD* = 24°.

Find

(i) *w*,

Answer(b)(i) *w* = ... [1]

(ii) *x*,

Answer(b)(ii) *x* = ... [1]

(iii) *y*.

Answer(b)(iii) *y* = ... [1]

(c) Complete the statement.

z = ... because .....

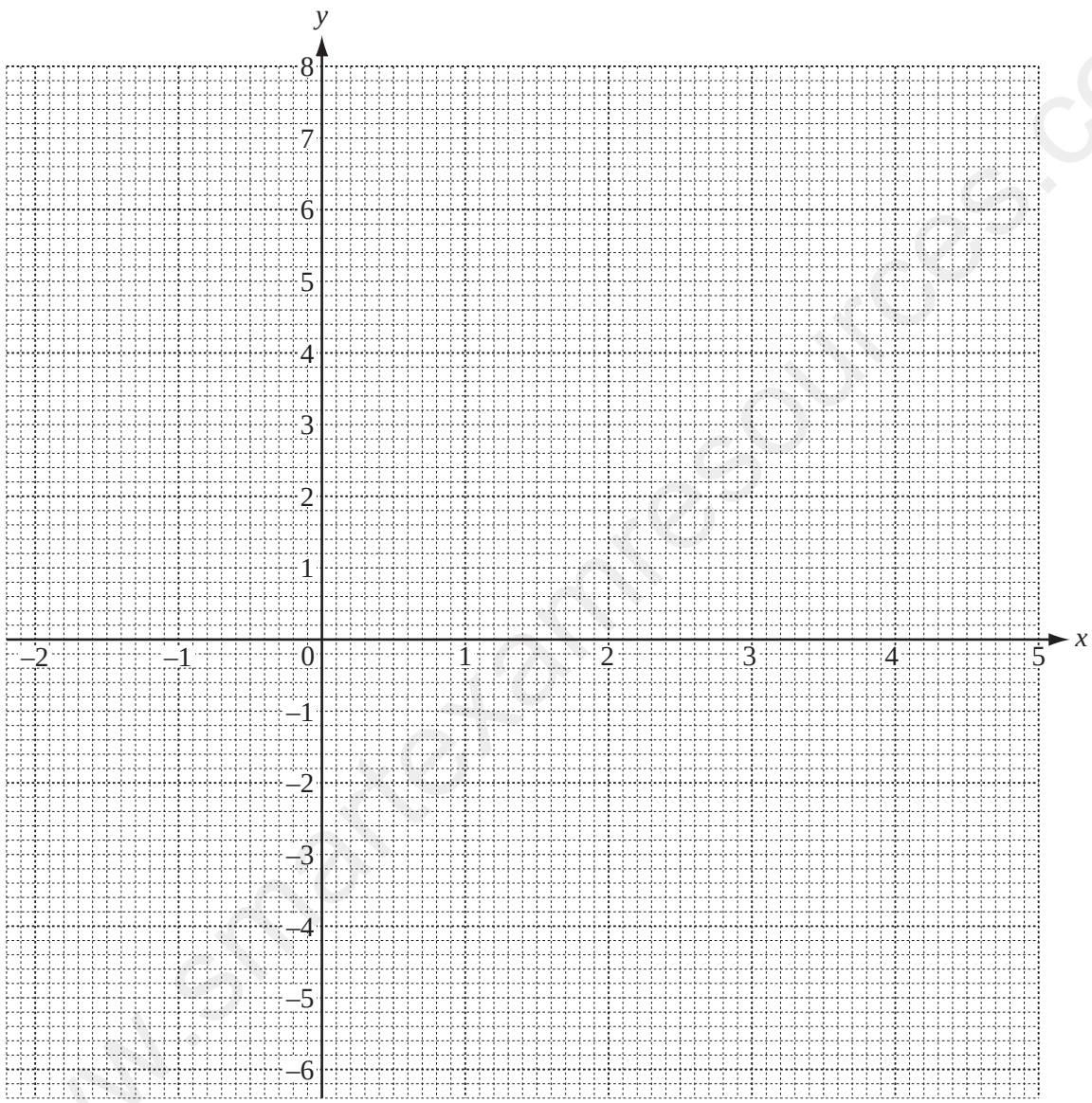
..... [2]

5 **(a)** **(i)** Complete the table for $y = 5 + 3x - x^2$.

x	–2	–1	0	1	2	3	4	5
y	–5		5	7		5		–5

[3]

(ii) On the grid, draw the graph of $y = 5 + 3x - x^2$ for $-2 \leqslant x \leqslant 5$.



[4]

(b) Use your graph to solve the equation $5 + 3x - x^2 = 0$.

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

(c) **(i)** On the grid, draw the line of symmetry of $y = 5 + 3x - x^2$. [1]

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

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

(d) **(i)** On the grid, draw a straight line from (–1, 1) to (3, 5). [1]

(ii) Work out the gradient of this line.

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

(iii) Write down the equation of this line in the form $y = mx + c$.

Answer(d)(iii) $y =$ ..... [1]

For Examiner's Use

6 Alison scored the following number of runs in 15 cricket matches.

12	3	27	35	0
7	52	4	18	30
18	7	94	61	7

(a) For these scores,

(i) work out the median,

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

(ii) write down the mode,

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

(iii) calculate the mean.

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

(b) These are the averages for the number of runs scored by Bethan in the 15 matches.

Median = 21 Mode = 13 Mean = 20

Alison says that her scores are better than Bethan's scores.
Bethan says that her scores are better than Alison's scores.

Explain how they could both be correct.

Answer(b) .....

.....

..... [2]

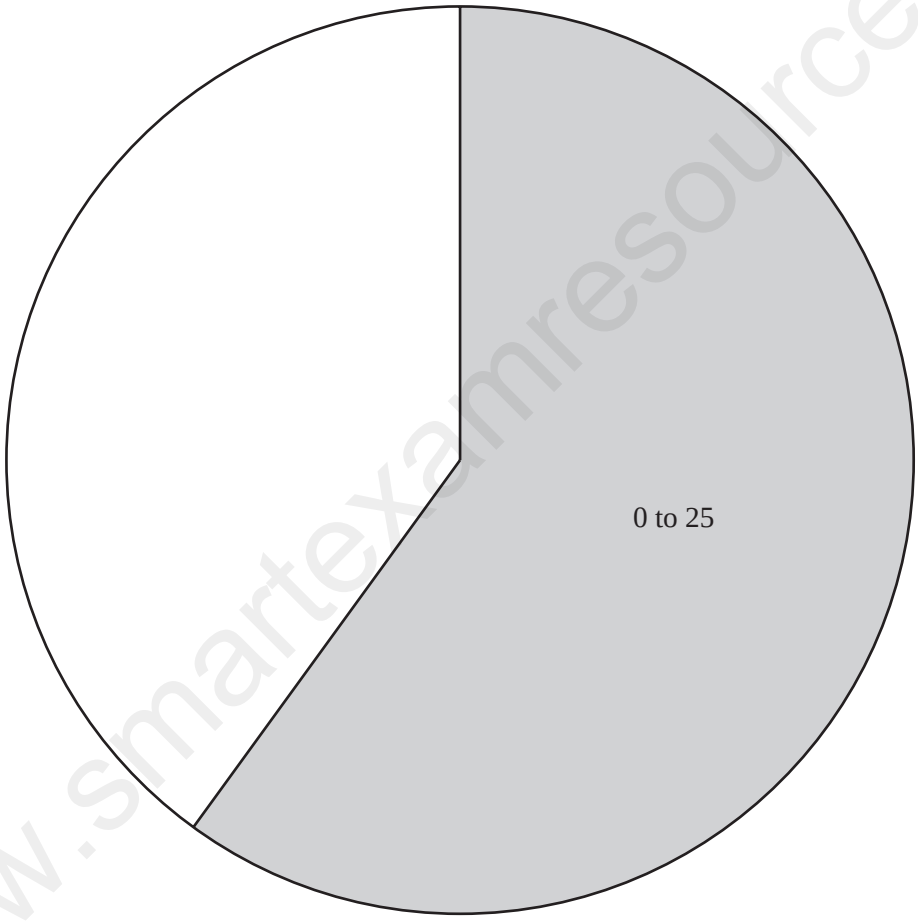
(c) Alison puts her 15 scores into 4 groups and shows them in a pie chart.

(i) Complete the table.

Score	Frequency	Sector Angle
0 to 25	9	216°
26 to 50		
51 to 75		
76 to 100		

[3]

(ii) Complete the pie chart and label the sectors.

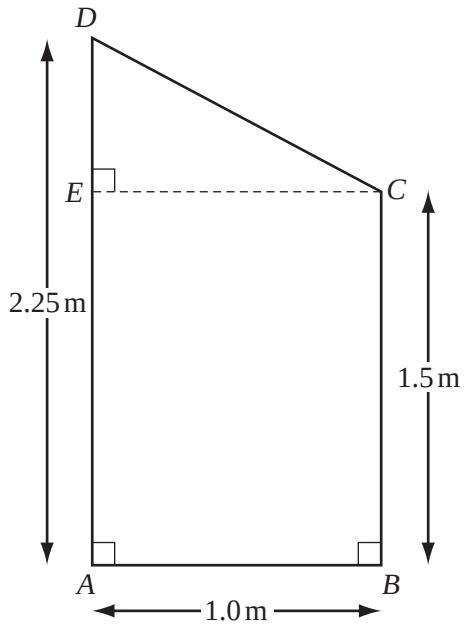


[3]

(d) Estimate the probability that in the next match Alison will score more than 25 runs.
Give your answer as a fraction in its simplest form.

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

7



NOT TO SCALE

The diagram shows a trapezium *ABCD*.
AB = 1.0 m, *AD* = 2.25 m, *BC* = 1.5 m and angle *DEC* = 90°.

(a) Using trigonometry, calculate angle *DCE*.

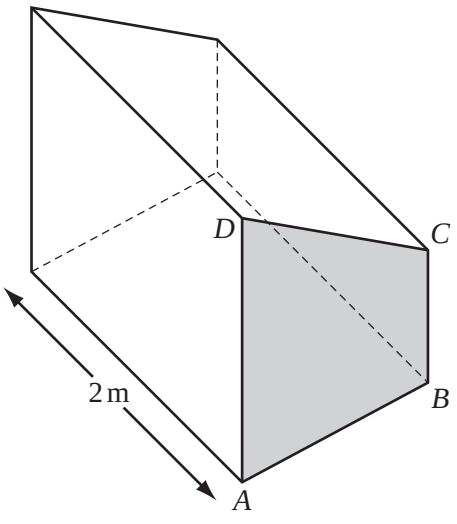
Answer(a) Angle *DCE* = ... [3]

(b) Calculate the area of the trapezium *ABCD*.

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

(c) *ABCD* is the cross-section of a box.
The box is 2 m long.

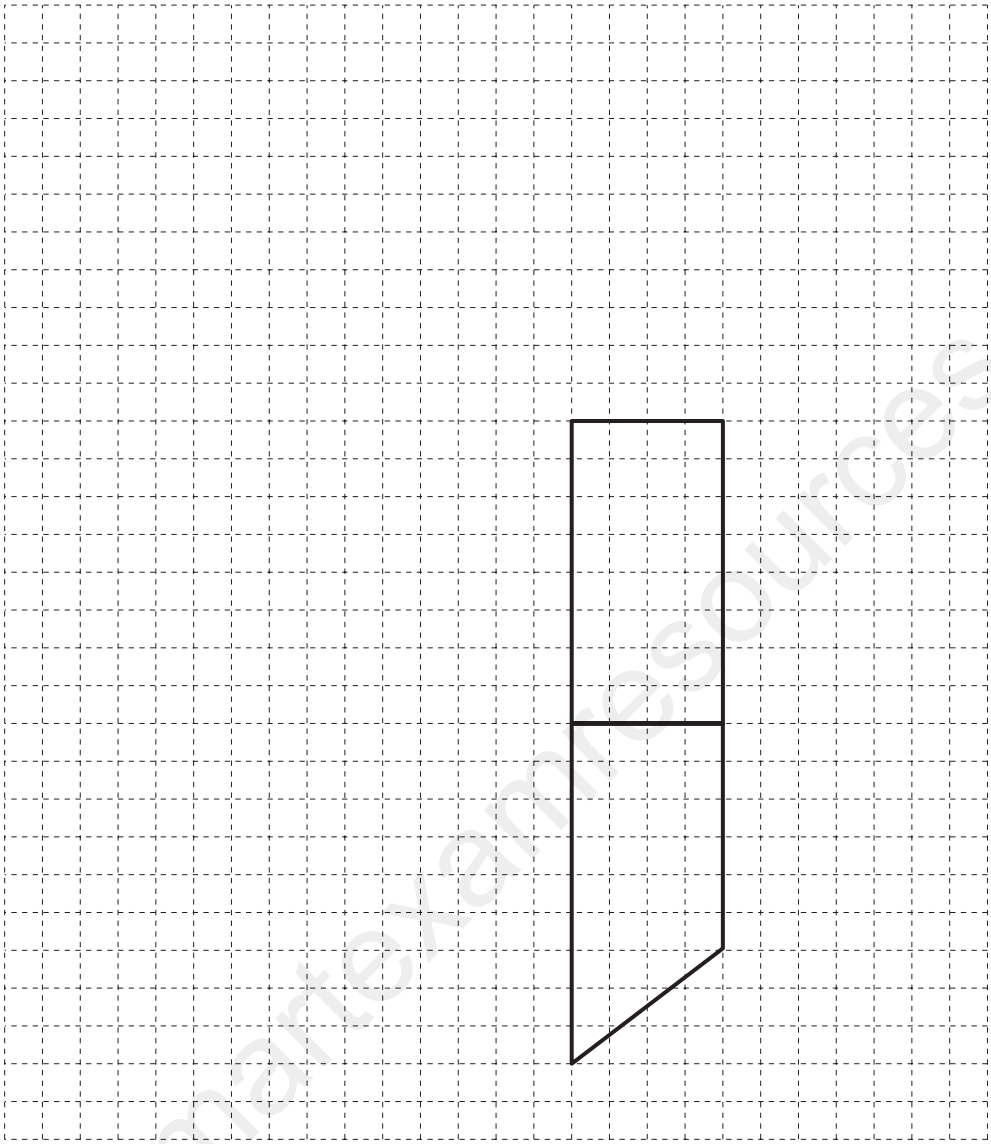
Calculate the volume of the box.



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

(d) On the grid, complete the net of the box.
The base and one face of the box have been drawn for you.

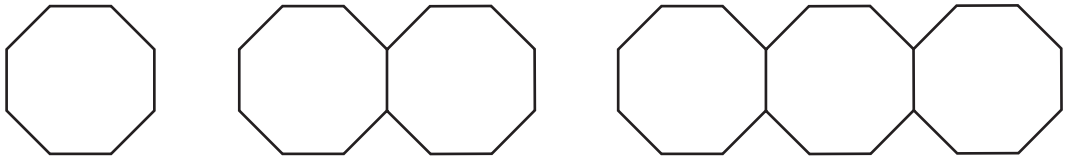
The scale is 2 cm to 1 m.



[4]

For Examiner's Use

8 Here is a sequence of patterns made using identical polygons.



Pattern 1 Pattern 2 Pattern 3

(a) Write down the mathematical name of the polygon in Pattern 1.

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

(b) Complete the table for the number of vertices (corners) and the number of lines in Pattern 3, Pattern 4 and Pattern 7.

Pattern	1	2	3	4		7
Number of vertices	8	14				
Number of lines	8	15				

[5]

(c) **(i)** Find an expression for the number of **vertices** in Pattern *n*.

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

(ii) Work out the number of vertices in Pattern 23.

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

(d) Find an expression for the number of **lines** in Pattern n.

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

(e) Work out an expression, in its simplest form, for

(number of lines in Pattern n) – (number of vertices in Pattern n).

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

Question 9 is printed on the next page.

For Examiner's Use

9 **(a)** The formula for the volume, V, of a cone with radius r, and height h, is $V = \frac{1}{3}\pi r^2 h$.

(i) To make r the subject of this formula, the first step is $3V = \pi r^2 h$.

Show the remaining steps to make r the subject of this formula.

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

(ii) An ice-cream cone has a volume of 141 cm^3 and height 15 cm.

Show that the radius of the cone is 3 cm, correct to the nearest whole number.

Answer(a)(ii)

[2]

(b) The open end of an ice-cream cone is a circle of radius 3 cm.

Calculate the circumference of this circle.

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

(c) The volume of a ball of ice-cream is 113 cm^3.
The ball of ice-cream costs \$2.15 .

Calculate the cost of 1 cm^3 of the ice-cream.
Give your answer in cents, correct to 1 decimal place.

Answer(c) ..... cents [3]