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0580/33

October/November 2013

2 hours

* 4 9 3 2 5 8 5 1 1 6 *

Geometrical instruments

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]

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

Calculate his percentage profit on the \$2040.

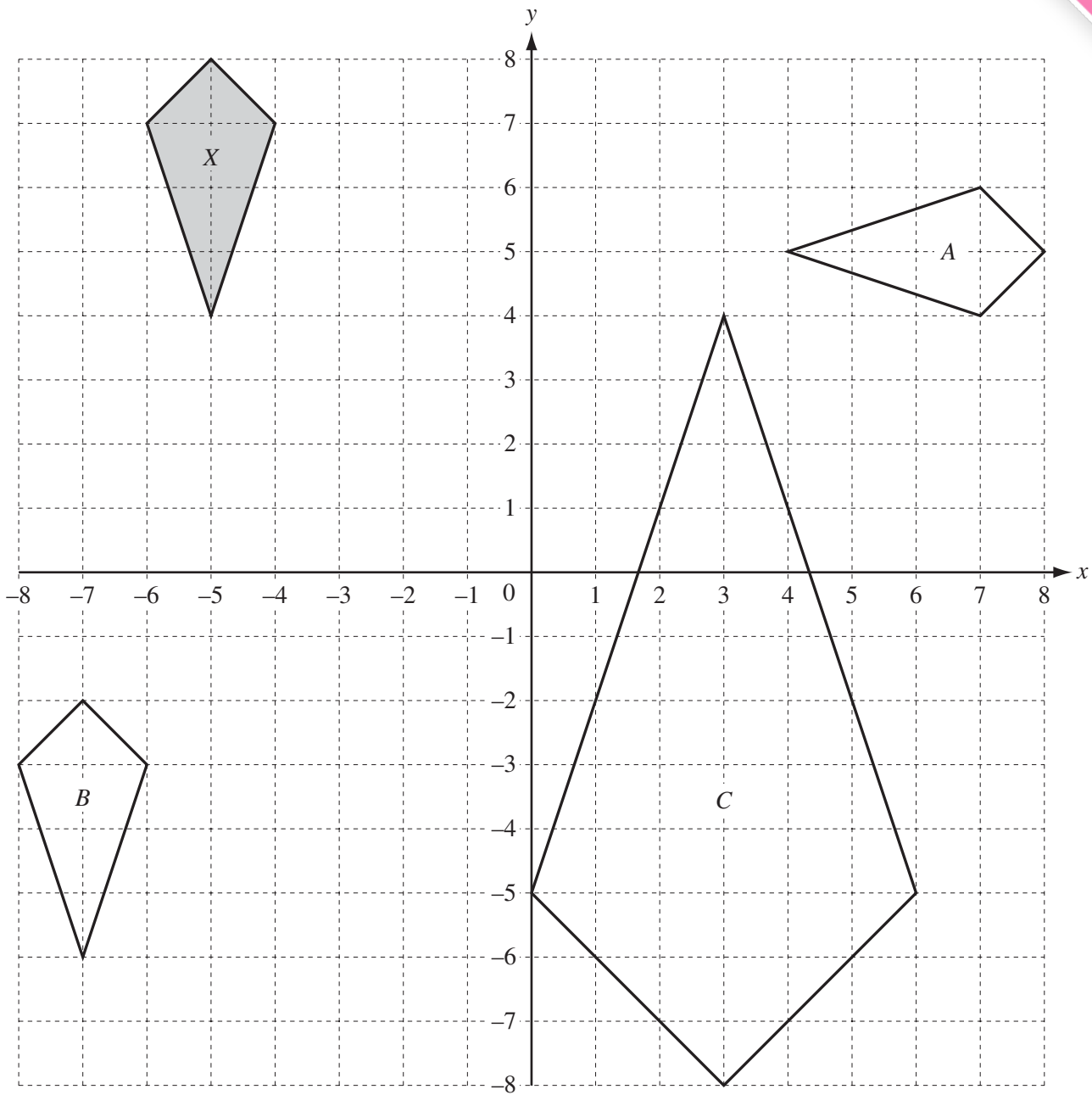
Answer(c) % [2]

- (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]

- 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]

(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]

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]

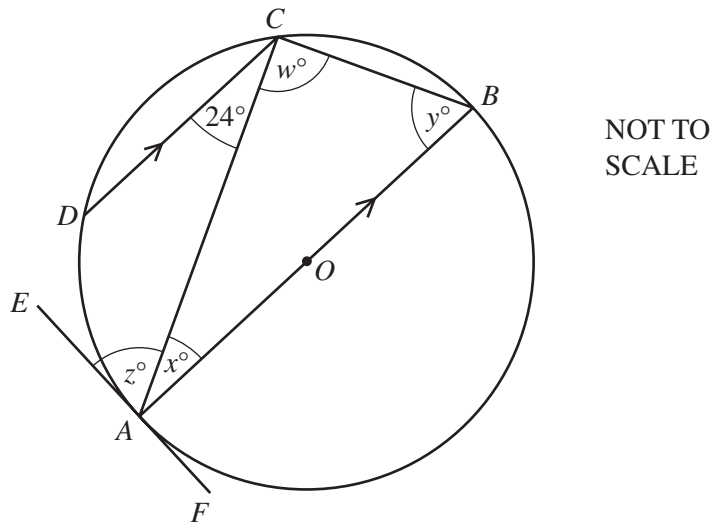
- 4 (a) A regular polygon has 9 sides.
For this polygon, calculate
- (i) the size of one exterior angle,

Answer(a)(i) [2]

- (ii) the size of one interior angle.

Answer(a)(ii) [1]

(b)



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 $ACD = 24^\circ$.

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

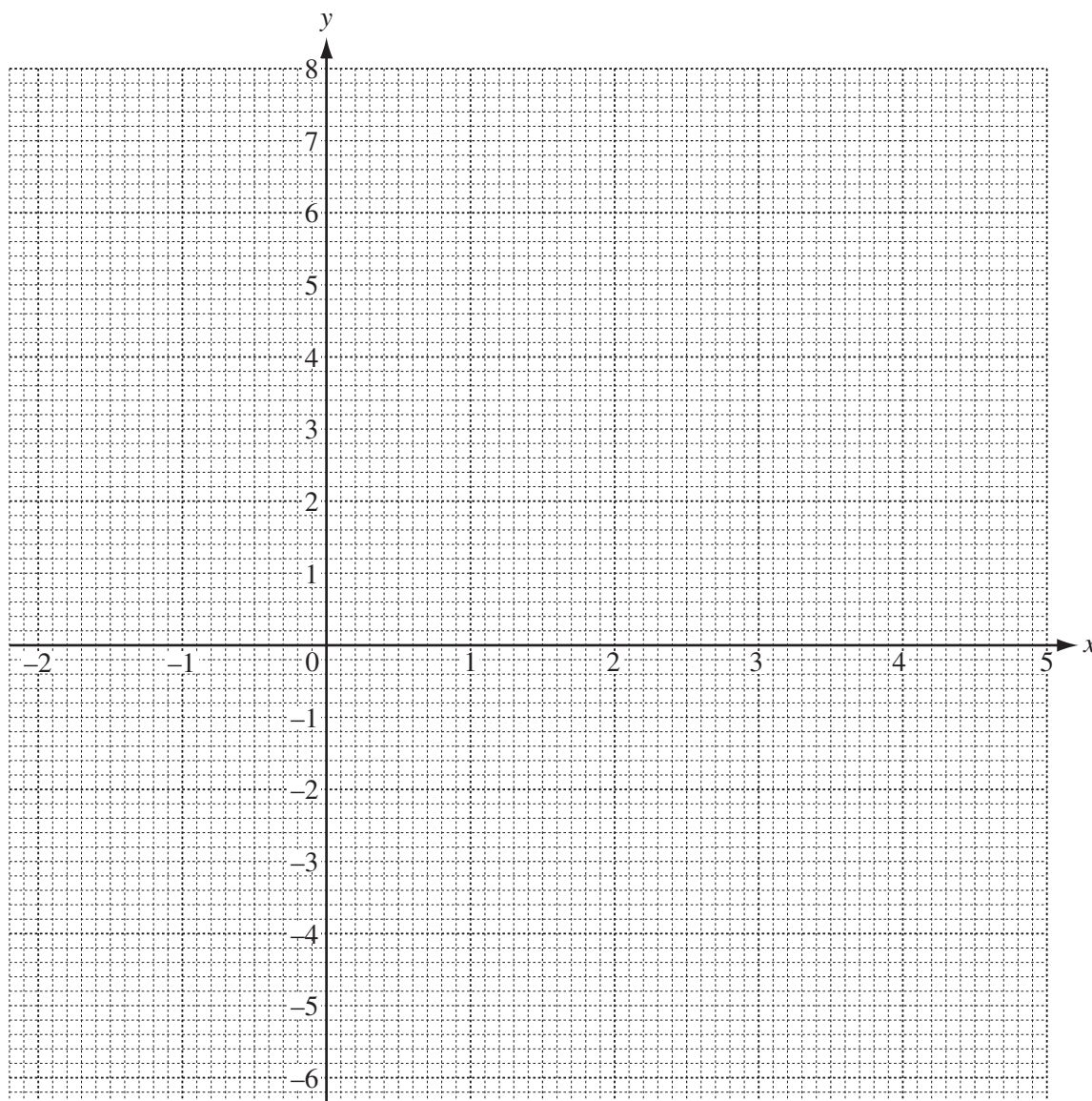
..... [2]

- 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 $-2 \leq x \leq 5$.



[4]

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

Answer(b) $x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

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

- 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]

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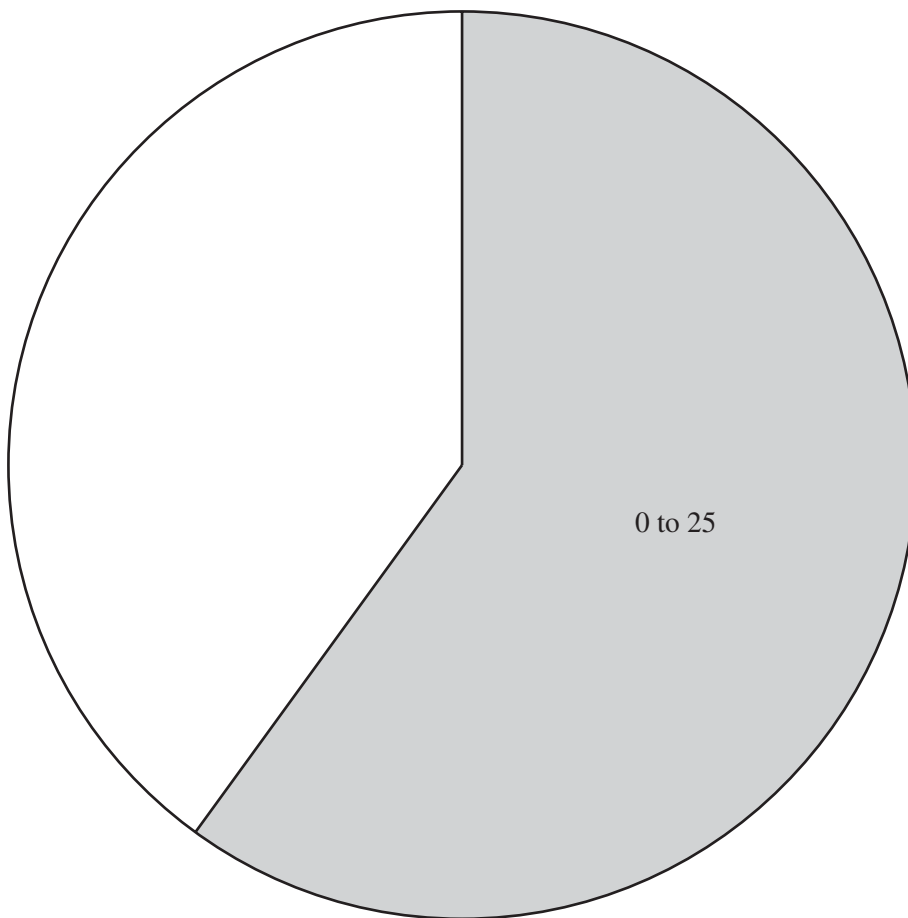
(c) Alison puts her 15 scores into 4 groups and shows them in a pie chart.

(i) Complete the table.

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

[3]

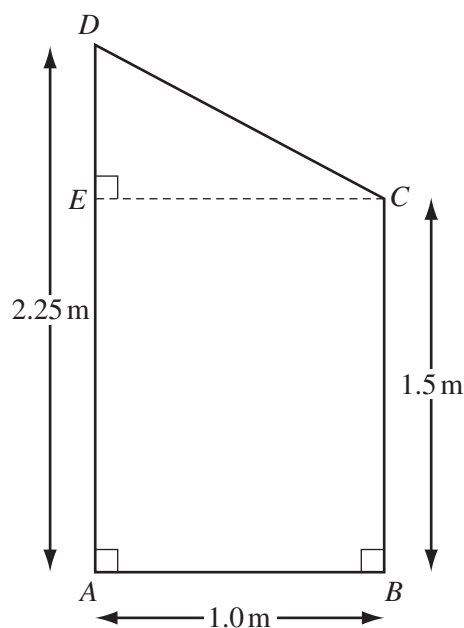
(ii) Complete the pie chart and label the sectors.



[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]



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The diagram shows a trapezium $ABCD$.

$AB = 1.0$ m, $AD = 2.25$ m, $BC = 1.5$ m and angle $DEC = 90^\circ$.

- (a) Using trigonometry, calculate angle DCE .

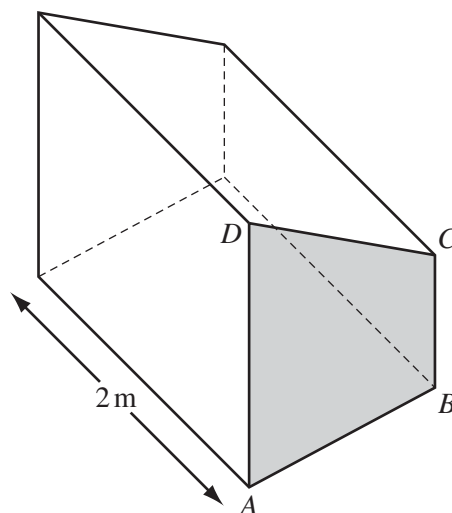
Answer(a) Angle $DCE = \dots\dots\dots$ [3]

- (b) Calculate the area of the trapezium $ABCD$.

Answer(b) $\dots\dots\dots$ m² [2]

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

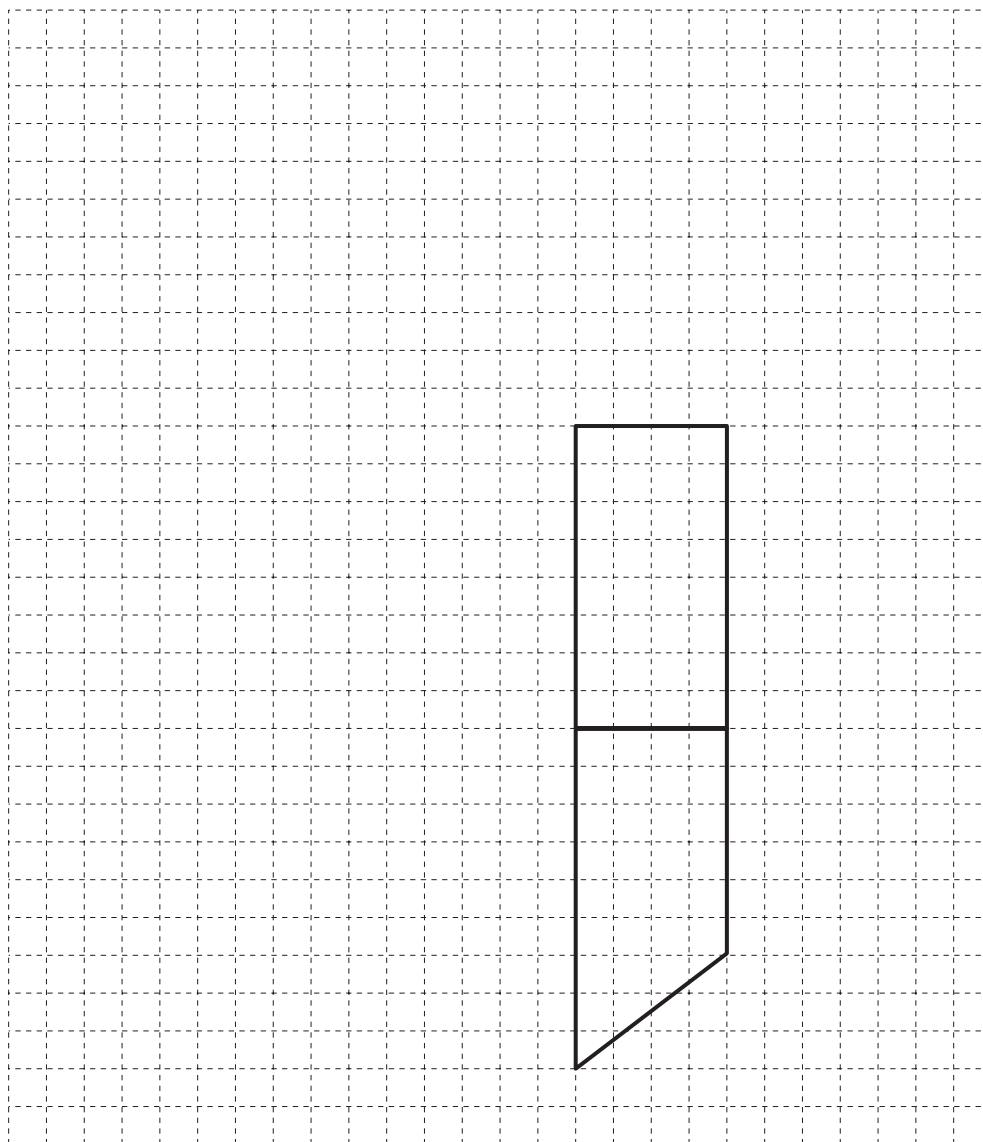
Calculate the volume of the box.



Answer(c) $\dots\dots\dots$ m³ [1]

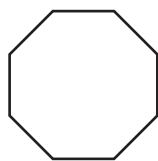
- (d) On the grid, complete the net of the box.
The base and one face of the box have been drawn for you.

The scale is 2 cm to 1 m.

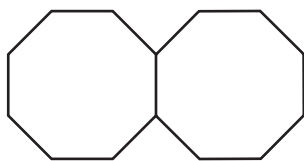


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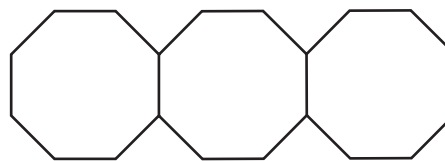
- 8 Here is a sequence of patterns made using identical polygons.



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.

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]

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