Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2016**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, 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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

CAMBRIDGE International Examinations

[Turn over

1 A wildlife park covers an area of 18 hectares.

(a) The 18 hectares is divided between enclosures, paths and buildings in the ratio

enclosures : paths : buildings = 11 : 14 : 5.

(i) Show that the area for enclosures is 6.6 hectares.

[1]

(ii) Calculate the area for paths and the area for buildings.

Paths ..... hectares

Buildings ..... hectares [2]

(b) Of the 6.6 hectares for enclosures, $\frac{7}{11}$ is for mammals and 30% is for reptiles.

Calculate the area for mammals and the area for reptiles.

Mammals ..... hectares

Reptiles ..... hectares [2]

(c) The table shows the opening times of the wildlife park.

Days	Opening times
Monday to Friday	09 30 to 17 15
Saturday and Sunday	10 00 to 18 30

(i) Work out how long, in hours and minutes, the wildlife park is open on a Wednesday.

..... h ..... min [1]

(ii) Calculate the total time, in hours and minutes, that the wildlife park is open in one week.

..... h ..... min [2]

(d) This table shows the ticket prices for the wildlife park.

Adult	$11.00
Senior (age 65 and over)	$9.25
Child (age 4 to 16)	$7.50
Child (age 3 and under)	Free

Mr Lu visits the wildlife park with his wife, their children (aged 6 and 2) and his parents (both aged 67).

(i) Work out the total cost of the tickets for this visit.

$..... [2]

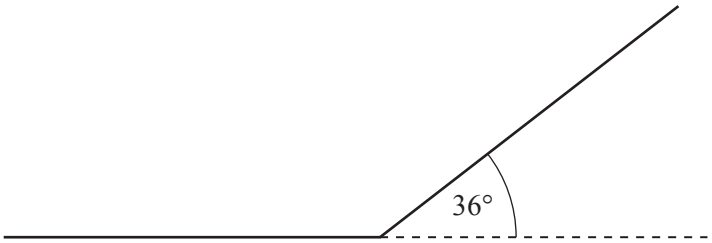
(ii) Mr Lu has a voucher for the wildlife park that reduces the total cost of the tickets to $42.

Calculate the percentage saving.

.....% [3]

2 (a)

NOT TO SCALE



The diagram shows 2 sides of a regular polygon with exterior angle 36°.

For this regular polygon, work out

(i) the number of sides,

..... [2]

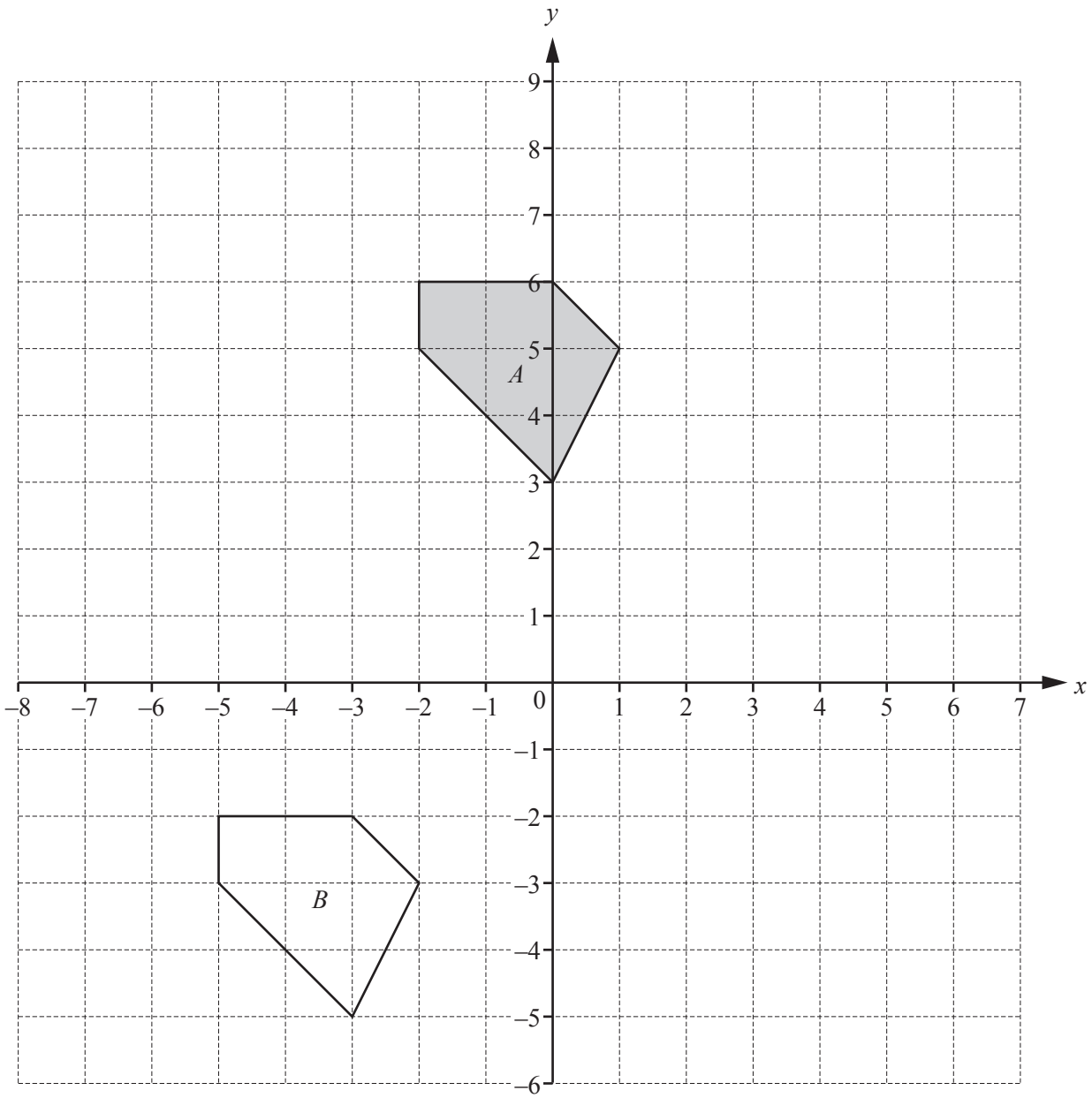
(ii) the interior angle,

..... [1]

(iii) the sum of the interior angles.

..... [1]

(b) The diagram shows two shapes, A and B, on a 1 cm^2 grid.



(i) Find the area of shape A.

..... cm^2 [1]

(ii) Describe fully the **single** transformation that maps shape A onto shape B.

.....

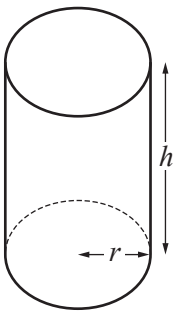
..... [2]

(iii) On the grid,

(a) draw the reflection of shape A in the line $x = 2$, [2]

(b) draw the enlargement of shape A with scale factor 2 and centre (1, 5). [2]

3 The diagram shows a cylindrical flower vase with radius, r, and height, h.



NOT TO SCALE

The volume, V, of the vase is $V = \pi r^2 h$.

The surface area, A, of the vase is $A = 2\pi rh + \pi r^2$.

(a) The vase has radius 4 cm and height 15 cm.

(i) Calculate the volume of the vase.
Write down the units of your answer.

.... [3]

(ii) Calculate the surface area of the vase.

..... cm^2 [2]

(b) Make h the subject of the formula $A = 2\pi rh + \pi r^2$.

$h =$ ..... [2]

(c) Factorise completely.

$2\pi rh + \pi r^2$

..... [2]

(d) Another cylindrical flower vase has radius 6 cm and height 22.5 cm.

(i) For this vase and the vase in **part (a)** the ratio of the radii is 4 : 6 and the ratio of the heights is 15 : 22.5 .

Write these ratios in their simplest form.

4 : 6 = ... : .....

15 : 22.5 = ... : ..... [2]

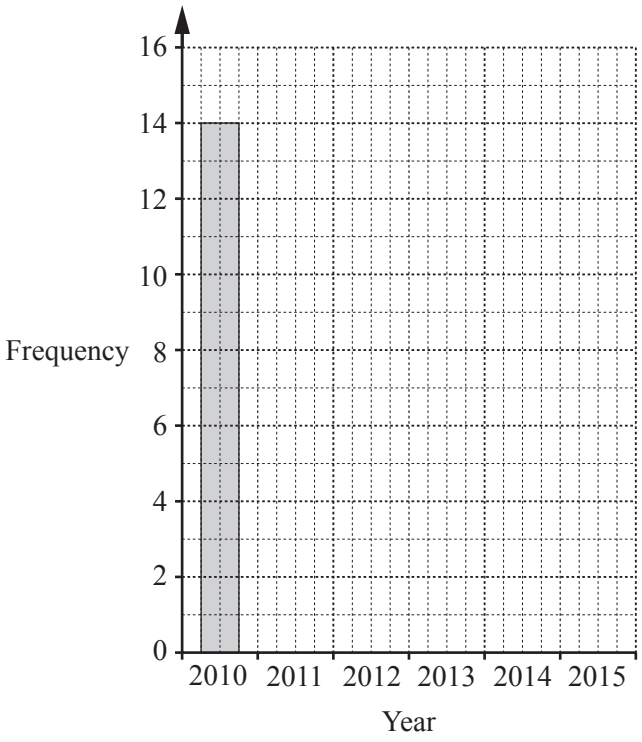
(ii) Write down a mathematical word to complete the statement.

The ratios show that the two vases are ..... [1]

4 A garage sells second-hand cars.
The table shows the number of cars sold and the year they were made.

Year	2010	2011	2012	2013	2014	2015
Frequency	14	13	4	8	0	11

(a) Complete the bar chart to show this information.



[2]

(b) For these cars, write down the modal year.

..... [1]

(c) The garage sold 6 cars last week.
The selling prices, in dollars, are listed below.

920 1070 3100 2240 2650 1840

(i) Work out the range.

$..... [1]

(ii) Work out the median.

$..... [2]

(iii) Calculate the mean.

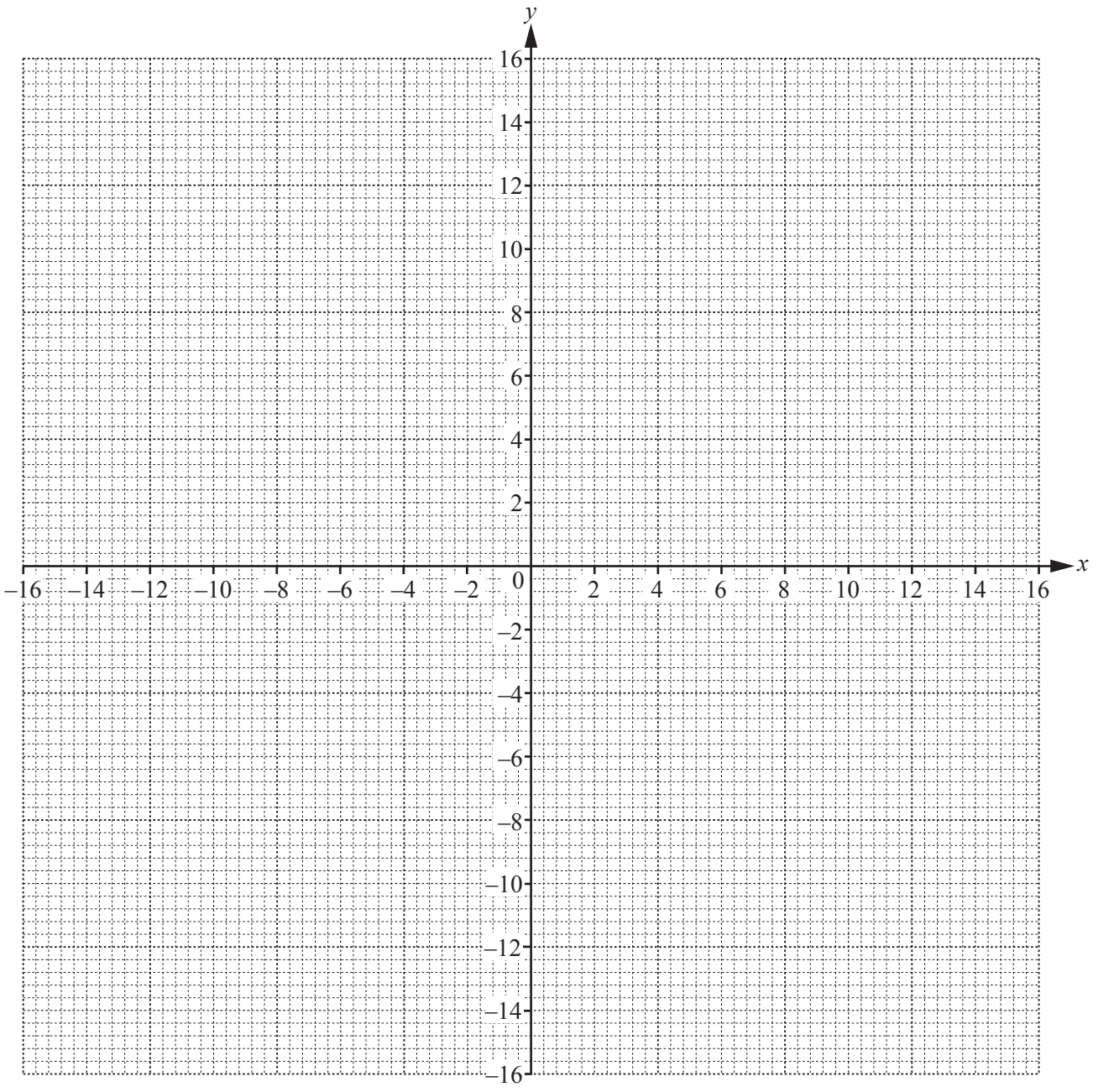
$..... [2]

5 **(a)** **(i)** Complete the table of values for $y = \frac{16}{x}$, $x \neq 0$.

x	−16	−8	−4	−2	−1	1	2	4	8	16
y	−1	−2		−8		16		4	2	

[2]

(ii) On the grid, draw the graph of $y = \frac{16}{x}$ for $-16 \leqslant x \leqslant -1$ and $1 \leqslant x \leqslant 16$.



[4]

(b) Write down the order of rotational symmetry of your graph.

..... [1]

(c) One line of symmetry crosses the graph twice.

(i) Draw this line of symmetry on the grid. [1]

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

..... [1]

(d) By drawing a suitable line on the grid, solve the equation $\frac{16}{x} = 7$.

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

6 **(a)** For the integers from 40 to 70, write down

(i) a multiple of 19,

..... [1]

(ii) a common multiple of 6 and 8,

..... [1]

(iii) the square root of 2500,

..... [1]

(iv) a factor of 106,

..... [1]

(v) an odd number where the tens digit is double the units digit,

..... [1]

(vi) a number that is **both** a square number **and** a cube number,

..... [1]

(vii) a number that has exactly 3 factors,

..... [1]

(viii) three prime numbers.

..... , ... , ... [2]

(b) Write 234 as a product of its prime factors.

..... [2]

(c) Write the answer to $3^4 \times 3^7$

(i) in the form 3^x,

..... [1]

(ii) as an integer,

..... [1]

(iii) in standard form.

..... [1]

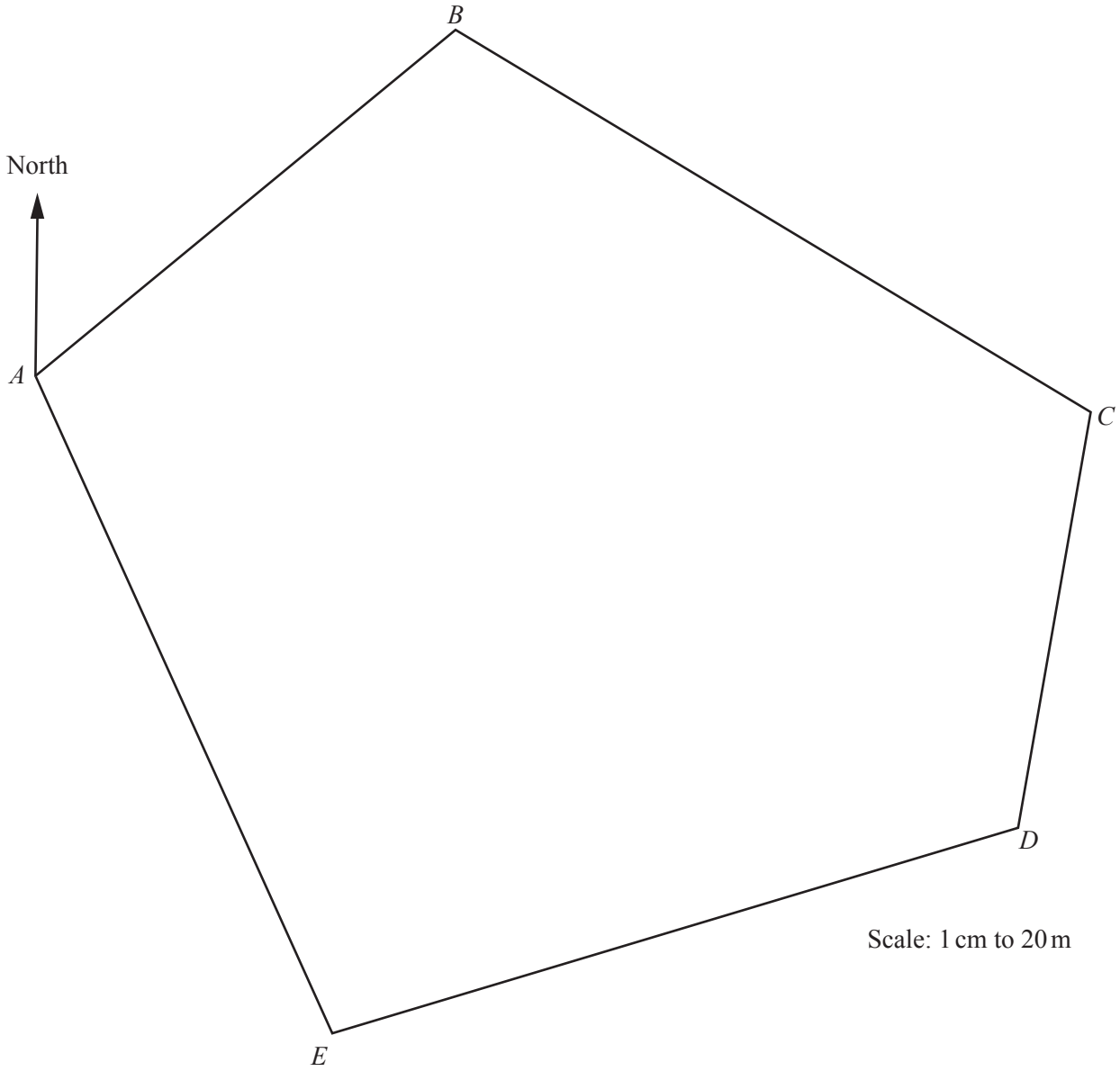
(d) **(i)** Write 3^{-2} as a fraction.

..... [1]

(ii) Find the value of $3x^0$ when $x = 5$.

..... [1]

7 The scale drawing shows a park, *ABCDE*.
The scale is 1 centimetre represents 20 metres.



(a) Measure the bearing of *B* from *A*.

..... [1]

All constructions in the following parts must be completed using a straight edge and compasses only. All construction arcs must be clearly shown.

(b) A straight cycle path crosses the park from E to BC.
The path bisects angle AED.

(i) Construct the cycle path. [2]

(ii) Work out the actual length, in metres, of the cycle path.

..... m [2]

(iii) Alice cycles from E to BC along the path at a constant speed of 9 km/h.

(a) Show that 9 km/h is equivalent to 2.5 m/s.

[1]

(b) Find the time she takes to cycle from E to BC.
Give your answer in seconds.

.....s [2]

(c) A straight footpath, equidistant from D and E, crosses the park from DE to AB.

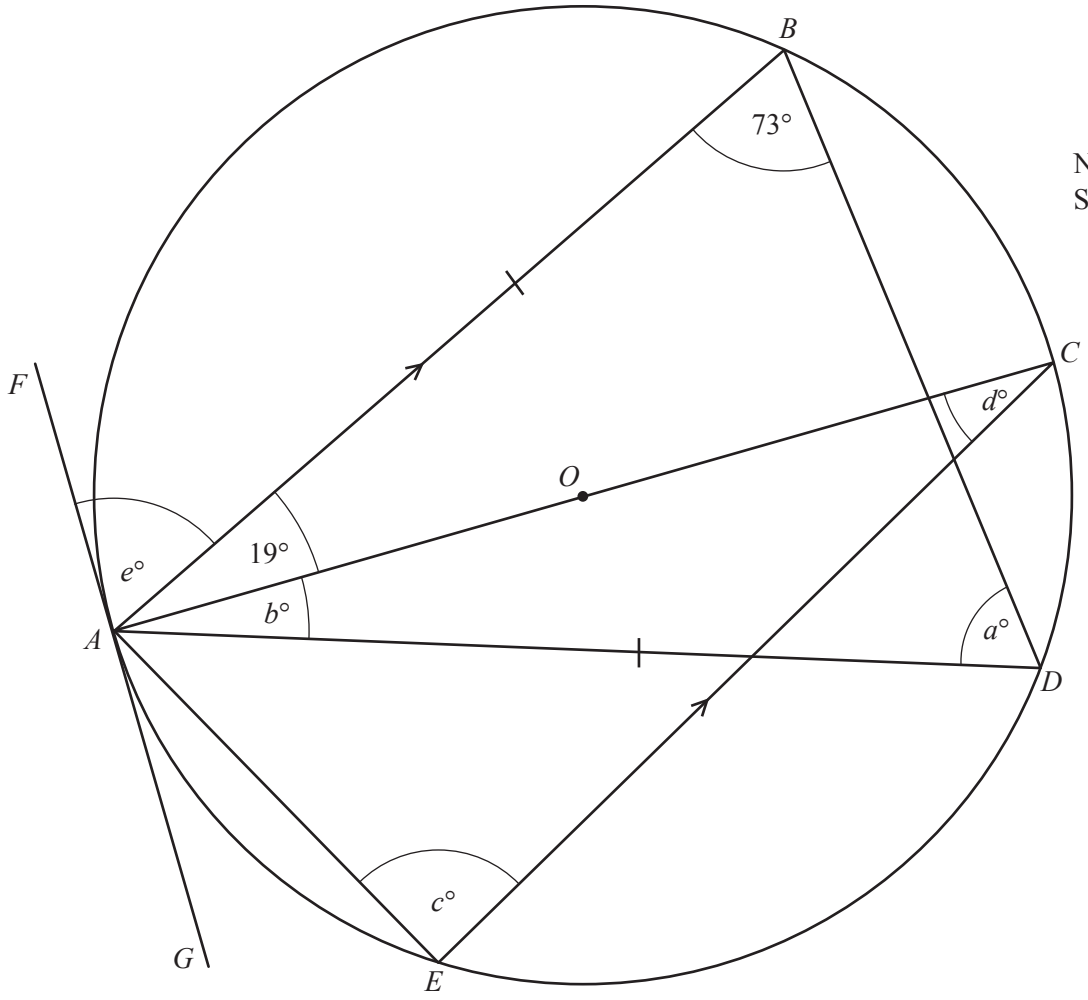
Construct the footpath. [2]

(d) **(i)** Construct the locus of points 150 metres from A and inside the park. [2]

(ii) A region for sports activities is less than 150 metres from A and closer to E than to D.

Shade this region. [1]

8



A, *B*, *C*, *D* and *E* are points on the circumference of a circle, centre *O*.
GAF is a tangent to the circle at *A*.
AB is parallel to *EC* and *AB* = *AD*.

(a) Write down the mathematical name of triangle *ABD*.

..... [1]

(b) Find the value of

(i) a,

$a =$ ..... [1]

(ii) b,

$b =$ ..... [1]

(iii) c,

$c =$ ..... [1]

(iv) d,

$d =$ ..... [1]

(v) e.

$e =$ ..... [2]

(c) The diameter, AC, of the circle is 13 cm.

Calculate the circumference of the circle.
Give your answer correct to 1 decimal place.

..... cm [3]

Question 9 is printed on the next page.

9 **(a)** A solid has 6 faces, 8 vertices and 12 edges.
All the edges have the same length.

Write down the mathematical name of this solid.

..... [1]

(b) Here is a sequence of diagrams made from identical square tiles.

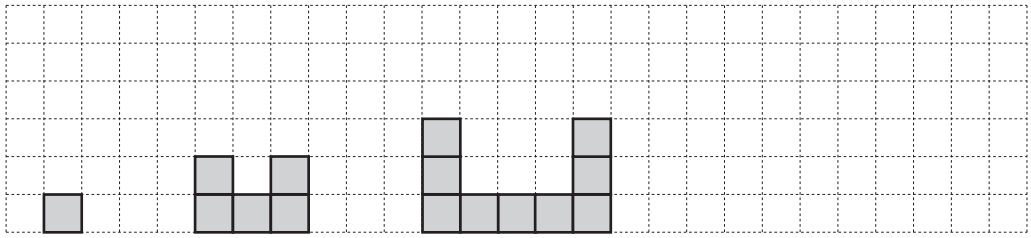


Diagram 1 Diagram 2 Diagram 3 Diagram 4

(i) On the grid, draw Diagram 4. [1]

(ii) Complete the table.

Diagram	1	2	3	4	5
Number of tiles	1	5	9		

[2]

(iii) Find an expression, in terms of n, for the number of tiles in Diagram n.

..... [2]

(iv) Find the number of tiles in Diagram 19.

..... [1]

(v) A box contains 98 of these tiles.

(a) Diagram x is made from as many tiles as possible from this box.

Find the value of x.

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

(b) When Diagram x is made, how many tiles are left in the box?

..... [1]