Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

MATHEMATICS **0580/42**

Paper 4 (Extended) **October/November 2015**

2 hours 30 minutes

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 130.

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.

1 A film company uses 512 actors in a film.
The actors are in the ratio men : women : children = 7 : 11 : 14.

(a) (i) Show that there are 224 children in the film.

Answer(a)(i)

[2]

(ii) Find the number of men in the film.

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

(b) Every working day, each child is given $1 to spend.
Each child works for 45 days.

Calculate the total amount that the film company gives the children to spend.
Give your answer correct to the nearest $100.

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

(c) The children have lessons every day in groups of no more than 12.

Calculate the smallest possible number of groups.

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

(d) The film costs four million and ninety three thousand dollars to make.

(i) Write this number in figures.

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

(ii) Write your answer to **part (d)(i)** in standard form.

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

(e) A DVD copy of the film costs $2.75 to make.
The selling price is $8.20 .

Calculate the percentage profit.

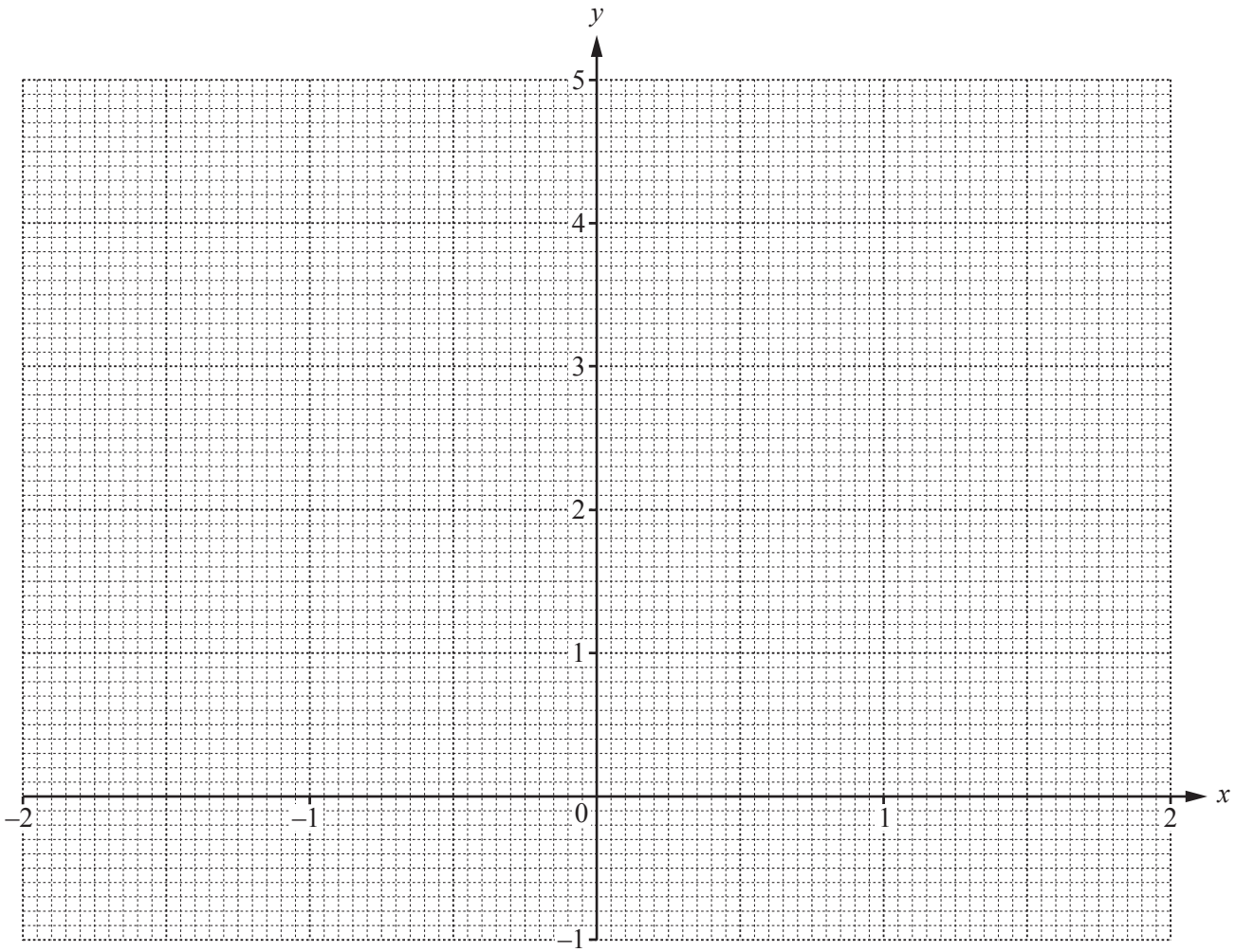
Answer(e) .....% [3]

2 The table shows some values for $y = x^3 - 3x + 2$.

x	–2	–1.5	–1	–0.5	0	0.5	1	1.5	2
y		3.125		3.375	2		0		4

(a) Complete the table of values. [4]

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



[4]

(c) By drawing a suitable line, solve the equation $x^3 - 3x + 2 = x + 1$ for $-2 \leqslant x \leqslant 2$.

Answer(c) $x =$ ..... or $x =$ ..... [3]

(d) By drawing a suitable tangent, find an estimate of the gradient of the curve at the point where $x = -1.5$.

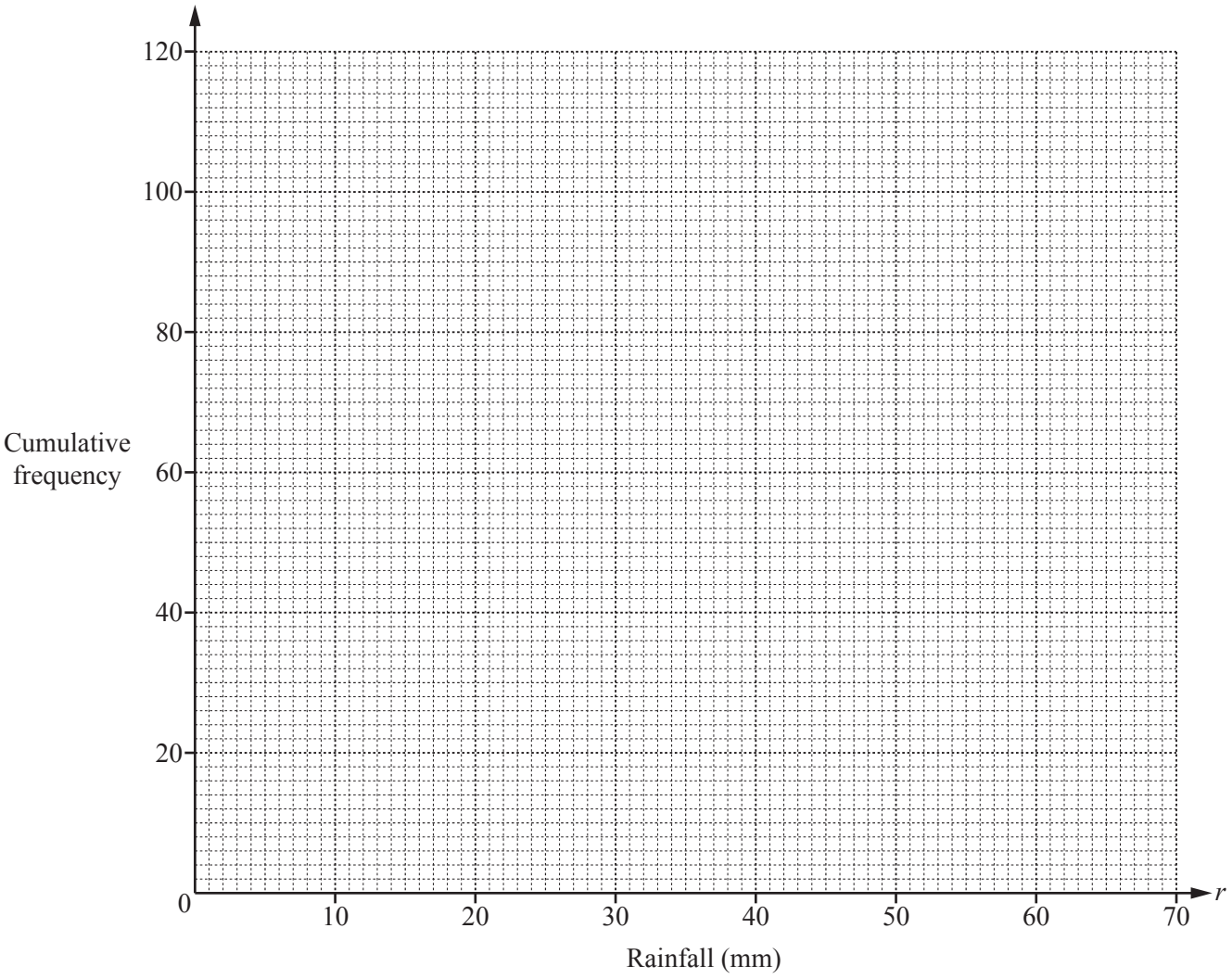
Answer(d) ..... [3]

[Turn over

3 Leo measured the rainfall each day, in millimetres, for 120 days.
The cumulative frequency table shows the results.

Rainfall (r mm)	$r \leqslant 20$	$r \leqslant 25$	$r \leqslant 35$	$r \leqslant 40$	$r \leqslant 60$	$r \leqslant 70$
Cumulative frequency	5	13	72	90	117	120

(a) On the grid below, draw a cumulative frequency diagram to show these results.



[3]

(b) **(i)** Find the median.

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

(ii) Use your diagram to find the number of days when the rainfall was more than 50 mm.

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

(c) Use the information in the cumulative frequency table to complete the frequency table below.

Rainfall (r mm)	$0 < r \leqslant 20$	$20 < r \leqslant 25$	$25 < r \leqslant 35$	$35 < r \leqslant 40$	$40 < r \leqslant 60$	$60 < r \leqslant 70$
Frequency	5		59			3

[2]

(d) Use your frequency table to calculate an estimate of the mean.
You must show all your working.

Answer(d) .....mm [4]

(e) In a histogram drawn to show the information in the table in **part (c)**, the frequency density for the interval $25 < r \leqslant 35$ is 5.9 .

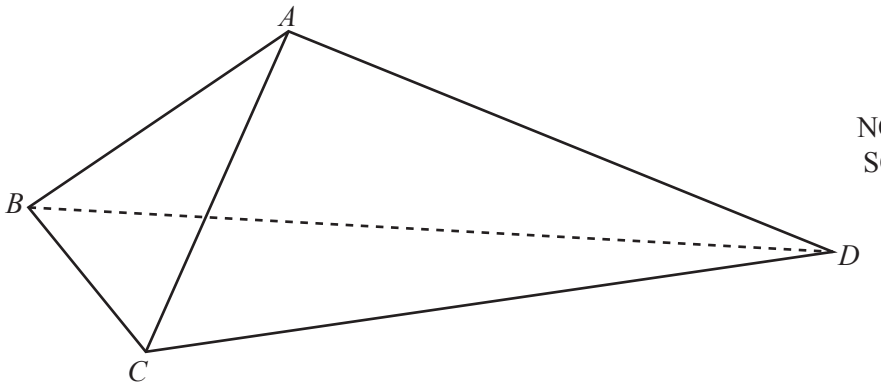
Calculate the frequency density for the intervals $20 < r \leqslant 25$, $40 < r \leqslant 60$ and $60 < r \leqslant 70$.

Answer(e) $20 < r \leqslant 25$ .....

$40 < r \leqslant 60$ .....

$60 < r \leqslant 70$ ..... [4]

4



NOT TO SCALE

The diagram shows a tent $ABCD$.
The front of the tent is an isosceles triangle ABC, with $AB = AC$.
The sides of the tent are congruent triangles ABD and ACD.

(a) $BC = 1.2$ m and angle $ABC = 68°$.

Find AC.

Answer(a) $AC =$ ..... m [3]

(b) $CD = 2.3$ m and $AD = 1.9$ m.

Find angle ADC.

Answer(b) Angle $ADC =$ ..... [4]

(c) The floor of the tent, triangle BCD, is also an isosceles triangle with $BD = CD$.

Calculate the area of the floor of the tent.

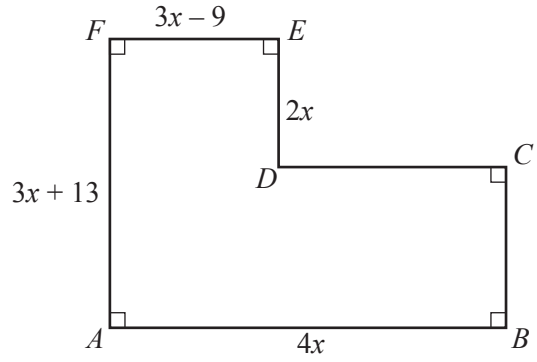
Answer(c) .....m^2 [4]

(d) When the tent is on horizontal ground, A is a vertical distance 1.25 m above the ground.

Calculate the angle between AD and the ground.

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

5 **(a)** The area of shape *ABCDEF* is 24 cm^2.
All lengths are in centimetres.



NOT TO SCALE

(i) Show that $5x^2 + 17x - 12 = 0$.

Answer(a)(i)

[3]

(ii) Solve, by factorising, the equation $5x^2 + 17x - 12 = 0$.
You must show all your working.

Answer(a)(ii) $x =$ ..... or $x =$ ..... [3]

(b) Solve the simultaneous equations.
You must show all your working.

$$3x - 2y = 23$$
$$-4x - y = -5$$

Answer(b) $x =$ .....

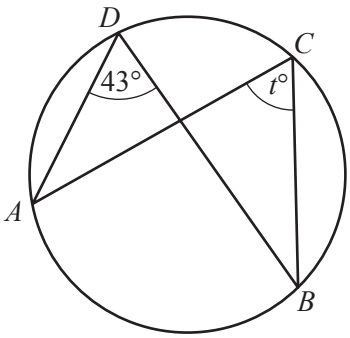
$y =$ ..... [3]

(c) Solve the equation.

$$\frac{2(t+3)}{t} - \frac{t}{t+3} = 1$$

Answer(c) $t =$ ..... [5]

6 **(a)** **(i)** A, B, C and D lie on the circumference of the circle.

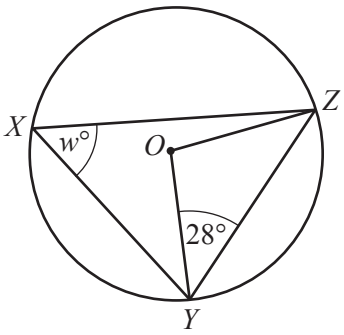


NOT TO SCALE

Find the value of t.

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

(ii) X, Y and Z lie on the circumference of the circle, centre O.



NOT TO SCALE

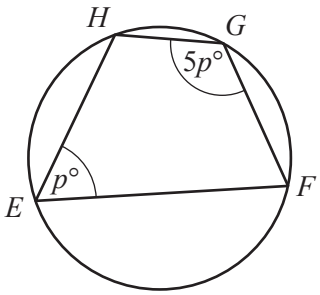
Find the value of w, giving reasons for your answer.

Answer(a)(ii) w = ... because .....

.....

..... [3]

(iii) E, F, G and H lie on the circumference of the circle.



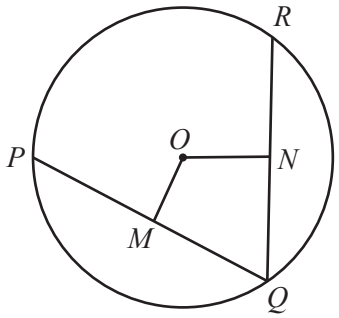
NOT TO SCALE

Find the value of p, giving a reason for your answer.

Answer(a)(iii) p = ... because .....

..... [3]

(b)



NOT TO SCALE

The diagram shows a circle, centre O.
PQ and QR are chords.
OM is the perpendicular from O to PQ.

(i) Complete the statement.

$PM : PQ$ = ... : ..... [1]

(ii) ON is the perpendicular from O to QR and $PQ = QR$.

Complete the statements to show that triangle OMQ is congruent to triangle ONQ.

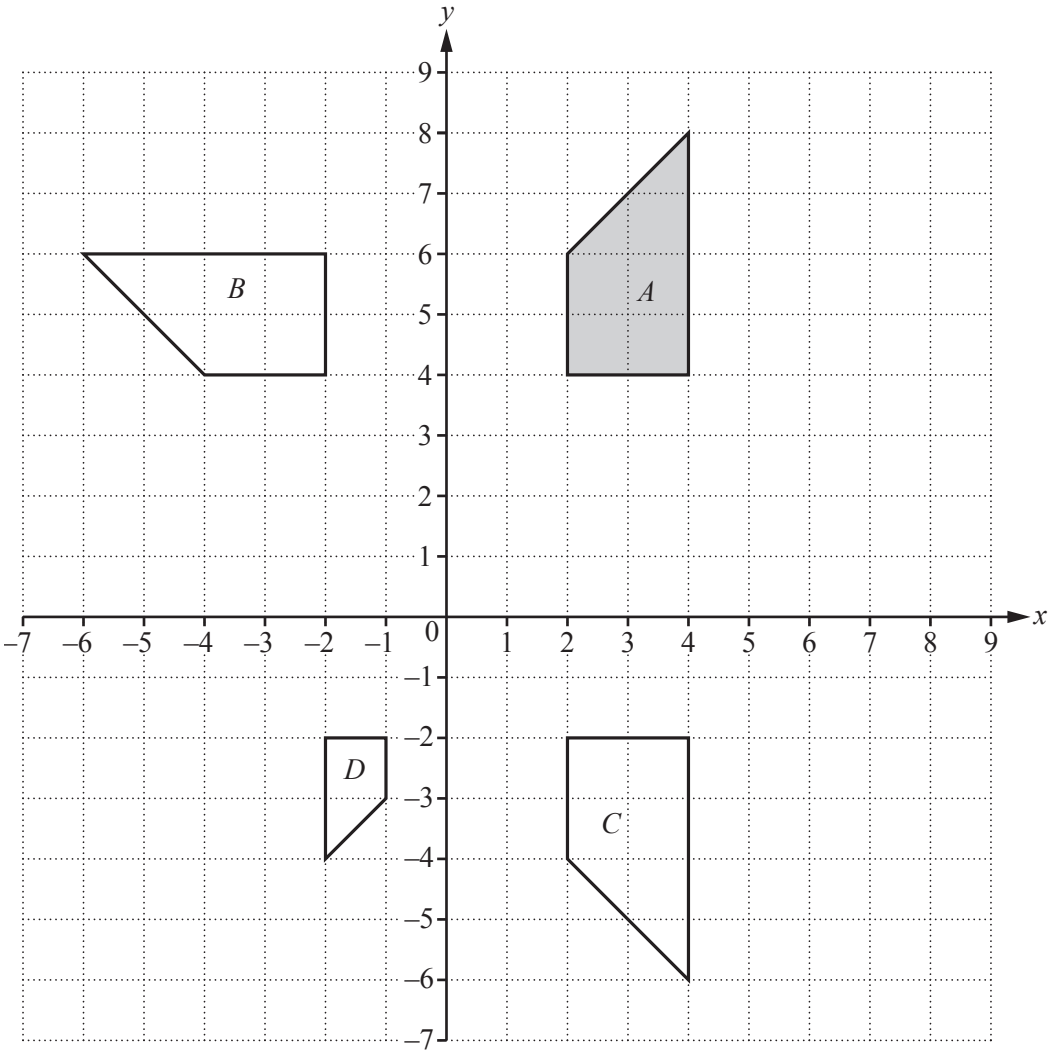
..... is a common side.

..... = ... because M is the midpoint of PQ and N is the midpoint of RQ.

..... = ... because equal chords are equidistant from .....

[4]

7



(a) Describe fully the **single** transformation that maps

(i) shape *A* onto shape *B*,

Answer(a)(i) .....

..... [3]

(ii) shape *A* onto shape *C*,

Answer(a)(ii) .....

..... [2]

(iii) shape *A* onto shape *D*.

Answer(a)(iii) .....

..... [3]

(b) Find the 2 × 2 matrix that represents the transformation in **part (a)(iii)**.

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

(c) On the grid, draw the image of shape *A* after a translation by the vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. [2]

(d) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$.

Answer(d) .....

..... [2]

8 A line AB joins the points A (3, 4) and B (5, 8).

(a) Write down the co-ordinates of the midpoint of the line AB.

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

(b) Calculate the distance AB.

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

(c) Find the equation of the line AB.

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

(d) A line perpendicular to AB passes through the origin and through the point (6, r).

Find the value of r.

Answer(d) r = ... [3]

9 $f(x) = 2x + 5$ $g(x) = 2^x$ $h(x) = 7 - 3x$

(a) Find

(i) f(3),

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

(ii) gg(3).

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

(b) Find $f^{-1}(x)$.

Answer(b) $f^{-1}(x) =$ ..... [2]

(c) Find fh(x), giving your answer in its simplest form.

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

(d) Find the integer values of x which satisfy this inequality.

$$1 < f(x) \leqslant 9$$

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

Question 10 is printed on the next page.

[Turn over

10 The table shows the first five terms of sequences A, B and C.

Sequence	1st term	2nd term	3rd term	4th term	5th term	6th term
A	3	4	5	6	7	
B	0	1	4	9	16	
C	–3	–3	–1	3	9	

(a) Complete the table for the 6th term of each sequence. [2]

(b) Write down the *n*th term of sequence A.

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

(c) **(i)** Find the *n*th term of sequence B.

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

(ii) Find the value of *n* when the *n*th term of sequence B is 8281.

Answer(c)(ii) $n =$ ..... [2]

(d) **(i)** Find the *n*th term of sequence C in its simplest form.

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

(ii) Find the 8th term of sequence C.

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

(e) The *n*th term of another sequence D is $\left(-\frac{1}{2}\right)^{n-1}$.

Complete the table for the first four terms of sequence D.

Sequence	1st term	2nd term	3rd term	4th term
D				

[3]