



1 A school has a sponsored swim in summer and a sponsored walk in winter.  
In 2010, the school raised a total of \$1380.  
The ratio of the money raised in summer : winter = 62 : 53.

(a) (i) Show clearly that \$744 was raised by the swim in **summer**.

Answer (a)(i)

[1]

(ii) Alesha's swim raised \$54.10. Write this as a percentage of \$744.

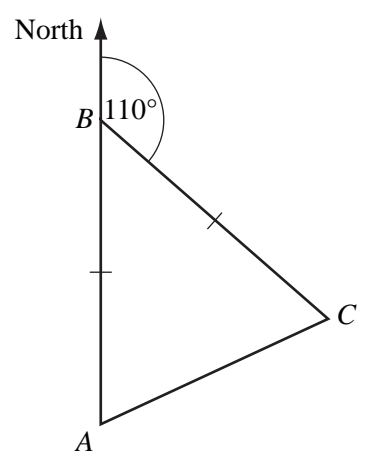
Answer(a)(ii) ..... % [1]

(iii) Bryan's swim raised \$31.50.  
He received 75 cents for each length of the pool which he swam.

Calculate the number of lengths Bryan swam.

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

(b) The route for the **sponsored walk in winter** is triangular.



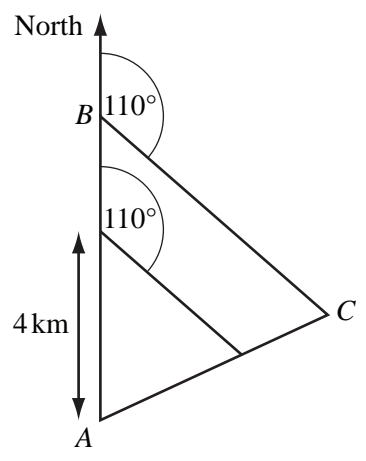
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(i) Senior students start at *A*, walk North to *B*, then walk on a bearing  $110^\circ$  to *C*.  
They then return to *A*.  
 $AB = BC$ .

Calculate the bearing of *A* from *C*.

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

(ii)



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$AB = BC = 6$  km.

Junior students follow a **similar** path but they only walk 4 km North from *A*, then 4 km on a bearing  $110^\circ$  before returning to *A*.

Senior students walk a total of 18.9 km.

Calculate the distance walked by junior students.

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

(c) The total amount, \$1380, raised in 2010 was 8% **less** than the total amount raised in 2009.

Calculate the total amount raised in 2009.

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



3 (a)  $p$  varies **inversely** as  $(m + 1)$ .

When  $p = 4$ ,  $m = 8$ .

Find the value of  $p$  when  $m = 11$ .

Answer(a)  $p =$  ..... [3]

(b) (i) Factorise  $x^2 - 25$ .

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

(ii) Simplify  $\frac{2x^2 + 11x + 5}{x^2 - 25}$ .

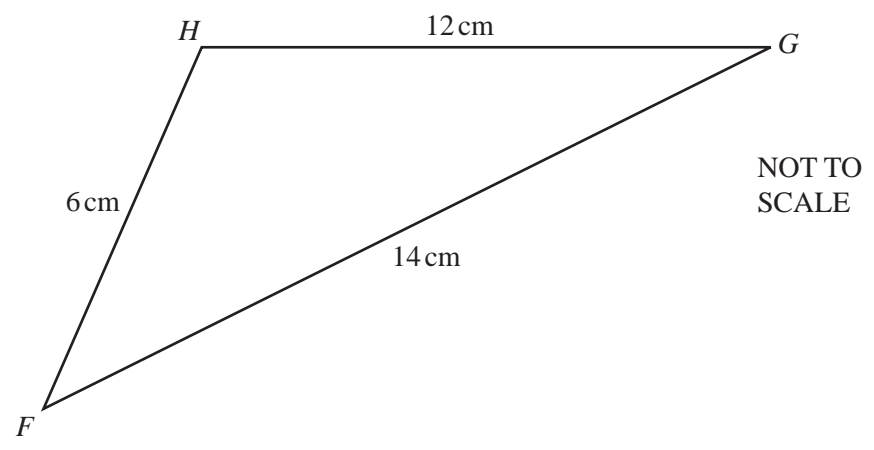
Answer(b)(ii) ..... [3]

(c) Solve the inequality  $5(x - 4) < 3(12 - x)$ .

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

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4 (a)



The diagram shows triangle  $FGH$ , with  $FG = 14\text{ cm}$ ,  $GH = 12\text{ cm}$  and  $FH = 6\text{ cm}$ .

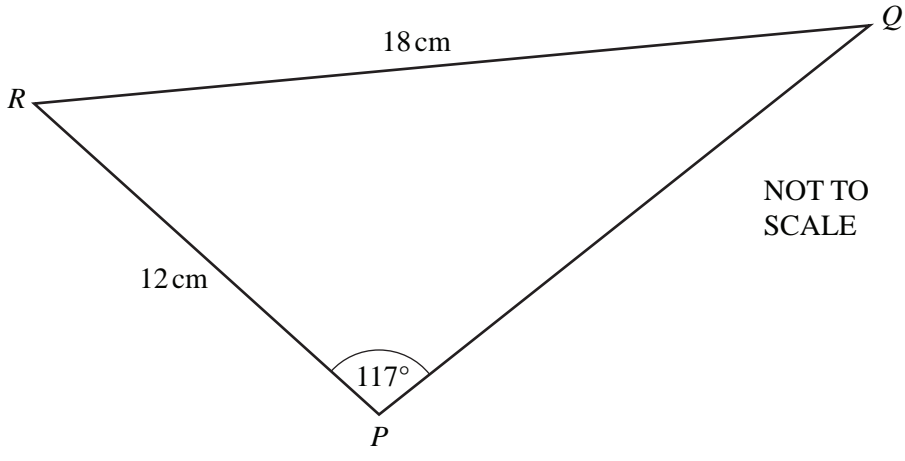
(i) Calculate the size of angle  $HFG$ .

Answer(a)(i) Angle  $HFG = \dots\dots\dots$  [4]

(ii) Calculate the area of triangle  $FGH$ .

Answer(a)(ii)  $\dots\dots\dots$   $\text{cm}^2$  [2]

(b)

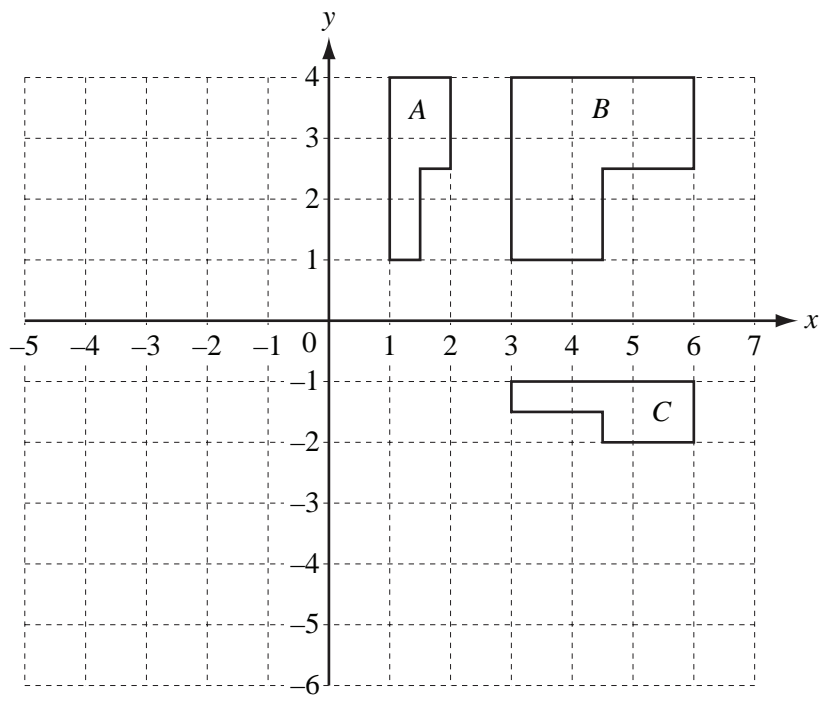


The diagram shows triangle  $PQR$ , with  $RP = 12$  cm,  $RQ = 18$  cm and angle  $RPQ = 117^\circ$ .

Calculate the size of angle  $RQP$ .

Answer(b) Angle  $RQP = \dots\dots\dots$  [3]

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(a) On the grid above, draw the image of

(i) shape *A* after translation by the vector  $\begin{pmatrix} -3 \\ -2 \end{pmatrix}$ , [2]

(ii) shape *A* after reflection in the line  $x = -1$ . [2]

(b) Describe fully the **single** transformation which maps

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

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

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

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

(c) Find the matrix representing the transformation which maps shape *A* onto shape *B*.

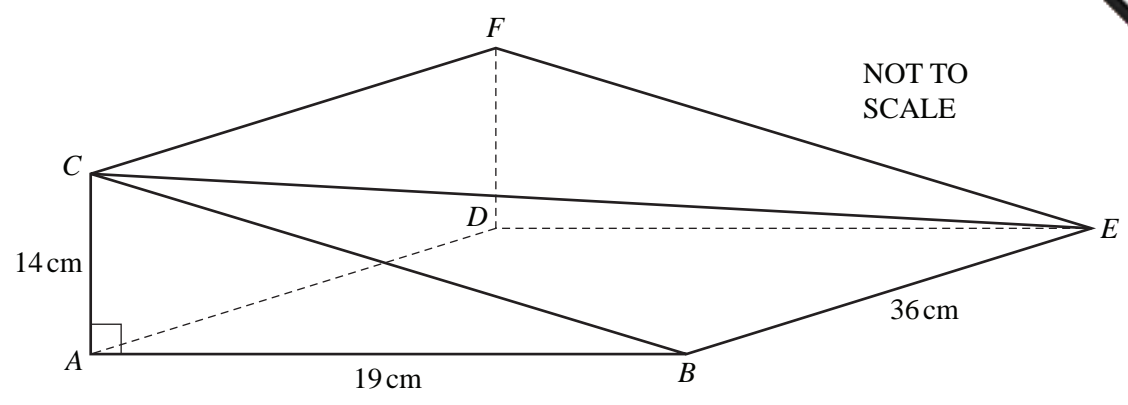
Answer(c)  $\begin{pmatrix} & \\ & \end{pmatrix}$  [2]

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

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



6



In the diagram,  $ABCDEF$  is a prism of length 36 cm.  
 The cross-section  $ABC$  is a right-angled triangle.  
 $AB = 19$  cm and  $AC = 14$  cm.

Calculate

(a) the length  $BC$ ,

Answer(a)  $BC =$  ..... cm [2]

(b) the total surface area of the prism,

Answer(b) .....  $\text{cm}^2$  [4]

(c) the volume of the prism,

Answer(c) .....  $\text{cm}^3$  [2]

(d) the length  $CE$ ,

Answer(d)  $CE =$  ..... cm [2]

(e) the angle between the line  $CE$  and the base  $ABED$ .

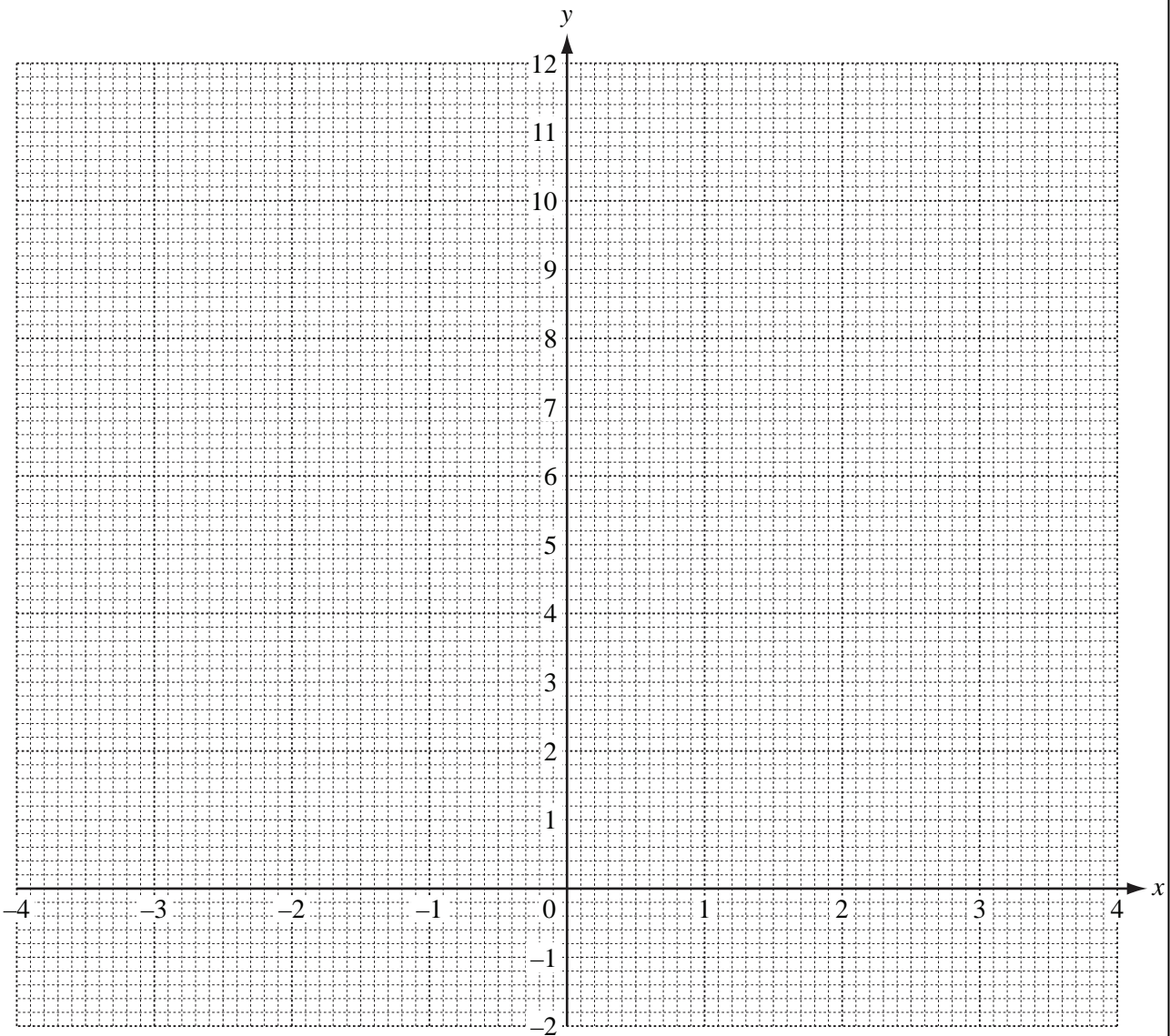
Answer(e) ..... [3]

7 (a) Complete the table of values for the equation  $y = \frac{4}{x^2}$ ,  $x \neq 0$ .

x	-4	-3	-2	-1	-0.6		0.6	1	2	3	4
y	0.25	0.44			11.11			4.00		0.44	

[3]

(b) On the grid, draw the graph of  $y = \frac{4}{x^2}$  for  $-4 \leq x \leq -0.6$  and  $0.6 \leq x \leq 4$ .



[5]

(c) Use your graph to solve the equation  $\frac{4}{x^2} = 6$ .

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

(d) By drawing a suitable tangent, estimate the gradient of the graph where  $x = 1.5$ .

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

(e) (i) The equation  $\frac{4}{x^2} - x + 2 = 0$  can be solved by finding the intersection of the graph of  $y = \frac{4}{x^2}$  and a straight line.

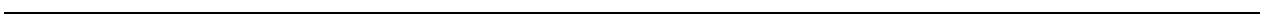
Write down the equation of this straight line.

Answer(e)(i)  $\dots\dots\dots$  [1]

(ii) On the grid, draw the straight line from your answer to **part (e)(i)**. [2]

(iii) Use your graphs to solve the equation  $\frac{4}{x^2} - x + 2 = 0$ .

Answer(e)(iii)  $x = \dots\dots\dots$  [1]



8 The table below shows the marks scored by a group of students in a test.

Mark	11	12	13	14	15	16	17	18
Frequency	10	8	16	11	7	8	6	9

(a) Find the mean, median and mode.

Answer(a) mean = .....

median = .....

mode = ..... [6]

(b) The table below shows the time ( $t$  minutes) taken by the students to complete the test.

Time ( $t$ )	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$	$40 < t \leq 50$	$50 < t \leq 60$
Frequency	2	19	16	14	15	9

(i) Cara rearranges this information into a new table.

Complete her table.

Time ( $t$ )	$0 < t \leq 20$	$20 < t \leq 40$	$40 < t \leq 50$	$50 < t \leq 60$
Frequency				9

[2]

(ii) Cara wants to draw a histogram to show the information in **part (b)(i)**.

Complete the table below to show the interval widths and the frequency densities.

	$0 < t \leq 20$	$20 < t \leq 40$	$40 < t \leq 50$	$50 < t \leq 60$
Interval width				10
Frequency density				0.9

[3]

(c) **Some** of the students were asked how much time they spent revising for the test.

10 students revised for 2.5 hours, 12 students revised for 3 hours and  $n$  students revised for 4 hours.

The mean time that **these** students spent revising was 3.1 hours.

Find  $n$ .

**Show all your working.**

*Answer(c)*  $n =$  ..... [4]

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9 Peter wants to plant  $x$  plum trees and  $y$  apple trees.  
He wants at least 3 plum trees and at least 2 apple trees.

(a) Write down one inequality in  $x$  and one inequality in  $y$  to represent these conditions.

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

(b) There is space on his land for no more than 9 trees.

Write down an inequality in  $x$  and  $y$  to represent this condition.

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

(c) Plum trees cost \$6 and apple trees cost \$14.

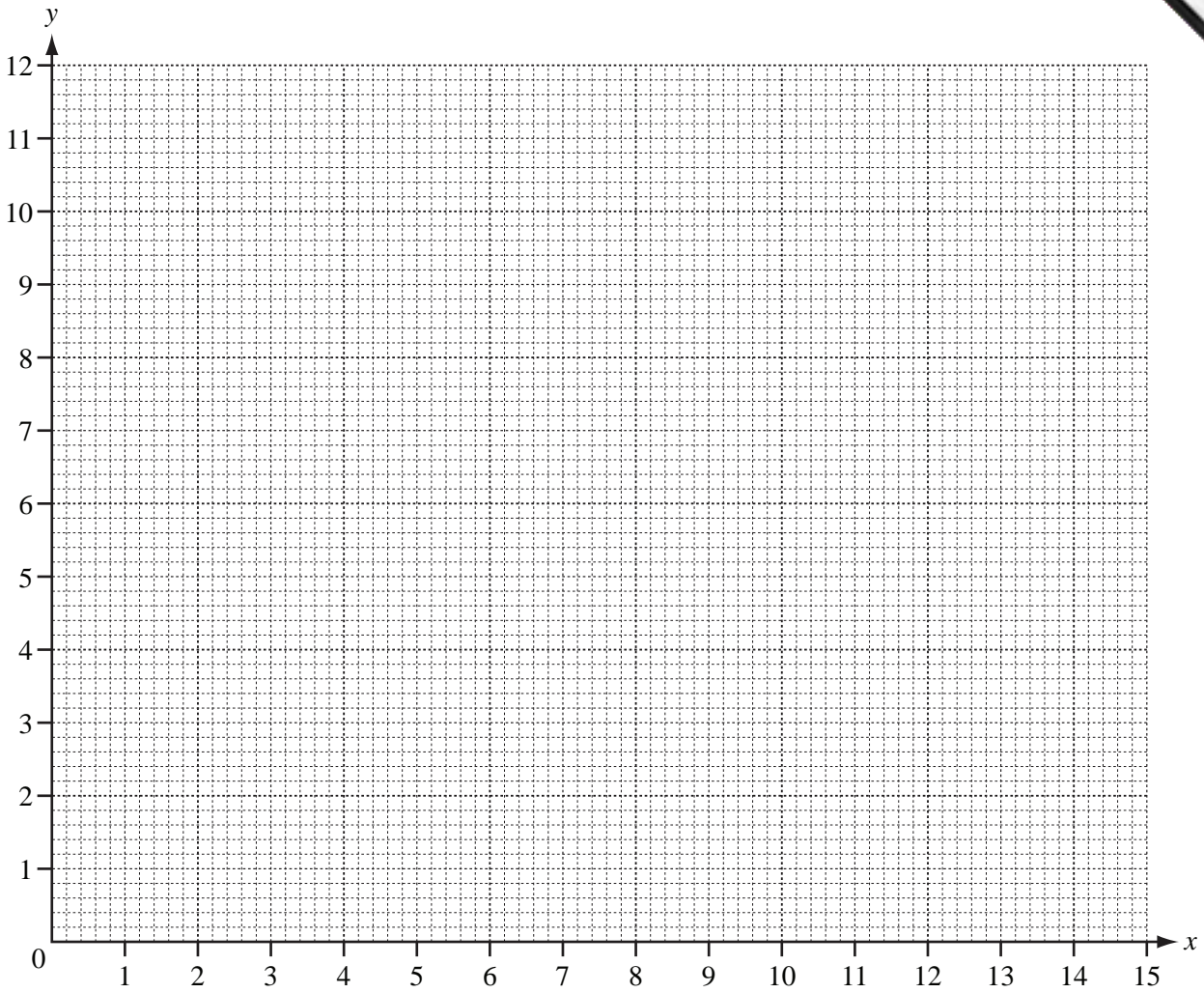
Peter wants to spend no more than \$84.

Write down an inequality in  $x$  and  $y$ , and show that it simplifies to  $3x + 7y \leq 42$ .

Answer(c)

[1]

(d) On the grid, draw four lines to show the four inequalities and shade the **unwanted** region.



[7]

(e) Calculate the smallest cost when Peter buys a total of 9 trees.

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

10 The first and the  $n$ th terms of sequences  $A$ ,  $B$  and  $C$  are shown in the table below.

(a) Complete the table for each sequence.

	1st term	2nd term	3rd term	4th term	5th term	$n$ th term
Sequence $A$	1					$n^3$
Sequence $B$	4					$4n$
Sequence $C$	4					$(n + 1)^2$

[5]

(b) Find

(i) the 8th term of sequence  $A$ ,

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

(ii) the 12th term of sequence  $C$ .

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

(c) (i) Which term in sequence  $A$  is equal to 15 625?

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

(ii) Which term in sequence  $C$  is equal to 10 000?

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

(d) The first four terms of sequences  $D$  and  $E$  are shown in the table below.

Use the results from **part (a)** to find the 5th and the  $n$ th terms of the sequences  $D$  and  $E$ .

	1st term	2nd term	3rd term	4th term	5th term	$n$ th term
Sequence $D$	5	16	39	80		
Sequence $E$	0	1	4	9		

[4]