



1 (a) A shop sells dress fabric for \$2.97 per metre.

(i) A customer buys 9 metres of this fabric.

Calculate the change he receives from \$50.

\$ ..... [2]

(ii) The selling price of \$2.97 per metre is an increase of 8% on the cost price.

Calculate the cost price.

\$ ..... per metre [3]

(b) A dressmaker charges \$35 or 2300 rupees to make a dress.

Calculate the difference in price when the exchange rate is 1 rupee = \$0.0153 .

Give your answer in rupees.

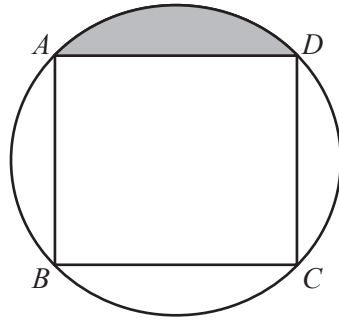
..... rupees [2]

(c) The dressmaker measures a length of fabric as 600 m, correct to the nearest 5 metres.

He cuts this into dress lengths of 9 m, correct to the nearest metre.

Calculate the largest number of complete dress lengths he could cut.

..... [3]



NOT TO SCALE

The vertices of a square  $ABCD$  lie on the circumference of a circle, radius 8 cm.

(a) Calculate the area of the square.

.....  $\text{cm}^2$  [2]

(b) (i) Calculate the area of the shaded segment.

.....  $\text{cm}^2$  [3]

(ii) Calculate the perimeter of the shaded segment.

..... cm [4]

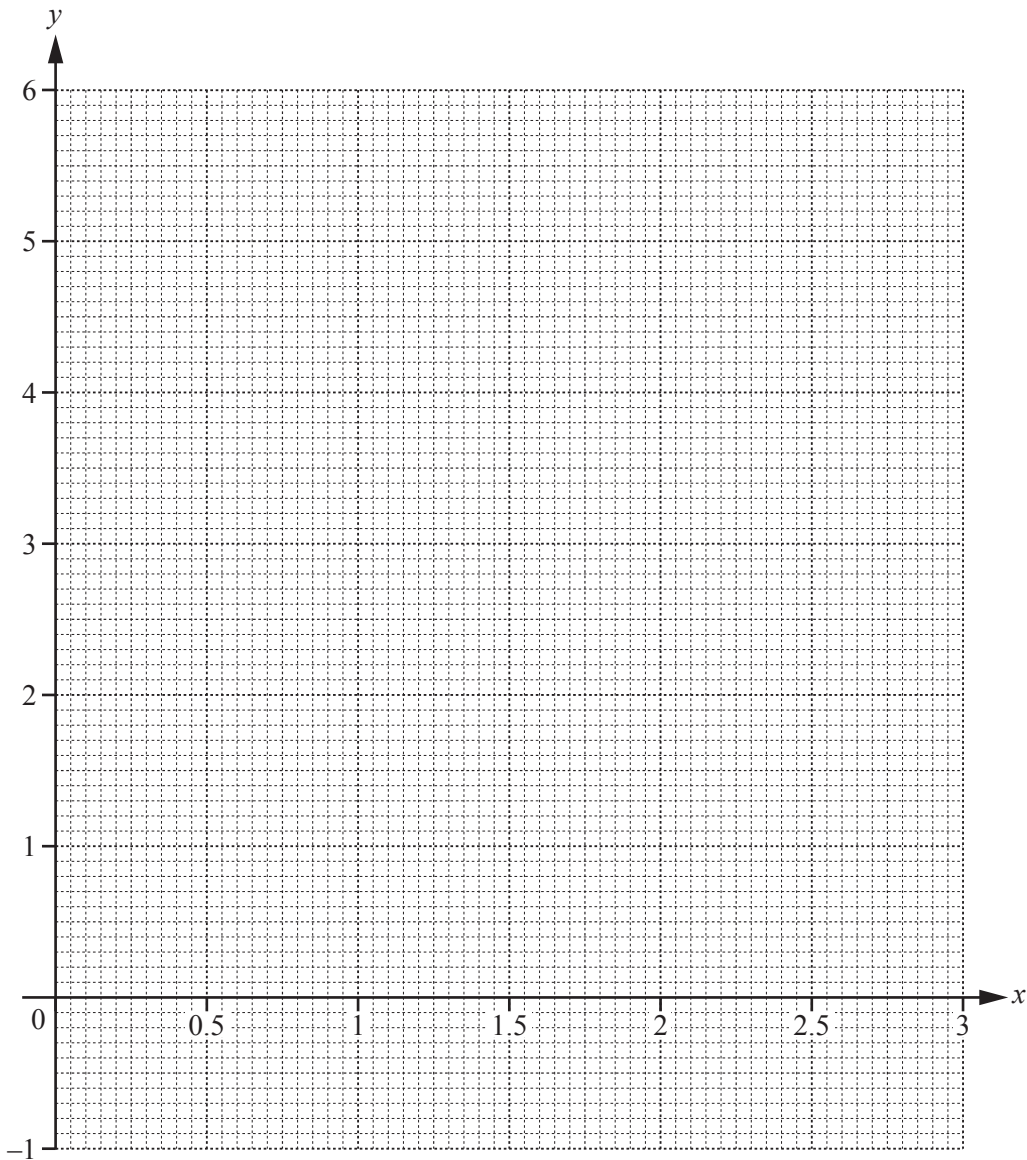
- 3 The table shows some values for  $y = 2x + \frac{1}{x} - 3$  for  $0.125 \leq x \leq 3$ .

$x$	0.125	0.25	0.375	0.5	0.75	1	1.5	2	2.5	3
$y$	5.25	1.5	0.42			0	0.67	1.5		3.33

(a) Complete the table.

[3]

(b) On the grid, draw the graph of  $y = 2x + \frac{1}{x} - 3$  for  $0.125 \leq x \leq 3$ .



[4]

(c) Use your graph to solve  $2x + \frac{1}{x} - 3 \geq 2$ .

.....

..... [3]

(d) The equation  $\frac{1}{x} = 7 - 3x$  can be solved using your graph in **part (b)** and a straight line.

(i) Write down the equation of this straight line.

..... [2]

(ii) Draw this straight line and solve the equation  $\frac{1}{x} = 7 - 3x$ .

$x =$  ..... or  $x =$  ..... [3]

- 4 (a) Make  $t$  the subject of the formula  $s = k - t^2$ .

$$t = \dots\dots\dots [2]$$

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

$$\dots\dots\dots [1]$$

- (ii) Simplify  $\frac{x^2 - 25}{x^2 - 2x - 35}$ .

$$\dots\dots\dots [3]$$

- (c) Write as a single fraction in its simplest form.

$$\frac{x-8}{x} + \frac{3x}{x+1}$$

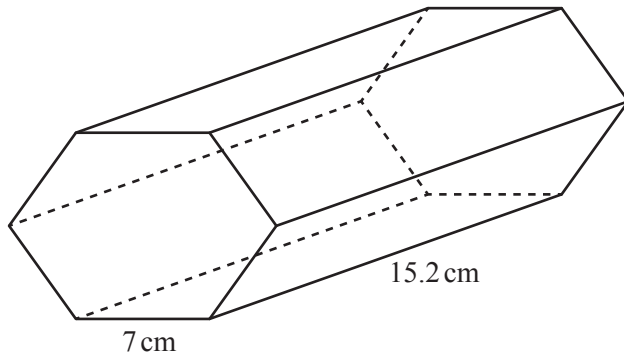
$$\dots\dots\dots [3]$$

- (d) Find the **integer** values of  $n$  that satisfy the inequality.

$$18 - 2n < 6n \leq 30 + n$$

$$\dots\dots\dots [3]$$

5 (a)

NOT TO  
SCALE

The diagram shows a solid prism with length 15.2 cm.  
The cross-section of this prism is a **regular** hexagon with side 7 cm.

(i) Calculate the volume of the prism.

..... cm<sup>3</sup> [5]

(ii) Calculate the total surface area of the prism.

..... cm<sup>2</sup> [3]

(b) Another solid metal prism with volume 500 cm<sup>3</sup> is melted and made into 6 identical spheres.

Calculate the radius of each sphere.

[The volume,  $V$ , of a sphere with radius  $r$  is  $V = \frac{4}{3}\pi r^3$ .]

..... cm [3]

6 Klaus buys  $x$  silver balloons and  $y$  gold balloons for a party.

He buys

- more gold balloons than silver balloons
- at least 15 silver balloons
- less than 50 gold balloons
- a total of no more than 70 balloons.

(a) Write down four inequalities, in terms of  $x$  and/or  $y$ , to show this information.

.....

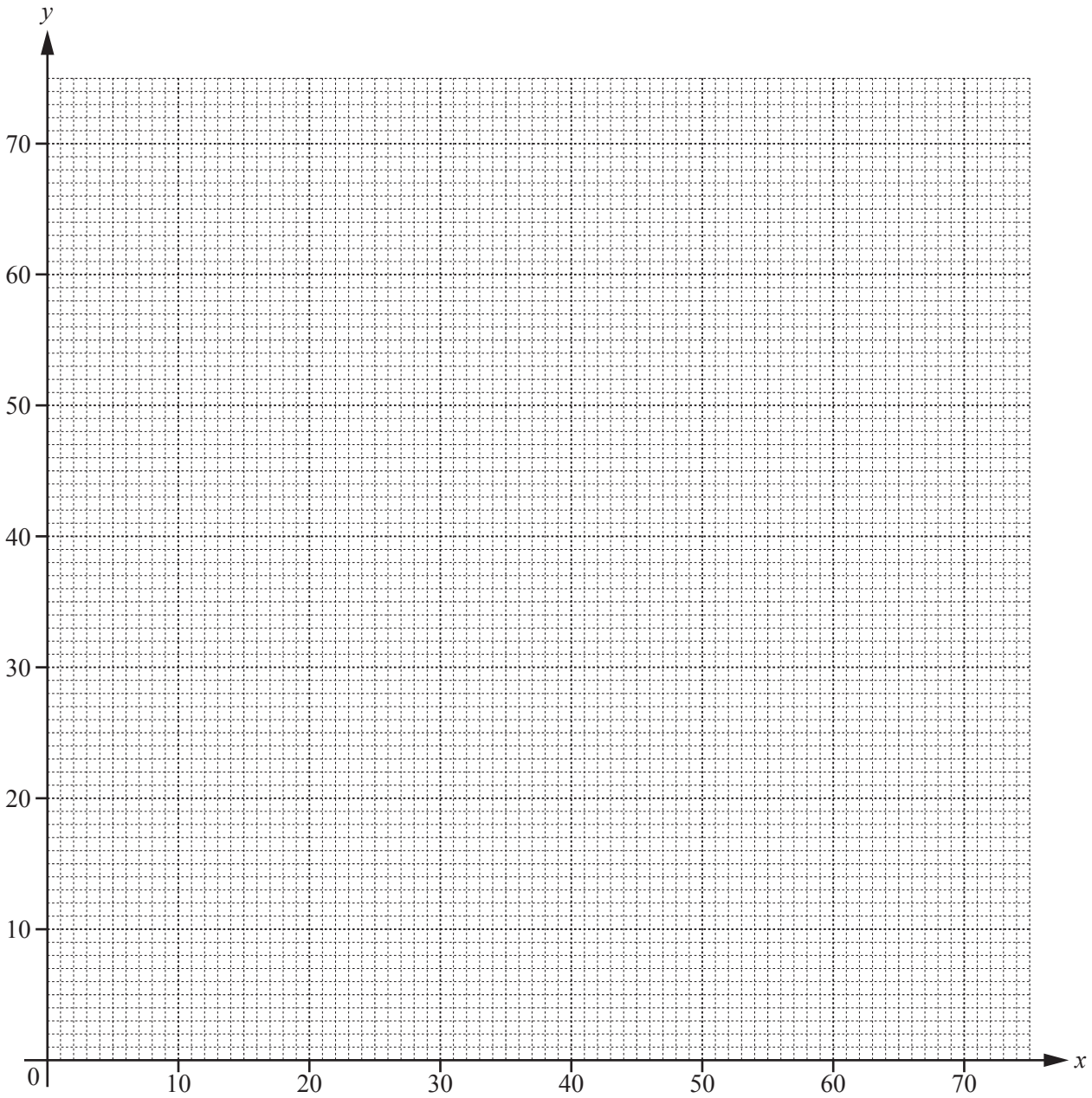
.....

.....

..... [4]



(b) On the grid, show the information from **part (a)** by drawing four straight lines and shading the unwanted regions.



[5]

(c) Silver balloons cost \$2 and gold balloons cost \$3.

Calculate the most that Klaus could spend.

\$ ..... [2]

7 The frequency table shows information about the time,  $m$  minutes, that each of 160 people spend in a library.

Time ( $m$ minutes)	$0 < m \leq 10$	$10 < m \leq 40$	$40 < m \leq 60$	$60 < m \leq 90$	$90 < m \leq 100$	$100 < m \leq 120$
Frequency	3	39	43	55	11	9

(a) (i) Find the probability that one of these people, chosen at random, spends more than 100 minutes in the library.

..... [1]

(ii) Calculate an estimate of the mean time spent in the library.

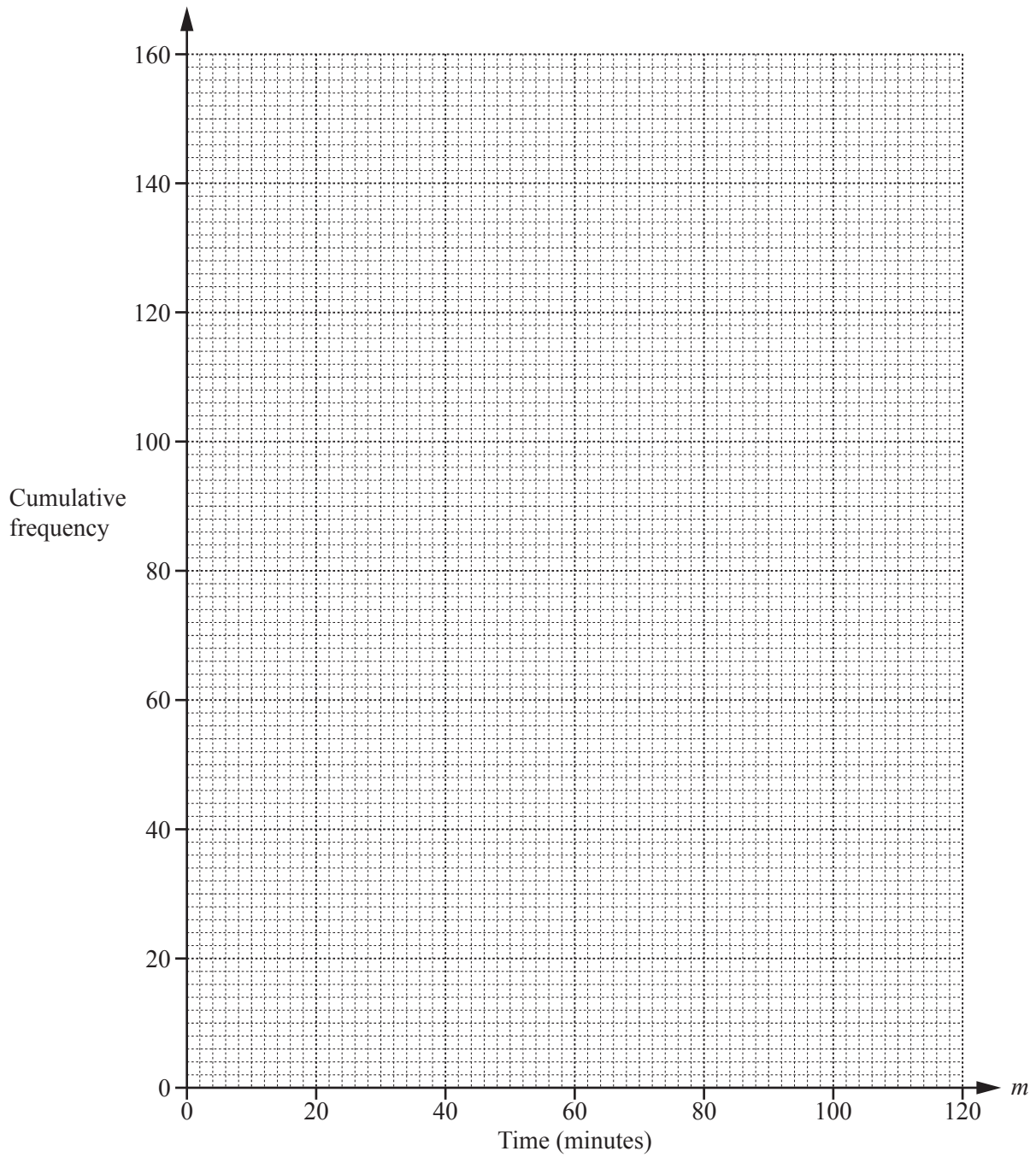
..... min [4]

(b) Complete the cumulative frequency table below.

Time ( $m$ minutes)	$m \leq 10$	$m \leq 40$	$m \leq 60$	$m \leq 90$	$m \leq 100$	$m \leq 120$
Cumulative frequency	3	42				

[2]

(c) On the grid opposite, draw the cumulative frequency diagram.



[3]

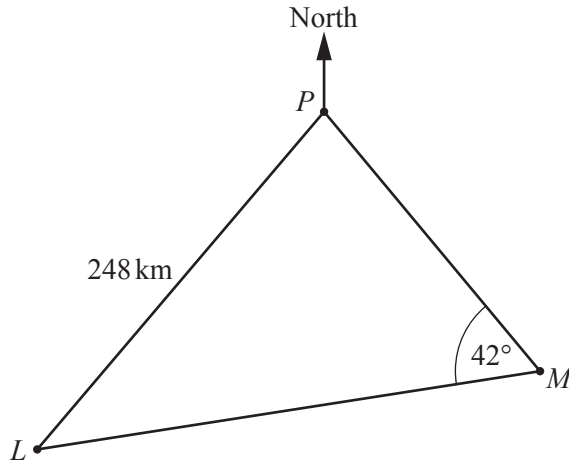
(d) Use your cumulative frequency diagram to find

(i) the median, ..... min [1]

(ii) the interquartile range, ..... min [2]

(iii) the 90th percentile, ..... min [2]

(iv) the number of people who spend more than 30 minutes in the library. .... [2]



NOT TO SCALE

The diagram shows two ports,  $L$  and  $P$ , and a buoy,  $M$ .  
 The bearing of  $L$  from  $P$  is  $201^\circ$  and  $LP = 248$  km.  
 The bearing of  $M$  from  $P$  is  $127^\circ$ .  
 Angle  $PML = 42^\circ$ .

(a) Use the sine rule to calculate  $LM$ .

$LM = \dots\dots\dots$  km [4]

(b) A ship sails directly from  $L$  to  $P$ .

(i) Calculate the shortest distance from  $M$  to  $LP$ .

$\dots\dots\dots$  km [3]

(ii) The ship leaves  $L$  at 20 45 and travels at a speed of 40 km/h.

Calculate the time the next day that the ship arrives at  $P$ .

$\dots\dots\dots$  [3]

9 (a) Find the magnitude of the vector  $\begin{pmatrix} -1 \\ 7 \end{pmatrix}$ .

..... [2]

(b) The determinant of the matrix  $\begin{pmatrix} 6 & 2m \\ 5 & m \end{pmatrix}$  is 24.

Find the value of  $m$ .

$m =$  ..... [2]

(c)  $\mathbf{L} = \begin{pmatrix} 2 & 5 \\ 3 & 9 \end{pmatrix}$     $\mathbf{M} = \begin{pmatrix} -4 \\ 2 \end{pmatrix}$     $\mathbf{N} = (1 \ 7)$

Work out the following.

(i)  $\mathbf{NM}$

..... [2]

(ii)  $\mathbf{LM}$

..... [2]

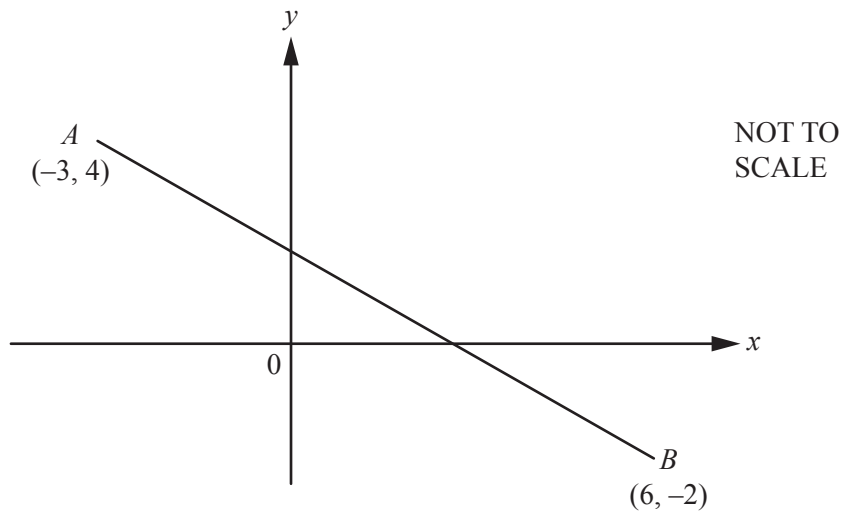
(iii)  $\mathbf{L}^2$

..... [2]

(iv)  $\mathbf{L}^{-1}$

..... [2]

10 (a)



Calculate the length of  $AB$ .

..... [3]

(b) The point  $P$  has co-ordinates  $(10, 12)$  and the point  $Q$  has co-ordinates  $(2, -4)$ .

Find

(i) the co-ordinates of the mid-point of the line  $PQ$ ,

(....., .....) [2]

(ii) the gradient of the line  $PQ$ ,

..... [2]

(iii) the equation of a line perpendicular to  $PQ$  that passes through the point  $(2, 3)$ .

..... [3]

- 11 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
$A$	0	1	4	9	16	
$B$	4	5	6	7	8	
$C$	-4	-4	-2	2	8	

- (a) Complete the table. [3]

- (b) Find an expression for the  $n$ th term of

- (i) sequence  $A$ ,

..... [2]

- (ii) sequence  $B$ .

..... [1]

- (c) Find the value of  $n$  when the  $n$ th term of sequence  $A$  is 576.

$n =$  ..... [2]

- (d) (i) Find an expression for the  $n$ th term of sequence  $C$ .  
Give your answer in its simplest form.

..... [3]

- (ii) Find the value of the 30th term of sequence  $C$ .

..... [2]

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