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0580/42

February/March 2018

2 hours 30 minutes

Additional Materials: Electronic calculator Geometrical instruments
 Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

For π , use either your calculator value or 3.142.

The total of the marks for this paper is 130.

This document consists of **15** printed pages and **1** blank page.

- 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.

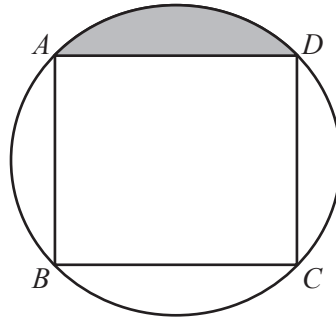
Calculate the difference in price when the exchange rate is 1 rupee = \$0.0153 .
Give your answer in rupees.

..... 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]



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

- (a) Calculate the area of the square.

..... cm^2 [2]

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

..... cm^2 [3]

- (ii) Calculate the perimeter of the shaded segment.

..... cm [4]

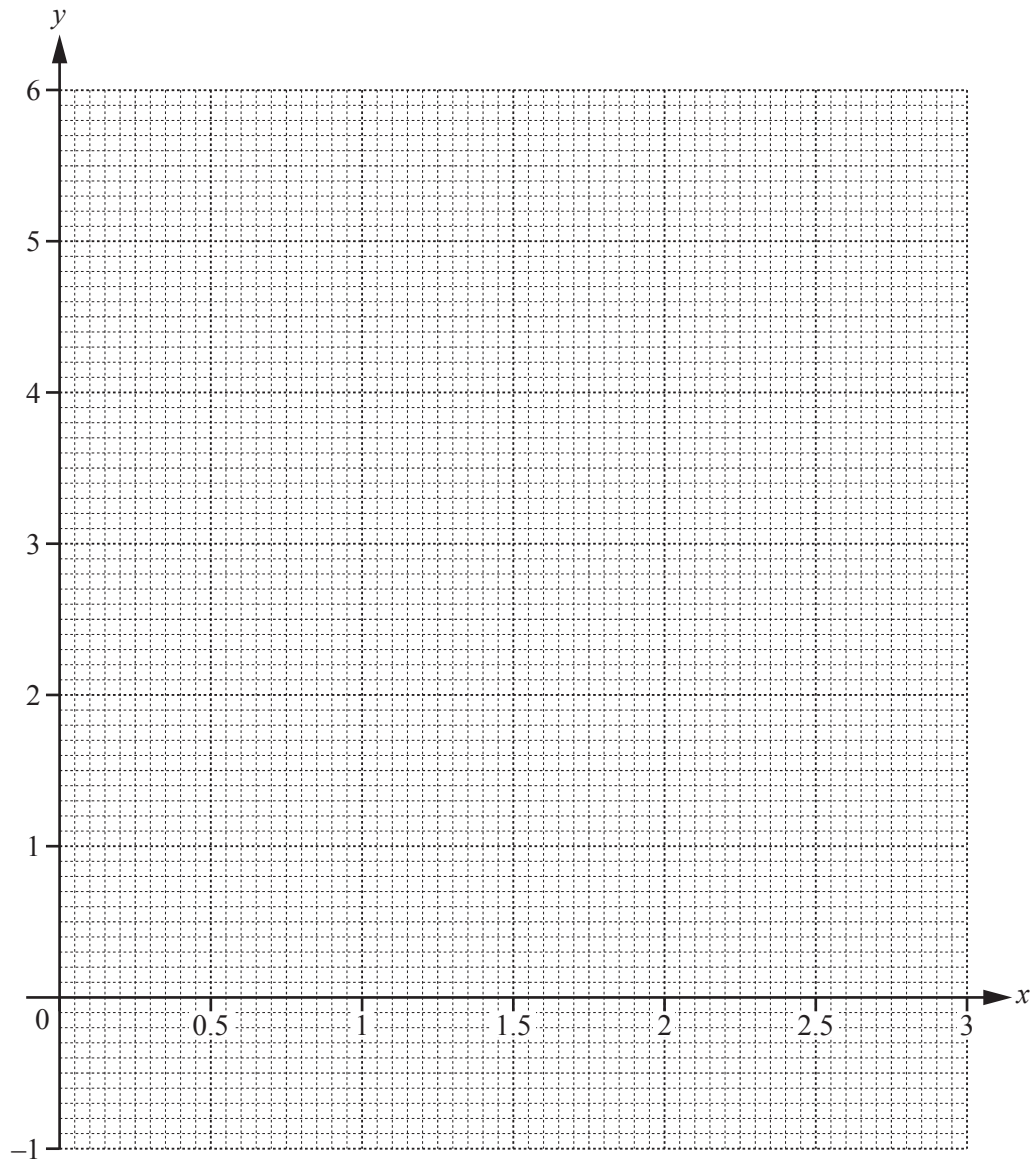
- 3 The table shows some values for $y = 2x + \frac{1}{x} - 3$ for $0.125 \leq x \leq 3$.

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.

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

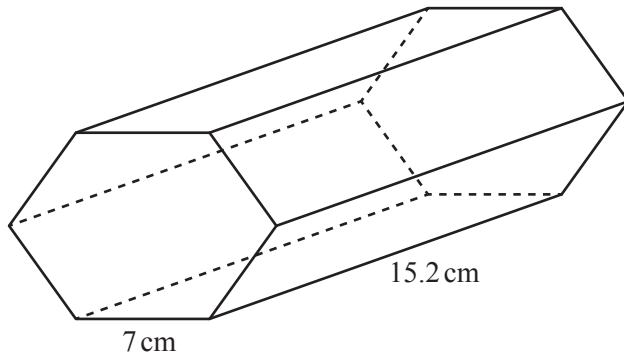
$\dots\dots\dots$ [3]

- (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
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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.

..... cm³ [5]

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

..... cm² [3]

- (b) Another solid metal prism with volume 500 cm³ 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.

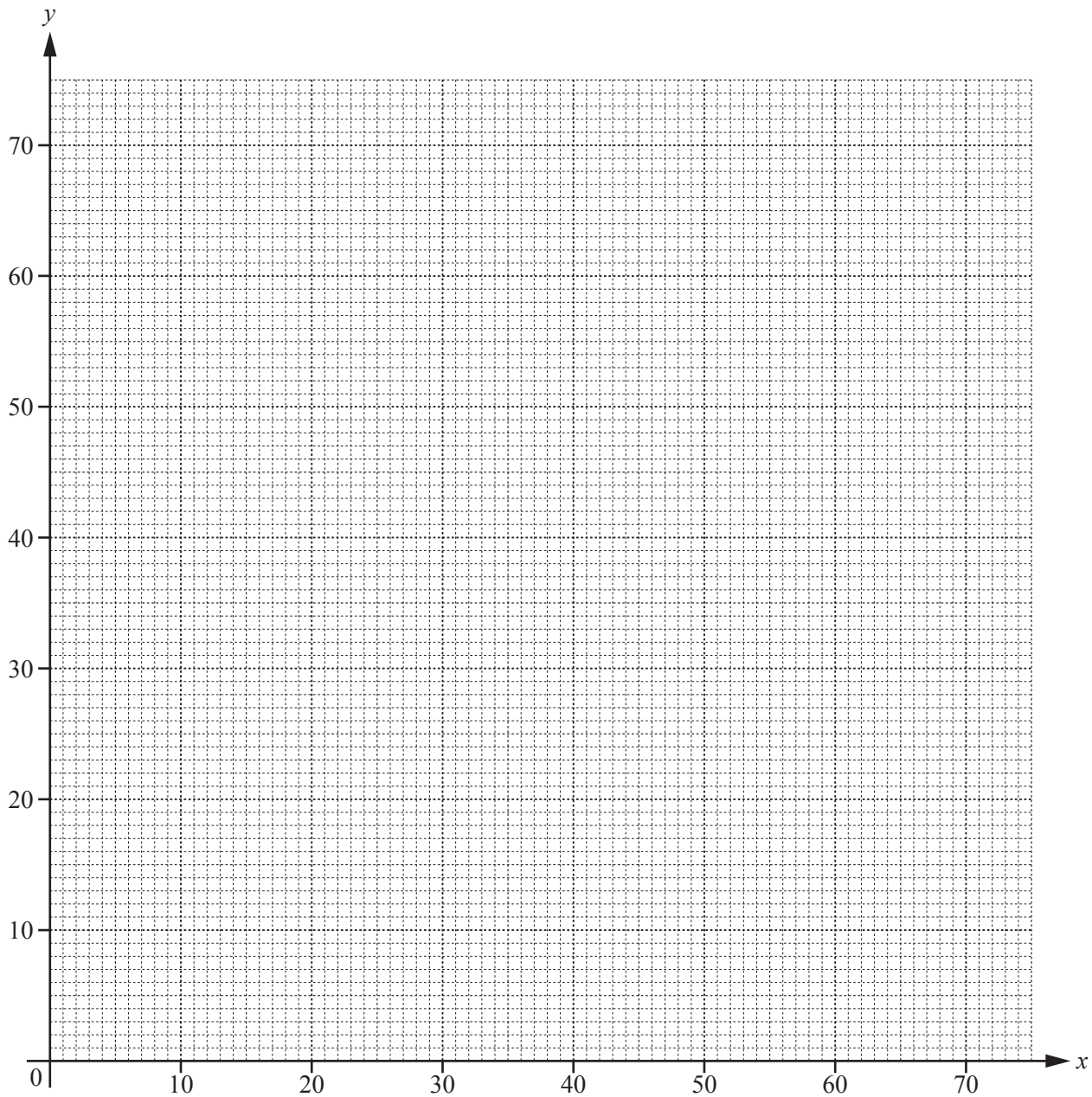
.....

.....

.....

..... [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.

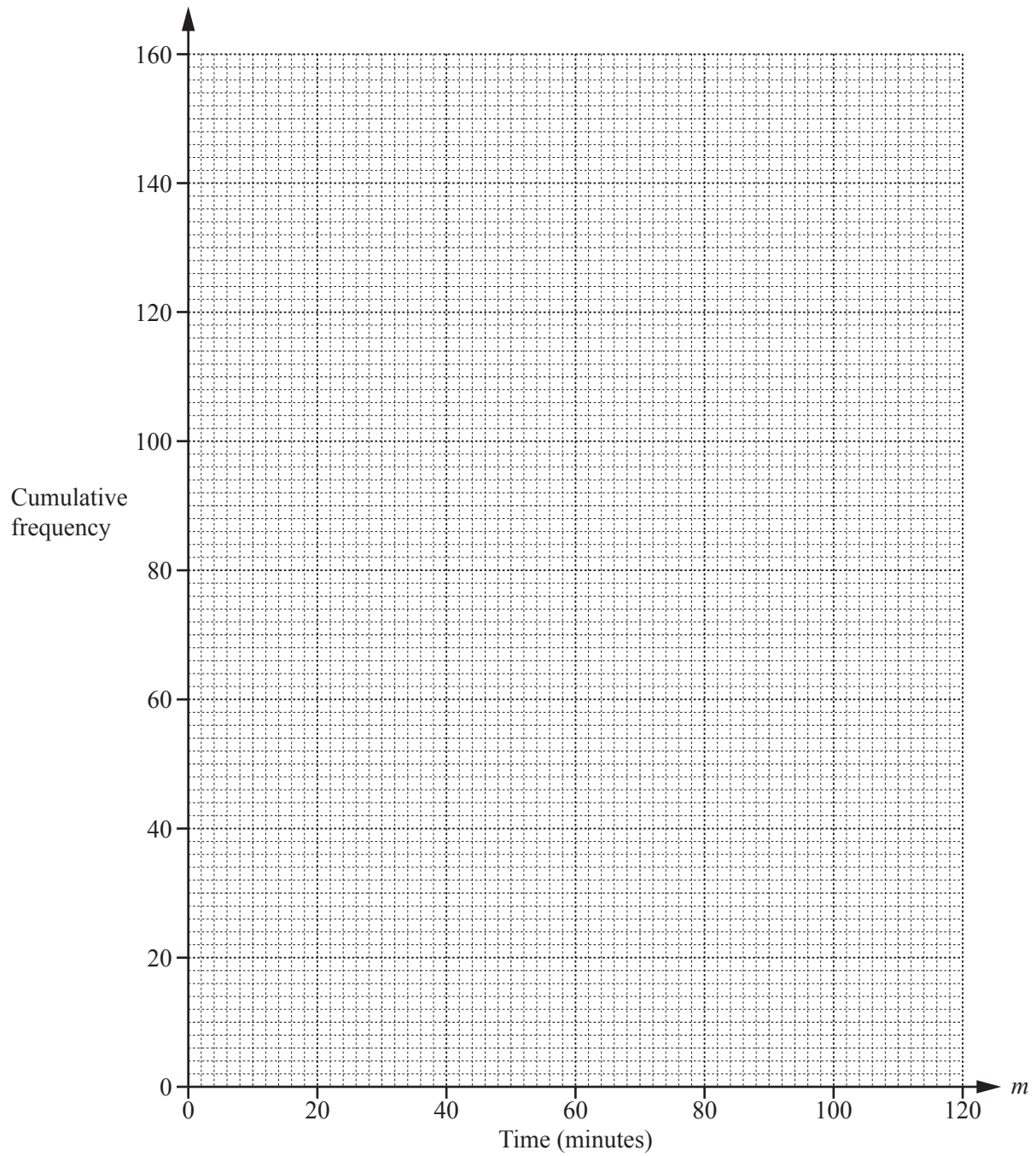
..... min [4]

- (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,

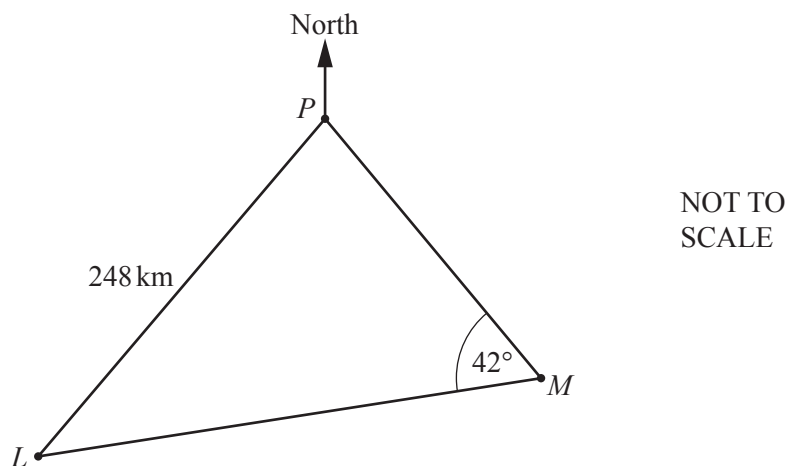
..... min [2]

(iii) the 90th percentile,

..... min [2]

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

..... [2]



The diagram shows two ports, L and P , and a buoy, M .

The bearing of L from P is 201° and $LP = 248$ km.

The bearing of M from P is 127° .

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 2045 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]

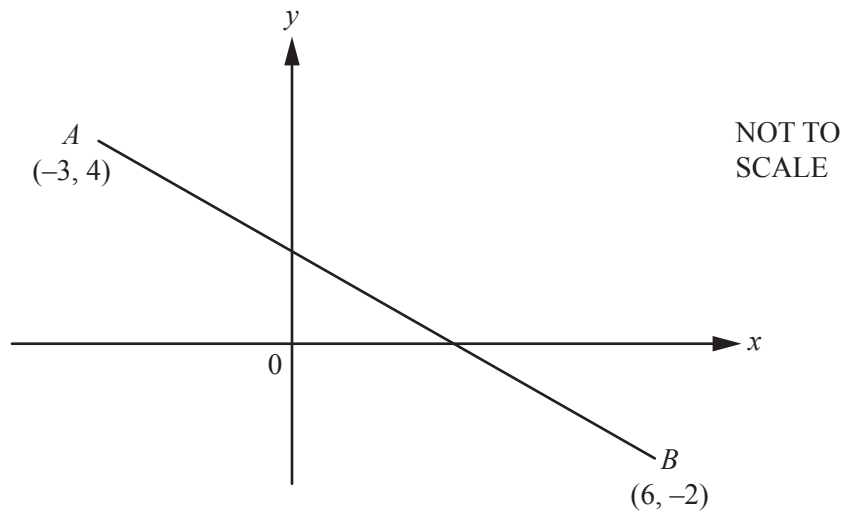
- (iii) $\mathbf{L}^2$

..... [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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