Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

5874029265

MATHEMATICS **0580/42**

Paper 4 (Extended) **February/March 2018**

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.

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

© UCLES 2018

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]

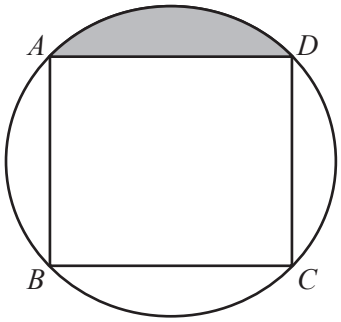
(c) The dressmaker measures a length of fabric as 600 m, correct to the nearest 5 metres.
He cuts this into dress lengths of 9 m, correct to the nearest metre.

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

..... [3]

© UCLES 2018

2



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.

..... cm^2 [2]

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

..... cm^2 [3]

(ii) Calculate the perimeter of the shaded segment.

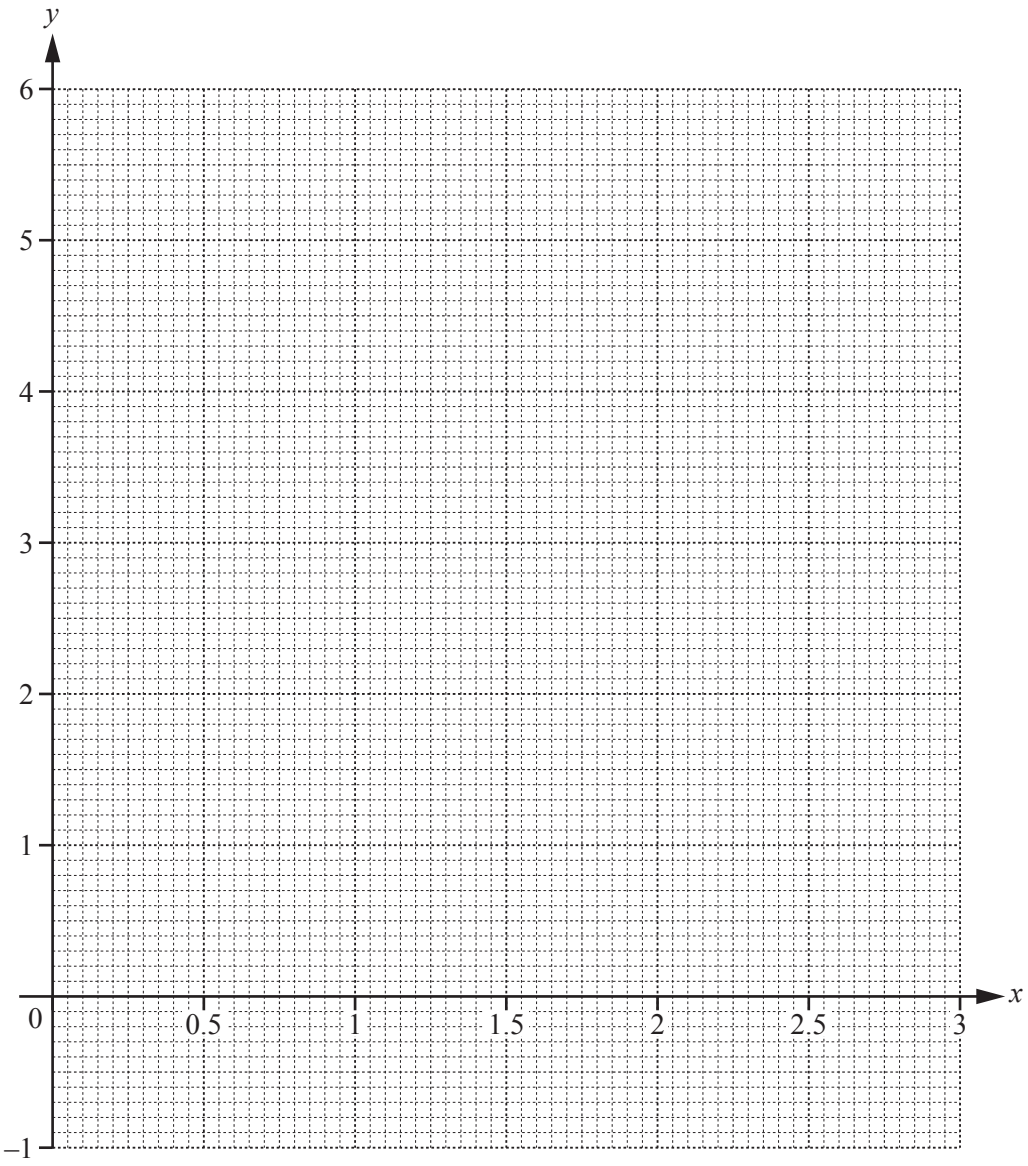
..... cm [4]

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

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 $0.125 \leqslant x \leqslant 3$.



[4]

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

.....

..... [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 $s = k - t^2$.

$t =$ ..... [2]

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

..... [1]

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

..... [3]

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

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

..... [3]

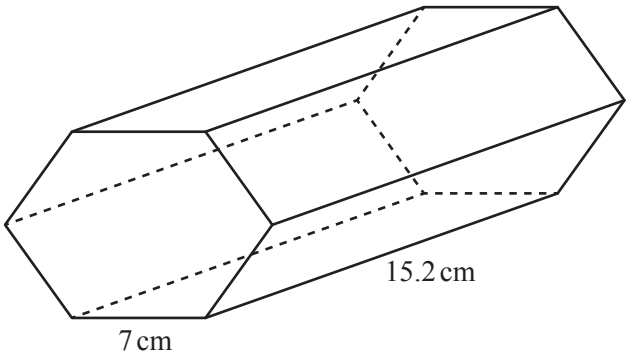
(d) Find the **integer** values of n that satisfy the inequality.

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

..... [3]

© UCLES 2018

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^3 [5]

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

..... cm^2 [3]

(b) Another solid metal prism with volume 500 cm^3 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.

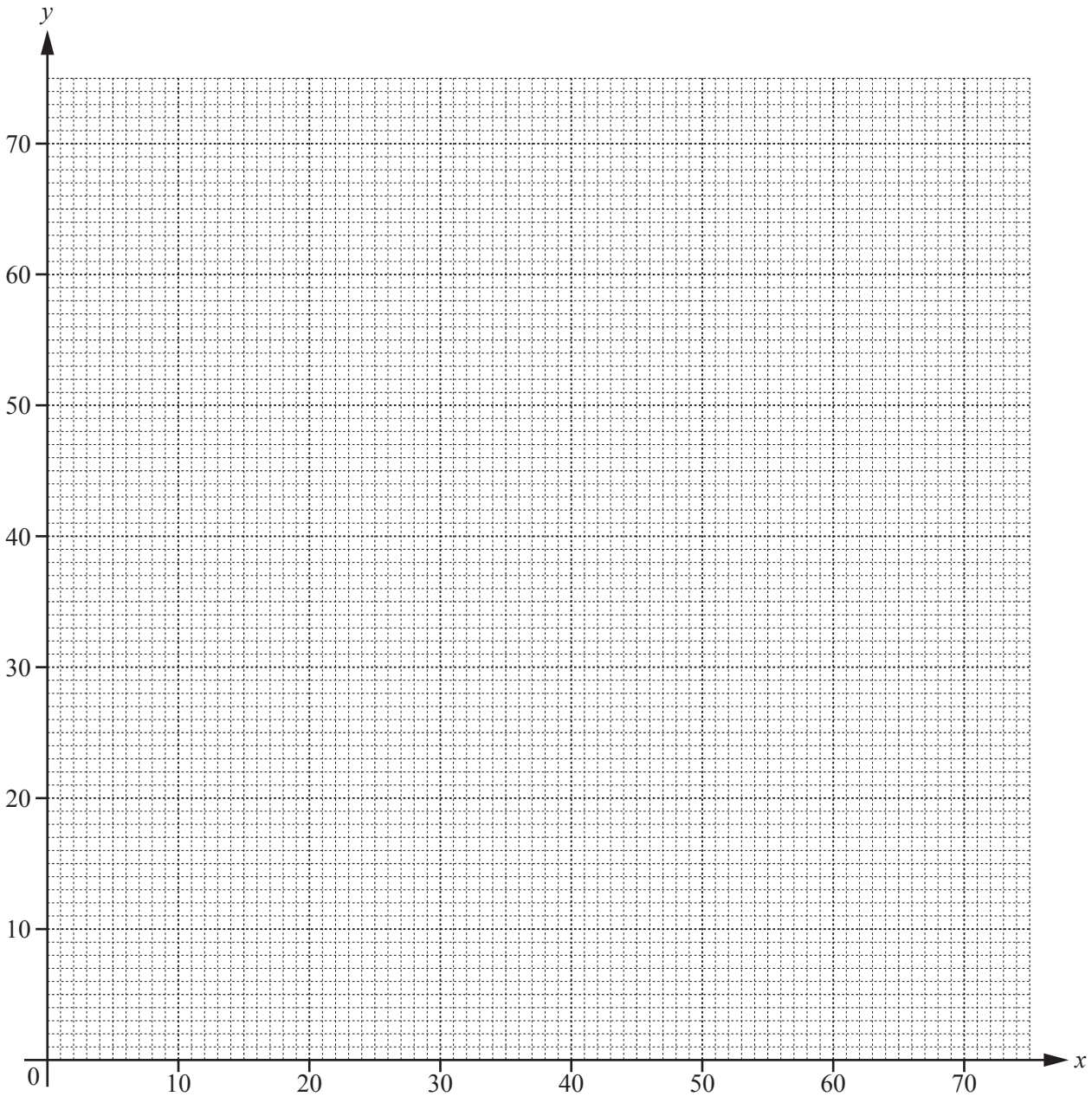
.....

.....

.....

..... [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)	$0 < m \leqslant 10$	$10 < m \leqslant 40$	$40 < m \leqslant 60$	$60 < m \leqslant 90$	$90 < m \leqslant 100$	$100 < m \leqslant 120$
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]

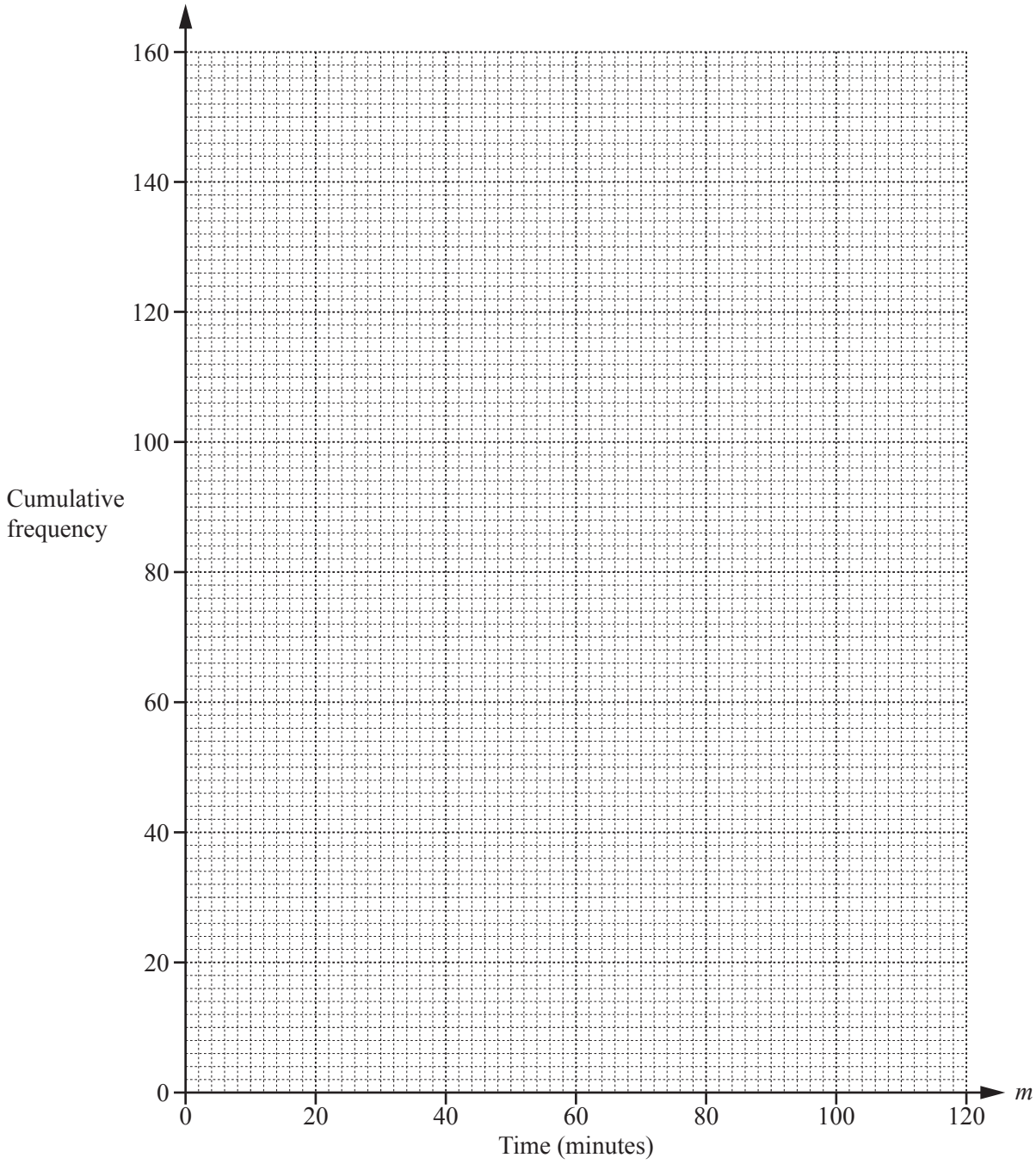
(b) Complete the cumulative frequency table below.

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

[2]

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

© UCLES 2018



[3]

(d) Use your cumulative frequency diagram to find

(i) the median,

..... min [1]

(ii) the interquartile range,

..... min [2]

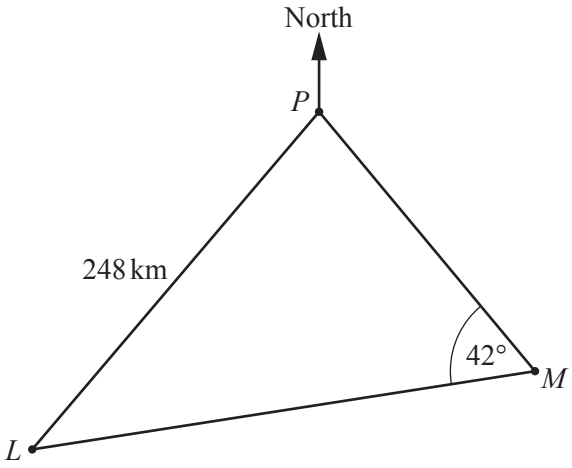
(iii) the 90th percentile,

..... min [2]

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

..... [2]

8



NOT TO SCALE

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 $PML = 42°$.

(a) Use the sine rule to calculate LM.

$LM =$ ..... km [4]

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

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

..... 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.

..... [3]

© UCLES 2018

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

Work out the following.

(i) **NM**

..... [2]

(ii) **LM**

..... [2]

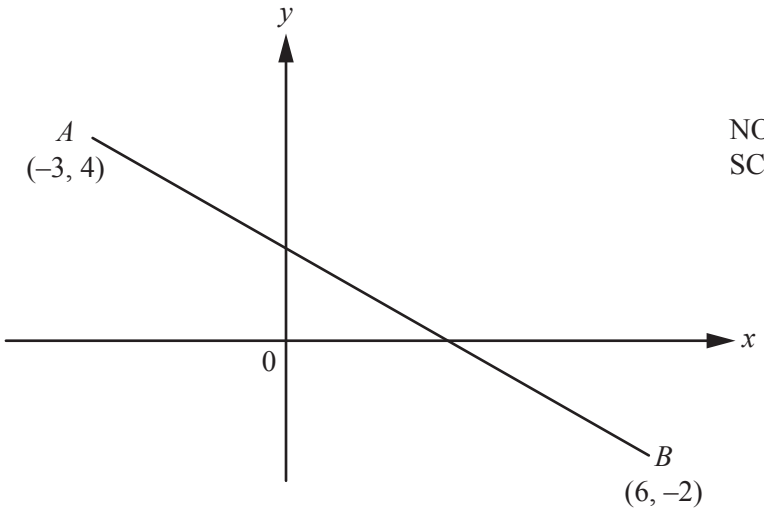
(iii) $\mathbf{L}^2$

..... [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]

© UCLES 2018

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 nth term of

(i) sequence A,

..... [2]

(ii) sequence B.

..... [1]

(c) Find the value of n when the nth term of sequence A is 576.

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

(d) **(i)** Find an expression for the nth term of sequence C.
Give your answer in its simplest form.

..... [3]

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

..... [2]

© UCLES 2018

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2018