



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**MATHEMATICS**

**0580/42**

Paper 4 (Extended)

**October/November 2015**

**2 hours 30 minutes**

Candidates answer on the Question Paper.

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

**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  $\pi$ , 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]

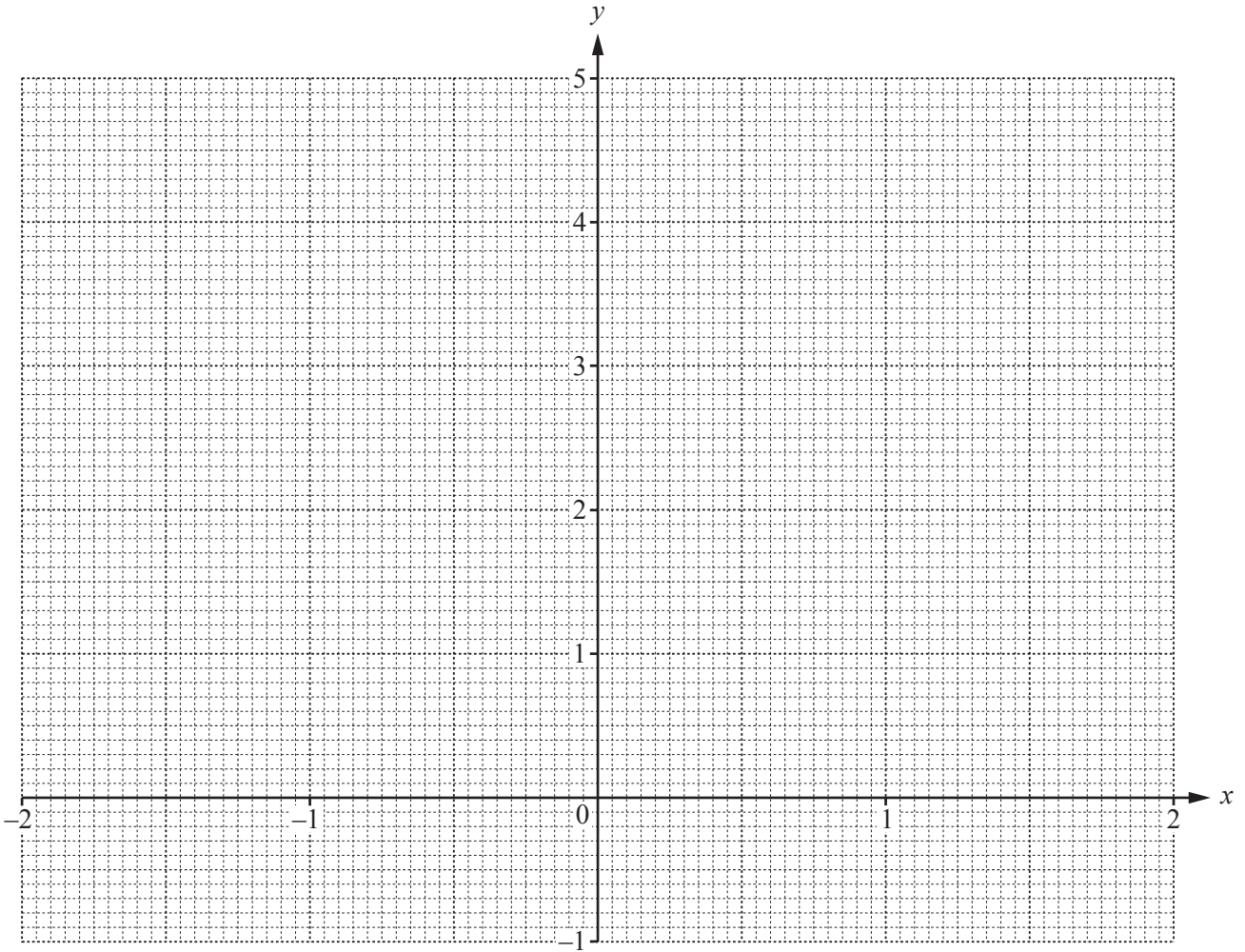
2 The table shows some values for  $y = x^3 - 3x + 2$ .

$x$	-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  $-2 \leq x \leq 2$ .



[4]

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

Answer(c)  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]

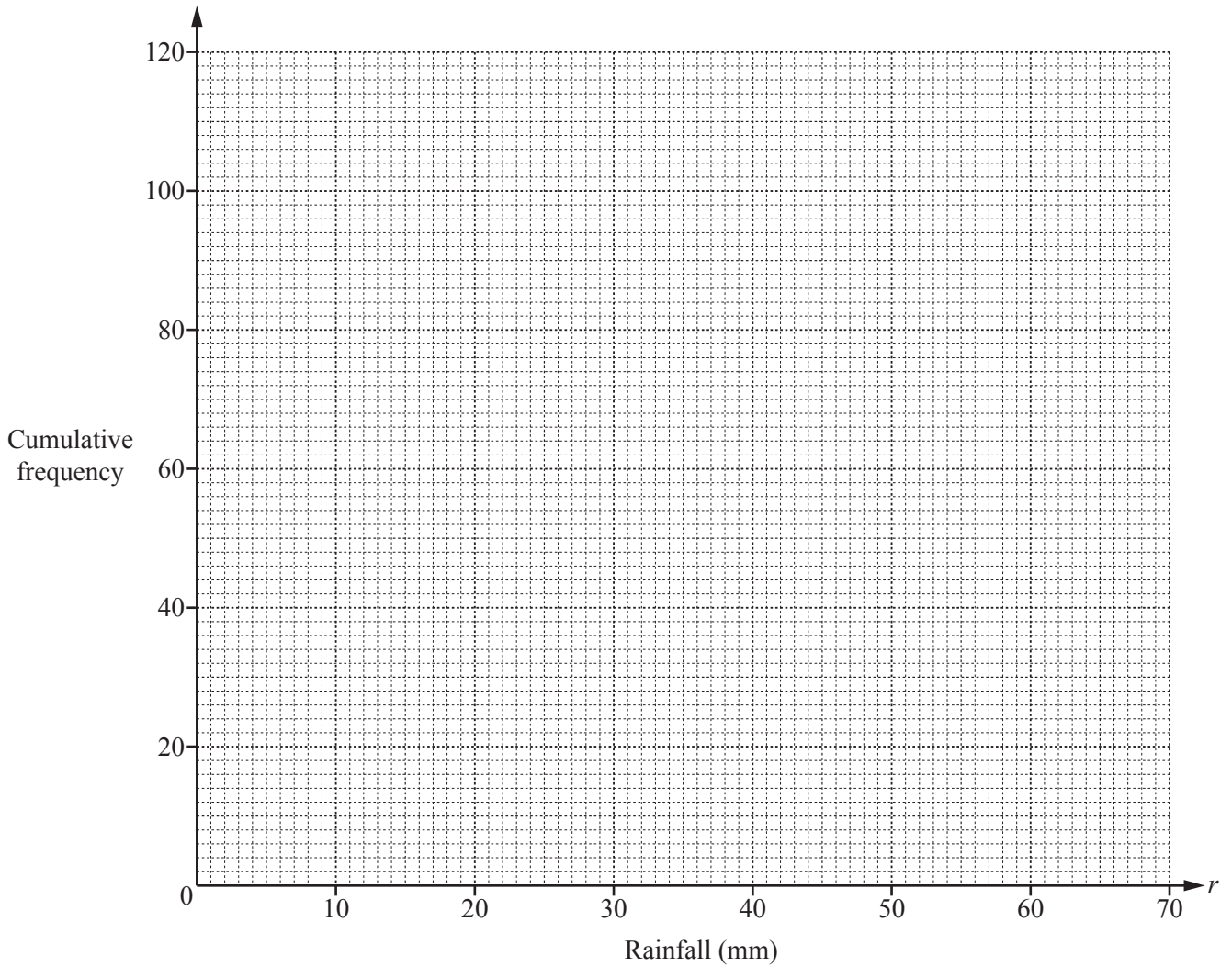
(d) By drawing a suitable tangent, find an estimate of the gradient of the curve at the point where  $x = -1.5$ .

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

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

Rainfall ( $r$ mm)	$r \leq 20$	$r \leq 25$	$r \leq 35$	$r \leq 40$	$r \leq 60$	$r \leq 70$
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)	$0 < r \leq 20$	$20 < r \leq 25$	$25 < r \leq 35$	$35 < r \leq 40$	$40 < r \leq 60$	$60 < r \leq 70$
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]

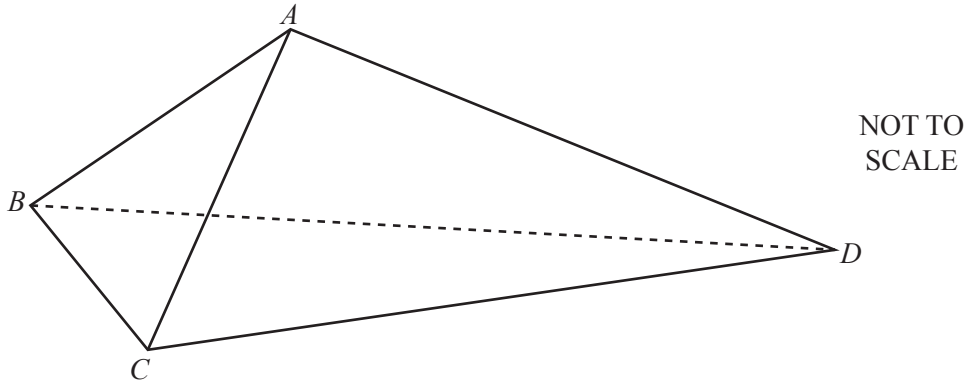
(e) In a histogram drawn to show the information in the table in **part (c)**, the frequency density for the interval  $25 < r \leq 35$  is 5.9 .

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

*Answer(e)*  $20 < r \leq 25$  .....

$40 < r \leq 60$  .....

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



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  $ABC = 68^\circ$ .

Find  $AC$ .

*Answer(a)*  $AC = \dots\dots\dots$  m [3]

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

Find angle  $ADC$ .

*Answer(b)* Angle  $ADC = \dots\dots\dots$  [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<sup>2</sup> [4]

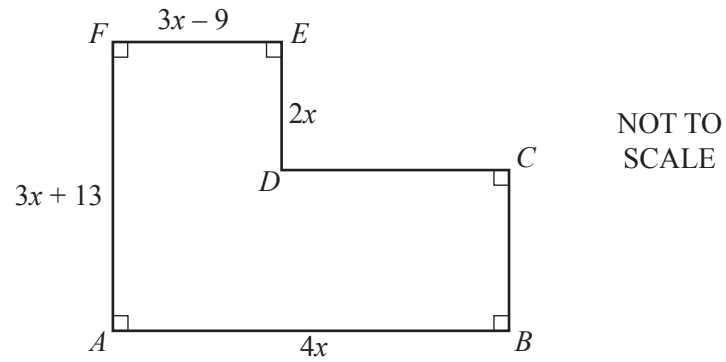
- (d) When the tent is on horizontal ground,  $A$  is a vertical distance 1.25 m above the ground.

Calculate the angle between  $AD$  and the ground.

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

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- 5 (a) The area of shape  $ABCDEF$  is  $24 \text{ cm}^2$ .  
All lengths are in centimetres.



- (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)*  $x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [3]



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

$$\begin{aligned}3x - 2y &= 23 \\ -4x - y &= -5\end{aligned}$$

*Answer(b)*  $x = \dots\dots\dots$

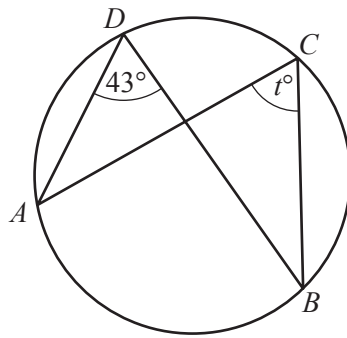
$y = \dots\dots\dots$  [3]

- (c) Solve the equation.

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

*Answer(c)*  $t = \dots\dots\dots$  [5]

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

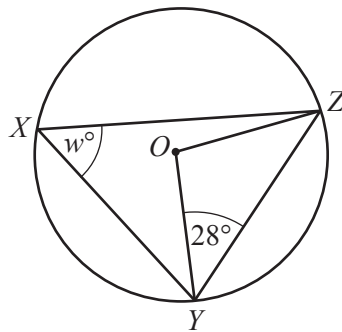


NOT TO SCALE

Find the value of  $t$ .

Answer(a)(i)  $t = \dots\dots\dots$  [1]

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



NOT TO SCALE

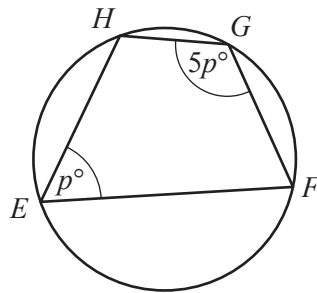
Find the value of  $w$ , giving reasons for your answer.

Answer(a)(ii)  $w = \dots\dots\dots$  because  $\dots\dots\dots$

$\dots\dots\dots$

$\dots\dots\dots$  [3]

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



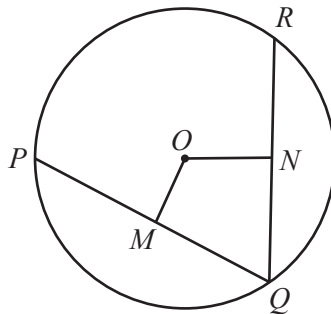
NOT TO SCALE

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

Answer(a)(iii)  $p = \dots\dots\dots$  because  $\dots\dots\dots$

$\dots\dots\dots$  [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.

$PM : PQ = \dots\dots\dots : \dots\dots\dots$  [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  $ONQ$ .

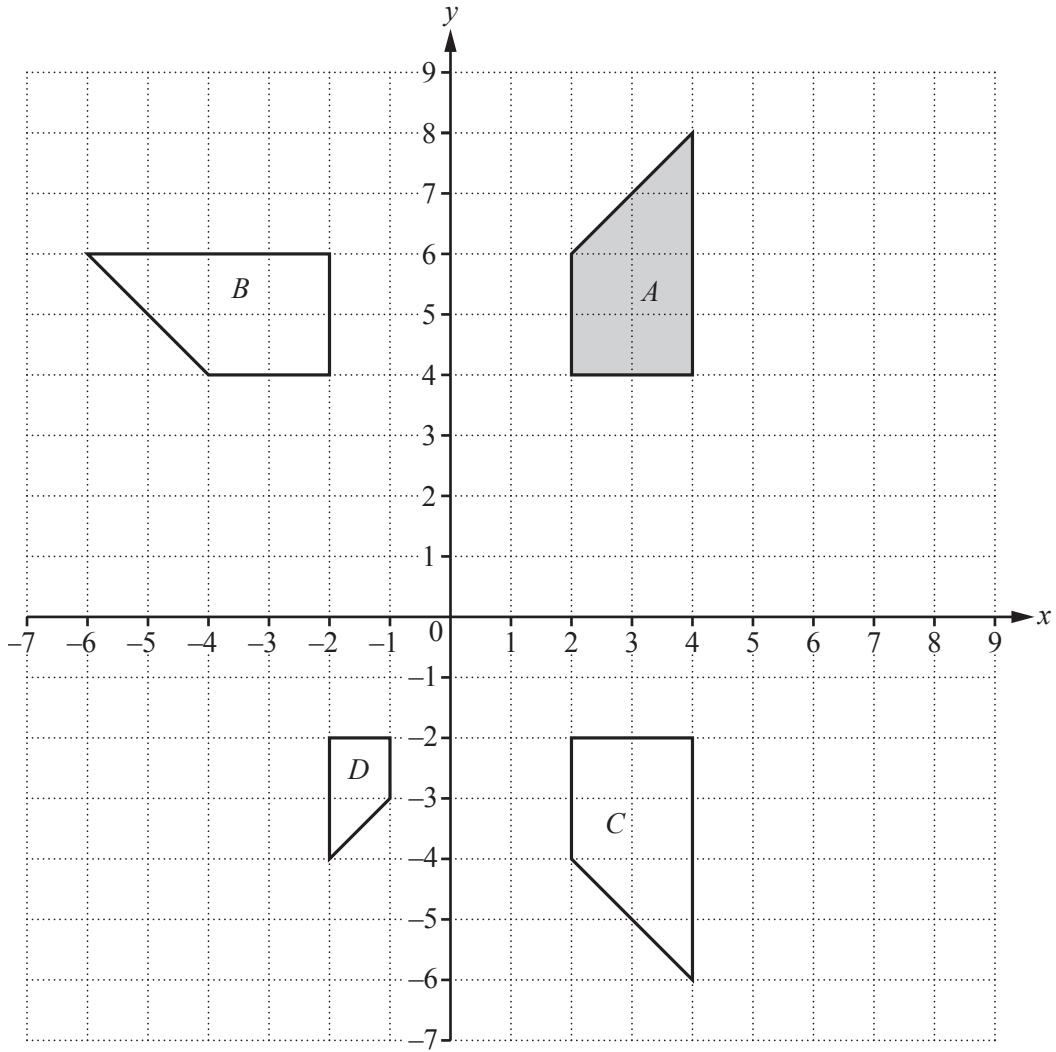
$\dots\dots\dots$  is a common side.

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

$\dots\dots\dots = \dots\dots\dots$  because equal chords are equidistant from  $\dots\dots\dots$

[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  $2 \times 2$  matrix that represents the transformation in **part (a)(iii)**.

*Answer(b)*  $\left( \begin{array}{cc} & \\ & \end{array} \right)$  [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.

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

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

Question 10 is printed on the next page.

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]

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