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519

2 hours 30 minutes

Additional Materials: Geometrical instruments
Mathematical tables (optional)

The total marks for this paper is 100.

For Examiner's Use	
1	
2	
3	
4	
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7	
8	
9	
Total	

[Turn over

1 Work out.

$$(a) \begin{pmatrix} 2 & -4 \\ 3 & 0 \end{pmatrix} - \begin{pmatrix} 3 & 5 \\ -1 & 7 \end{pmatrix}$$

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

$$(b) 3 \begin{pmatrix} 2 & -1 \\ 1 & 4 \end{pmatrix}$$

Answer (b)..... [2]

$$(c) \begin{pmatrix} -3 & 5 \end{pmatrix} \begin{pmatrix} 2 \\ -7 \end{pmatrix}$$

Answer (c)..... [2]

$$(d) \begin{pmatrix} 3 & 2 \\ 4 & 1 \end{pmatrix} \begin{pmatrix} 2 & 1 \\ 1 & 5 \end{pmatrix}$$

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

$$(e) \text{ Given that } \begin{pmatrix} x & 3 \\ -3 & y \end{pmatrix} \begin{pmatrix} 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}, \text{ find the values of } x \text{ and } y.$$

Answer (e) $x = \dots\dots\dots$ and $y = \dots\dots\dots$ [3]

2 (a) Remove brackets and simplify completely.

(i) $9 - 2(3x - 1)$

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

(ii) $(x + 9)(x - 2)$

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

(b) Simplify $\frac{2}{x-1} - \frac{4}{2x+1}$.

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

(c) Given that $\frac{ay+x}{x} = 4 - y$, make y the subject of the formula.

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

- 3 (a) Solve the following simultaneous equations.

$$4x + y = 13$$

$$3x - 2y = 7$$

Answer (a)..... [3]

- (b) Factorise $x^2 - 8x + 15$.

Answer (b)..... [2]

- (c) Solve the following equations.

(i) $7 = \frac{7x}{3}$

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

(ii) $a^2 - 25 = 0$

Answer (c)(ii).....[2]

- The head teacher chooses two students at random, one from each class.

- Form 3A
- Form 3B
- boy
- girl
- boy
- girl
- boy
- girl
- boy
- girl
- $\frac{12}{21}$
- $\frac{20}{36}$
- [2]

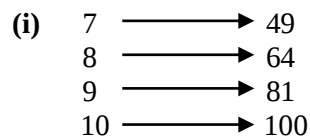
- (i) both students are girls,

Answer (b)(i)..... [2]

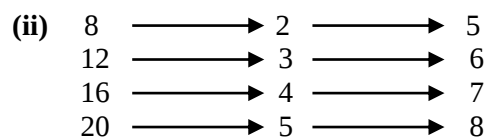
- (ii) one is a boy and one is a girl.

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

- 5 (a) Use function notation to describe the following functions represented by the arrow diagrams.



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



Answer (a)(ii).....

..... [2]

- (b) Function f is defined by $f(x) = 3x + 2$.

- (i) Evaluate $f(3)$

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

- (ii) Find x if $f(x) = -7$

Answer (b)(ii)..... [2]

- (c) Solve the inequality $\frac{2m+3}{6} < \frac{m-5}{2}$.

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

- 6 (a)** A boy leaves town A for town B which is 50 km due east of town A.
He then leaves town B for town C which is 30 km due south of town B.

(i) Draw a rough sketch of the journey.

[2]

(ii) Calculate how far the boy is from town A.

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

(iii) Using trigonometry, calculate the bearing of the direct journey from C to A.

Answer (a)(iii)..... [4]

- (b)** A ladder of length 8 m rests against a wall so that the angle between the ladder and the wall is 31° .

How far is the base of the ladder from the wall?

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

- (c) A hunter on level ground sees a bird at the top of a tree 3 m high.
The angle of depression of the hunter from the bird is 23° .

- (i) Calculate the distance from the hunter to the bird.

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

- (ii) State the angle of elevation of the bird from the height.

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

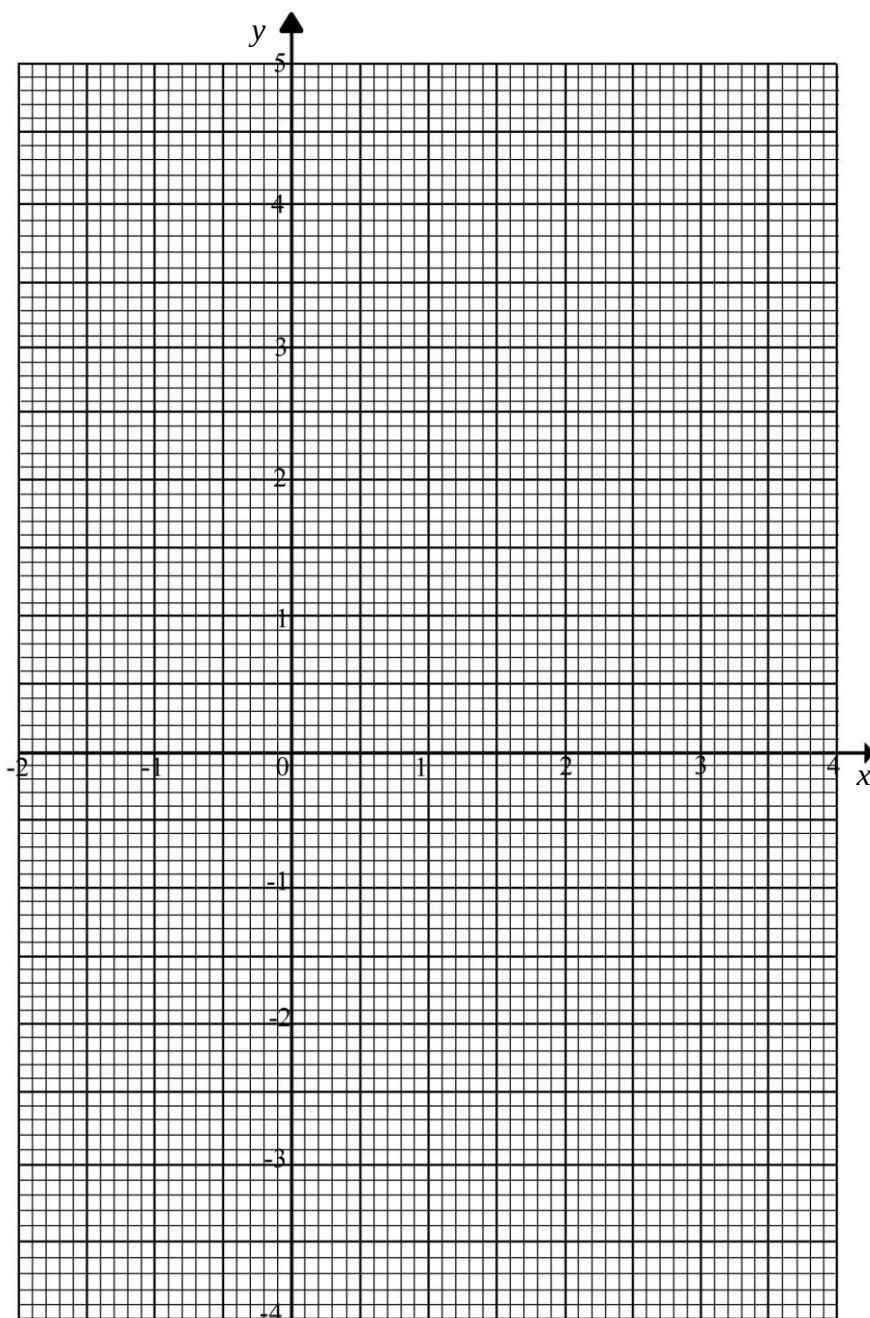
- 7 The variables x and y are connected by the equation $y = x^2 - 2x - 3$ for $-2 \leq x \leq 4$.

x	-2	-1	0	1	2	3	4
$y = x^2 - 2x - 3$	5	0	-3	<i>a</i>	-3	0	<i>b</i>

- (a) Find the values of ***a*** and ***b***.

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

- (b) Using a scale of 2 cm to 1 unit on each axes, plot the points and draw a smooth curve in the range $-2 \leq x \leq 4$.



[4]

- (c) On the same set of axes, draw the line $y = x$.
- (d) Use your graph to solve the equation $x^2 - 2x - 3 = x$.

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

- (e) Write down the equation of the line of symmetry of the graph.

Answer (e)..... [1]

For
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Use

- 8 (a) The point P has co-ordinates $(1, -4)$ and $\overrightarrow{PQ} = \begin{pmatrix} 5 \\ -8 \end{pmatrix}$.

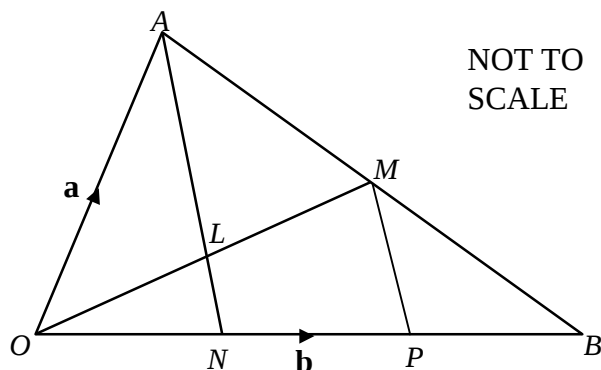
(i) Write down the co-ordinates of Q .

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

(ii) Work out $|\overrightarrow{PQ}|$.

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

(b)



In the diagram, M is the midpoint of AB and L is the midpoint of OM .
 $ON = NP = PB$.

$\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

(i) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, $\overrightarrow{AB}$.

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

(ii) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, in its simplest form, $\overrightarrow{OM}$.

Answer (b)(ii)..... [2]

- (iii) Find, in terms of $\mathbf{a}$ and $\mathbf{b}$, in its simplest form, $\overrightarrow{AL}$.

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

- (iv) Given that $\overrightarrow{AN} = \frac{1}{3}\mathbf{b} - \mathbf{a}$, show that $\overrightarrow{AL}$ is $\frac{3}{4}$ of $\overrightarrow{AN}$.

Answer (b)(iv)..... [2]

- (v) Find $\overrightarrow{MP}$, in terms of $\mathbf{a}$ and $\mathbf{b}$, and show that it simplifies to $\frac{1}{6}\mathbf{b} - \frac{1}{2}\mathbf{a}$.

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

- (vi) Hence show that $\overrightarrow{AN}$ is parallel to $\overrightarrow{MP}$.

Answer (b)(vi)..... [2]

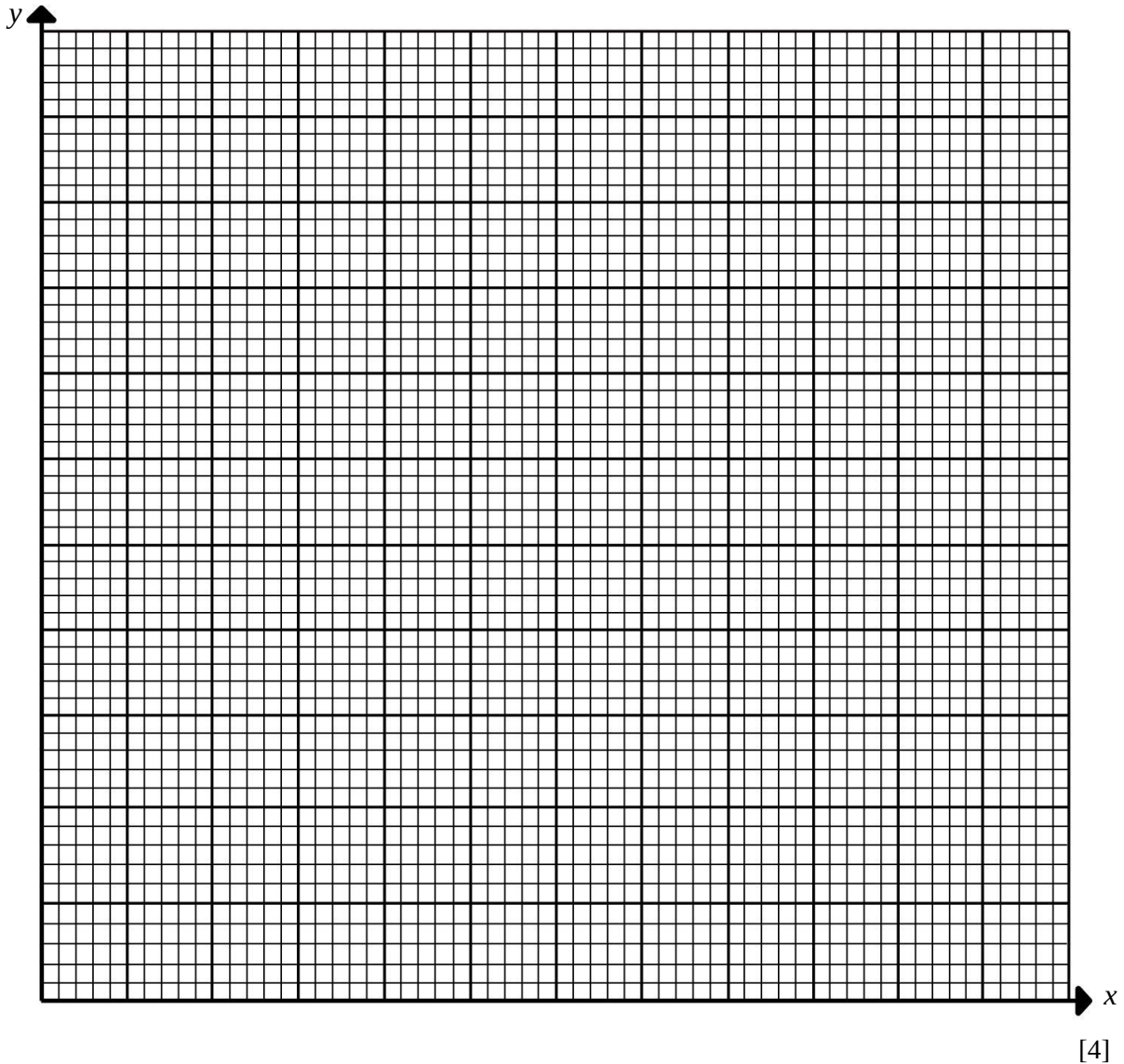
- 9 Mr. Zungu's class scored the following marks in an Additional Mathematics test.

Marks	Number of students	Cumulative frequency
0	0	0
5	4	4
10	7	11
15	5	
20	10	26
25	8	
30	3	37
35	11	48
40	2	

- (a) Complete the cumulative frequency table.

[2]

- (b) Using a scale of 1 cm to represent 5 marks on the horizontal axis and 1 cm to represent 5 students on the vertical axis, draw a cumulative frequency curve.



- (c) Use your cumulative frequency curve to find the median mark.

Answer (c)..... [2]

- (d) If 29 students passed the test, what was the pass mark?

Answer (d)..... [2]

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