



EXAMINATIONS COUNCIL OF ESWATINI
Junior Certificate Examination

CANDIDATE
NAME

CENTRE
NAME

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CANDIDATE
NUMBER

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ADDITIONAL MATHEMATICS

519

October/November 2022

2 hours 30 minutes

Candidates answer on Question Paper.
Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on the spaces provided.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use an HB pencil for any diagrams or graphs or rough working.
Do **not** use staples, paperclips, highlighters, and glue or correction fluid.

Answer **all** questions.

All working should be clearly shown below that question.
The number of marks is given in brackets [] at the end of each question or part question.

Scientific 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 3.14 or the value given in the specific question.
The total of marks for this paper is 100.

For Examiner's Use	
1	
2	
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9	
Total	

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

1 (a) Write down any 3 by 1 matrix.

Answer (a) [1]

(b) Work out.

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

Answer (b)(i) [2]

(ii) $\begin{pmatrix} -5 & 3 & 0 \\ 1 & 2 & -7 \end{pmatrix} + \begin{pmatrix} 11 & -3 & -5 \\ 4 & -1 & -2 \end{pmatrix}$

Answer (b)(ii) [2]

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

Answer (b)(iii) [3]

(c) Given that $\begin{pmatrix} 4 \\ x \\ -y \end{pmatrix} \begin{pmatrix} 2 & 1 \end{pmatrix} = \begin{pmatrix} 8 & 4 \\ 6 & 3 \\ -8 & -4 \end{pmatrix}$, find the values of x and y .

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

- 2 (a) Given that $\frac{m-bn}{b-2}=3$, make b the subject of the formula.

Answer (a) [4]

- (b) Solve the inequality.

$$\frac{2x+9}{5} \leq \frac{3(x-1)}{2}$$

Answer (b) [3]

- (c) Solve the simultaneous equations.

$$3y+8=4x$$

$$2x+y=4$$

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

- 3 (a) You are given that $x^2 - 225 = (x+p)(x+q)$

Find the value of p and q .

Answer (a) $p = \dots\dots\dots$ and $q = \dots\dots\dots$ [2]

- (b) The ordered pairs represent a function.

$(1, 1); (-1, 1); (2, 4); (-2, 4); (3, 9); (-3, 9)$

- (i) Write down the range of the function.

Answer (b)(i) $\dots\dots\dots$ [1]

- (ii) Describe the set of numbers in the range.

Answer (b)(ii) $\dots\dots\dots$ [1]

- (iii) Describe using function notation, the function represented by the ordered pairs.

Answer (b)(iii) $\dots\dots\dots$ [1]

- (c) You are given that $f(x) = -3x$ and $h(x) = 1 - 4x$.

Find

- (i) $h(-2)$,

Answer (c)(i) $\dots\dots\dots$ [2]

- (ii) the value of x if $f(x) = h(x)$.

Answer (c)(ii) $\dots\dots\dots$ [2]

4 Senzo and Zweli sit their Additional Mathematics examination.

(a) The probability of Senzo passing his Additional Mathematics examination is 0.8.

Find the probability that Senzo fails his Additional Mathematics examination.

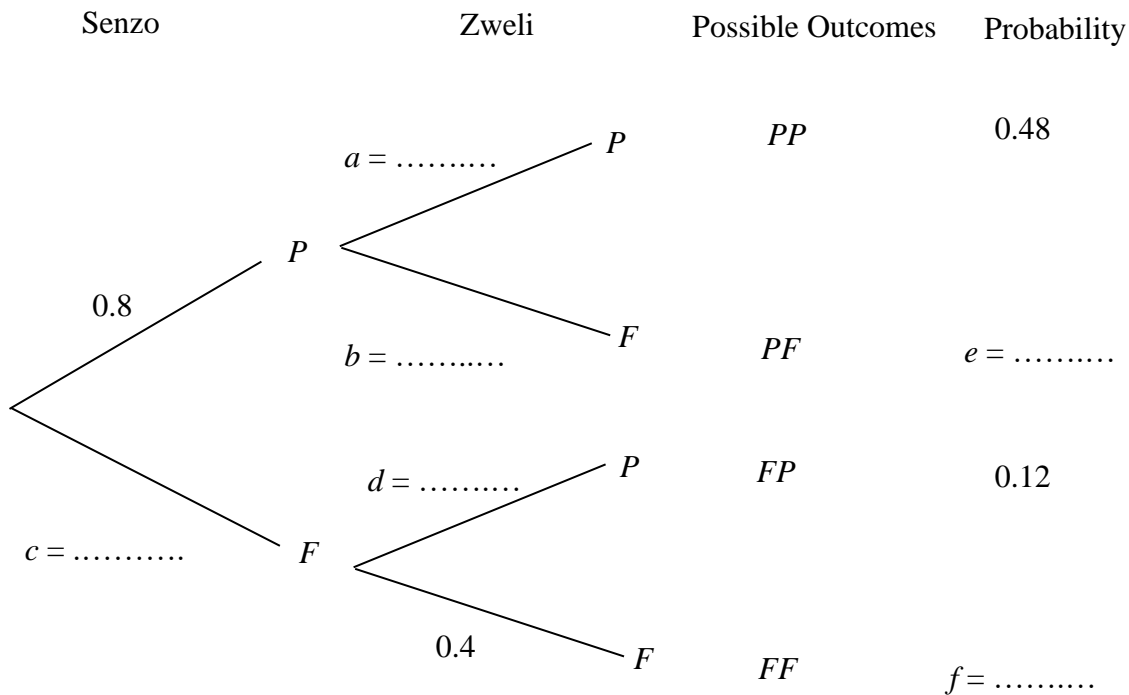
Answer (a) [1]

(b) The probability of both Senzo and Zweli passing is 0.48.

Hence, calculate the probability of Zweli passing his Additional Mathematics examination.

Answer (b) [2]

(c) Complete the tree diagram.



[4]

(d) Calculate the probability that **only one** of them fails the Additional Mathematics examination.

Answer (d) [2]

5 Three cats at point O are 50 m due west of a tall tree at point T .
One cat moves 80 m south to a point F .

(a) Draw a **rough sketch** to show the positions of T , O and F .

[2]

(b) Calculate how far point F is from point T .

Answer (b) [2]

(c) Calculate the bearing of F from T .

Answer (c) [4]

- (d) Another cat takes the shortest path to the path joining T and F .

Calculate how far the cat moves.

Answer (d) [2]

- (e) The third cat at point O sees a bird at the top of the tree.
The angle of elevation of the bird from the cat is 18° .

Calculate the direct distance of the bird from the cat.

Answer (e) [2]

- 6 (a) You are given the expression $2(3u - v) + 3(u + v)$.
Find the value of the expression when $u = 1$ and $v = -2$.

Answer (a) [2]

- (b) Remove brackets and simplify.

(i) $-3(4 - 5x)$

Answer (b)(i) [1]

(ii) $(2x - 3)(x + 2)$

Answer (b)(ii) [2]

(c) Simplify $\frac{4}{x+3} - \frac{2}{2x-1}$.

Answer (c) [3]

(d) Solve the following equations.

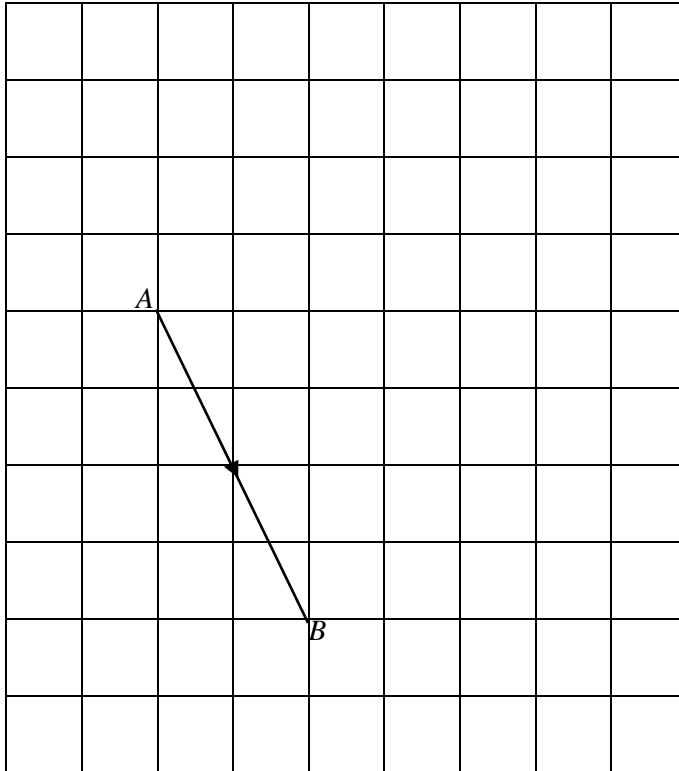
(i) $2(3y - 4) = 7$

Answer (d)(i) [2]

(ii) $\frac{2m - 3}{2} - \frac{m}{4} = 3$

Answer (d)(ii) [3]

7 (a) The diagram shows vector \overrightarrow{AB} .



(i) Express vector \overrightarrow{AB} as a column vector.

Answer (a)(i) [1]

(ii) Given that $\overrightarrow{AB} + \overrightarrow{BC} = \begin{pmatrix} 5 \\ 2 \end{pmatrix}$, draw vector \overrightarrow{BC} on the diagram. [2]

(iii) Find $\frac{1}{2} \overrightarrow{BA}$.

Answer (a)(iii) [2]

(b) You are given that $\mathbf{a} = \begin{pmatrix} 2 \\ -1 \end{pmatrix}$, $\mathbf{b} = \begin{pmatrix} 3 \\ 2 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 6 \\ -3 \end{pmatrix}$.

(i) Find $2\mathbf{a} - \mathbf{b} + \frac{1}{3}\mathbf{c}$.

Answer (b)(i) [3]

(ii) Find $|\mathbf{c}|$.

Answer (b)(ii) [2]

(iii) Show that vectors \mathbf{a} and \mathbf{c} are parallel.

Answer (b)(iii) [2]

(iv) Find the ratio $\mathbf{c} : \mathbf{a}$.

Answer (b)(iv) [1]

- 8 The table shows the number of credits obtained by 100 Form 5 learners.

Number of credits	Number of learners	Cumulative frequency
0	2	2
1	5	7
2	3	10
3	12	22
4	20	42
5	26	68
6	17	85
7	10	95
8	5	100

- (a) State the modal number of credits.

Answer (a) [1]

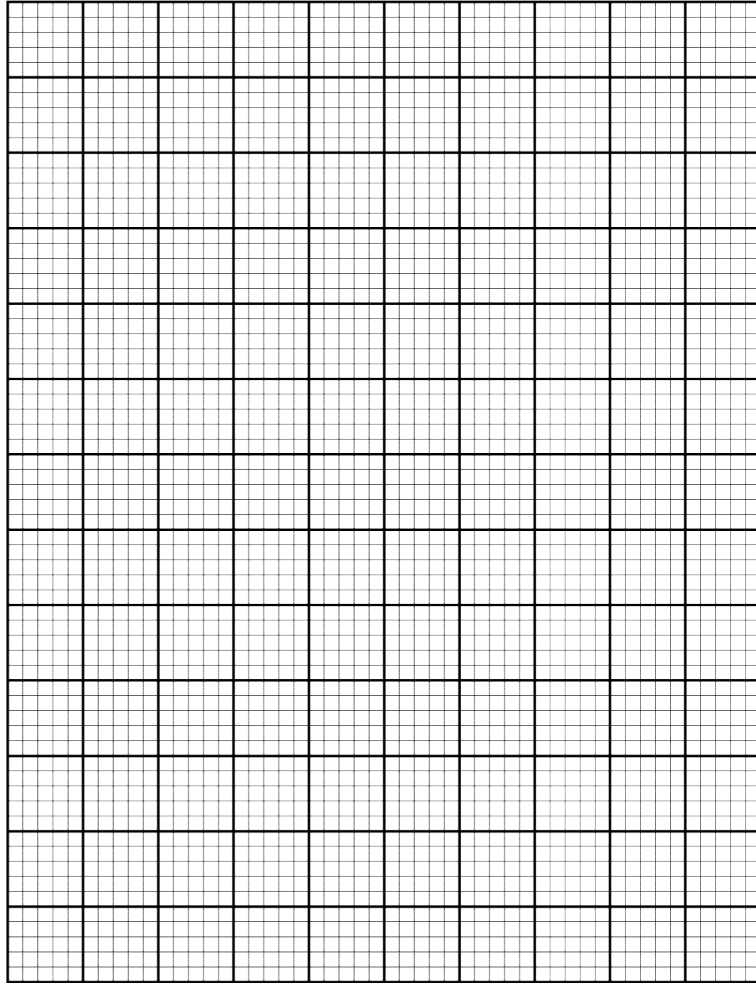
- (b) (i) Find the number of learners who got at least 6 credits.

Answer (b)(i) [2]

- (ii) Calculate the percentage number of learners who got 4 or less credits.

Answer (b)(ii) [1]

- (c) Using a scale of 1 cm to represent 1 credit on the horizontal axis and 2 cm to represent 10 learners on the vertical axis, draw a cumulative frequency curve.



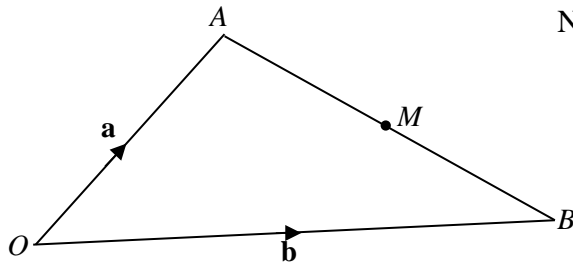
[4]

- (d) Use your curve to estimate the median credit.

Answer (d) [2]

9 The diagram shows triangle OAB .

$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$ and M is the midpoint of AB .



NOT TO SCALE

Find

(a) \overrightarrow{AB}

Answer (a) [1]

(b) \overrightarrow{BM}

Answer (b) [1]

(c) \overrightarrow{OM}

Answer (c) [2]

10 The table shows values of x and y connected by the equation $y = x^2 - 5x + 4$.

x	-1	0	1	2	3	4	5	6
$y = x^2 - 5x + 4$	a	4	0	-2	b	0	4	10

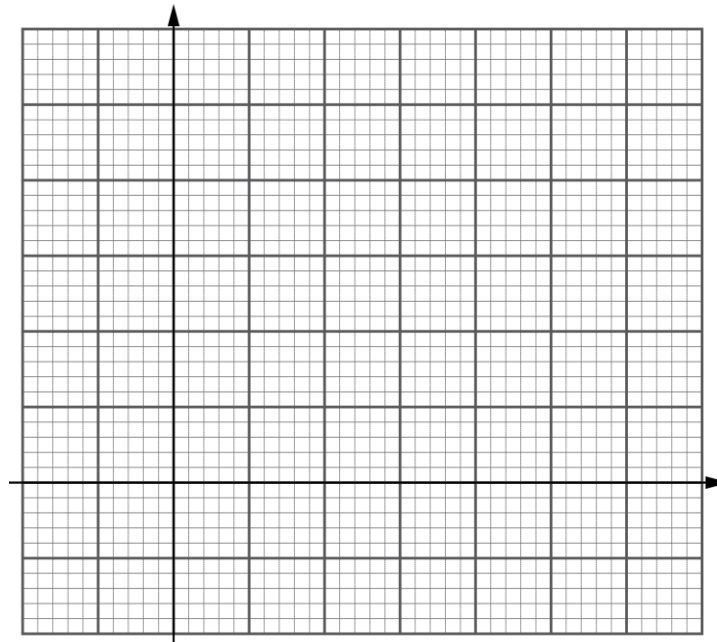
(a) Find the values of a and b .

Answer (a) $a = \dots\dots\dots$

$b = \dots\dots\dots$ [2]

(b) Using the set of axes below, draw the graph of $y = x^2 - 5x + 4$.

Use a scale of 1 cm to represent a unit on the horizontal axis and 1 cm to represent 2 units on the vertical axis.



[3]

(c) Write down the equation of the line of symmetry of the graph.

Answer (c) $\dots\dots\dots$ [1]

(d) Find the values of x when $y = -2$.

Answer (d) $\dots\dots\dots$ [2]

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