

SC 4012
WASSCE 2025
**FURTHER MATHEMATICS/
 MATHEMATICS (ELECTIVE) 2**
 2½ hours

2

CANDIDATE'S NAME	
INDEX NUMBER	INDEX NUMBER
DATE:	

THE WEST AFRICAN EXAMINATION COUNCIL
West African Senior School Certificate Examination
For School Candidates

SC 2025

FURTHER MATHEMATICS/MATHEMATICS (ELECTIVE) 2
 [100 marks]

2½ hours

INSTRUCTIONS TO CANDIDATES

1. *In the spaces provided above, insert your **name, full index number,***
2. *normal signature and the **date of examination.***
3. *This booklet consists of **two sections: A and B.** Answer **all** the questions in **Section A (compulsory)** and **four** questions from **Section B** with **at least one from each part.***
4. *In each question, all necessary details of working, including rough work, **must** be shown with the answer.*
5. *Give answers as accurately as data and tables allow.*
6. *Graph paper is provided for your use in the examination.*
7. *The use of non-programmable, silent and cordless calculator is allowed.*
8. *Write your **name, index number** and the **number of each question you answer, at the top of each page.***
9. *Write on both sides of the paper unless otherwise instructed on the question paper.*
10. *Answer **twelve** questions in all. **All** the eight questions in section A and **four** questions from section B, with **at least** one from **each** part.*

For Examiner's Use Only	
Question Number	Mark
TOTAL	

SECTION A

[48 marks]

Answer **all** the questions in this section. All questions carry equal marks.

1. A binary operation $*$ is defined on the set of real numbers, R , by $x * y = 2x + 2y - \frac{xy}{5}$,

find the:

- (a) Inverse of x under the operation $*$.
 (b) Truth set when $m * 7 = -2 * m$

2. Given that ${}^x C_2 + {}^x C_3 - 4x = 0$, where x is a positive integer, find the value of x .

3. A function f is defined by $f(x) = \frac{72}{px+r}$, where p and r are constants. Given that

$f(6) = 12$ and $f(7) = 9$ find;

- (a) The values of p and r .

- (b) $f^{-1}\left(\frac{5}{3}\right)$

4. Resolve $\frac{2x-7}{25x-24-6x^2}$ into partial fractions.

5. The table shows the distribution of the weights (*Newtons*) of 100 blood donors.

Weight (N)	55 – 59	60 – 65	66 – 71	72 – 78	79 – 86	87 – 90
Number of donors	18	5	20	22	27	8

Draw a histogram for the distribution.

6. If two fair dice are thrown together twice, find the probability of obtaining a product of six in the first throw and a sum of eight in the second throw.
7. A light inextensible string passes over a smooth pulley and carries masses 4 kg and 3 kg at its ends. If the masses are released from rest, calculate:
- (a) their acceleration
 (b) their speed after 3 *seconds*.
8. A force of FN acts on a body of mass 50 kg and changes its velocity from 30 ms^{-1} and 40 ms^{-1} in 6 *seconds*. Find the
- (a) magnitude of the force,
 (b) acceleration of the body,
 (c) distance covered in 9 *seconds* when the initial velocity is 30 ms^{-1} .

SECTION B

[52 marks]

Answer **four** questions **only** from this section with at least one from **each** part.
All questions carry equal marks.

PART I
PURE MATHEMATICS

9. (a) Given that $\int_{-1}^m (2x^2 - x - 3) dx = \frac{-9}{2}$, where m is an integer, find the value of m .
- (b) Solve $2(\log_3 x - 1) = \log_3 x$ and $y = \sqrt{x} + 1$ simultaneously.
10. Given that 8C_x , 7C_x and $\frac{7}{6}({}^6C_x)$ form the three consecutive terms of an exponential sequence ($G.P$), find the:
- (a) Value of x ;
- (b) Common ratio of the sequence;
- (c) Sum of the first ten terms of the sequence.
11. (a) Express $\left[\frac{4+\sqrt{7}}{4-\sqrt{7}}\right]^2 - \left[\frac{4-\sqrt{7}}{4+\sqrt{7}}\right]^2$ in the form $p + q\sqrt{7}$, where p and q are real numbers
- (b) Two functions f and g are on the set of real numbers by $f : x \rightarrow \sqrt{\frac{16-x^2}{x^2+4}}$ and $g : x \rightarrow \frac{x^2-4}{8-x^2}$, $x \neq \pm 2\sqrt{2}$. Find:
- (i) the domain of f ;
- (ii) $g \circ f(x)$

PART II
STATISTICS AND PROBABILITY

12. If the mean and standard deviation of the numbers $x, 2.5, 4, y$ and 7 are 4 and $\sqrt{\frac{31}{10}}$ respectively. Find the value of x and y where $x < y$.
13. An association is made up of 10 journalists and 9 engineers. If a committee of 4 members is to be formed from the association, find the probability that it will consist of;
- (a) **at least two** engineers;
- (b) 75% journalists;
- (c) odd number of engineers

PART III
VECTORS AND MECHANICS

14. (a) Five forces acting on a particle are represented by $(2i + 3j)$, $(4i - 7j)$, $(-5i + 8j)$, $(i + j)$ and $(pi + qj)$, where $p, q \in R$. If the particle is in equilibrium, find the value of p and q
- (b) $WXYZ$ is a parallelogram whose vertices are $W(-1, 1)$, $X(m, n)$, $Y(5, -7)$ and $Z(2, 4)$
Find the;
- (i) values of m and n ;
- (ii) unit vector in the direction of \overrightarrow{XY} .
15. An object is thrown vertically upwards from the top of a building 20m high. If the object passes the point it was thrown after 4 seconds on its way down, find the:
- (a) velocity at which the object was thrown;
- (b) time taken when the object is 10m above the level it was thrown;
- (c) time taken when the object is 10m below the level it was thrown;
- (d) velocity with which the object hits the ground.

[Take $g = 10 \text{ ms}^{-2}$]

END OF PAPER

