

SC 4011
WASSCE (SC) 2022
FURTHER MATHEMATICS /
MATHEMATICS (ELECTIVE) 1
Objective Test
1 ½ hours

1

Name:.....

Index Number:.....

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THE WEST AFRICAN EXAMINATIONS COUNCIL
West African Senior School Certificate Examination (WASSCE)
for School Candidates, 2022

SC 2022

FURTHER MATHEMATICS/MATHEMATICS (ELECTIVE) 1
OBJECTIVE TEST
[40 marks]

1 ½ hours

Do not open this booklet until you are told to do so. While you are waiting, write your name and index number in the spaces provided at the top right-hand corner of this booklet and thereafter, read the following instructions carefully.

- Use HB pencil throughout.
- If you have got a blank answer sheet, complete its top section as follows.
 - In the space marked *Name*, write in capital letters your surname followed by your other names.
 - In the spaces marked *Examination*, *Year*, *Subject* and *Paper*, write 'WASSCE (SC)', '2022', 'FURTHER MATHEMATICS/MATHEMATICS (ELECTIVE)' and '1' respectively.
 - In the box marked *Index Number*, write your index number vertically in the spaces on the left-hand side. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
 - In the box mark corresponding number.
 - In the box mark
- If you have got a pre-printed answer sheet, check that the details are correctly printed, as described in 2 above. In the boxes marked *Index Number*, *Paper Code* and *Sex*, reshade each of the shaded spaces.
- An example is given below. This is for a male candidate whose name is Chinedu Oladapo DIKKO, whose index number is 4251102068 and who is offering Further Mathematics / Mathematics (Elective) 1.

THE WEST AFRICAN EXAMINATIONS COUNCIL

PRINT IN BLOCK LETTERS

Name: DIKKO CHINEDU OLADAPO Examination: WASSCE (SC) Year: 2022

Subject: FURTHER MATHEMATICS/MATHEMATICS (ELECTIVE) Paper: 1

INDEX NUMBER	
4	0 1 2 3 4 5 6 7 8 9
2	0 1 2 3 4 5 6 7 8 9
5	0 1 2 3 4 5 6 7 8 9
1	0 1 2 3 4 5 6 7 8 9
1	0 1 2 3 4 5 6 7 8 9
0	0 1 2 3 4 5 6 7 8 9
2	0 1 2 3 4 5 6 7 8 9
0	0 1 2 3 4 5 6 7 8 9
6	0 1 2 3 4 5 6 7 8 9
8	0 1 2 3 4 5 6 7 8 9

PAPER CODE	
4	0 1 2 3 4 5 6 7 8 9
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1	0 1 2 3 4 5 6 7 8 9
2	0 1 2 3 4 5 6 7 8 9

SEX
Indicate your sex by shading the space marked M (for Male) or F (for Female) in this box: M F
<input type="checkbox"/> <input type="checkbox"/>

INSTRUCTIONS TO CANDIDATES

- Use grade HB pencil throughout.
- Answer each question by choosing one letter and shading it like this: [A] [B] [C] [D]
- Erase completely any answer(s) you wish to change.
- Leave extra spaces blank if the answer spaces provided are more than you need.
- Do not make any markings across the heavy black marks at the right-hand edge of your answer sheet.

For Supervisors only.
If candidate is absent shade this space:

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Answer **all** the questions.

Each question is followed by **four** options lettered A to D. Find the **correct** option for **each** question and shade **in pencil**, on your answer sheet, the answer space which bears the same letter as the option you have chosen.

Give only **one** answer to **each** question. An example is given below.

The ages in years of four boys are 10, 12, 14 and 16, what is the mean age of the boys?

- A. 12 years
- B. $12 \frac{1}{2}$ years
- C. 13 years
- D. $13 \frac{1}{2}$ years

The correct answer is 13 years, which is lettered C and therefore answer space C would be shaded.

[A] [B] [C] [D]

Think carefully before you shade the answer spaces; erase completely any answer(s) you wish to change.

Now answer the following questions.

1. A binary operation Δ is defined on the set of real numbers, R , by

$$x\Delta y = \sqrt{x + y - \frac{xy}{4}}, \text{ where } x, y \in R. \text{ Find the value of } 4\Delta 3.$$

- A. 16
- B. 8
- C. 4
- D. 2

2. Simplify: $\left[\frac{3\sqrt{6} + \sqrt{54}}{\sqrt{5}(3\sqrt{5})} \right]^{-1}$

- A. $\frac{5\sqrt{3}}{6}$
- B. $\frac{3\sqrt{15}}{6}$
- C. $\frac{5\sqrt{6}}{12}$
- D. $\frac{5\sqrt{3}}{12}$

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3. If $\log_{10}(3x - 1) + \log_{10}4 = \log_{10}(9x + 2)$, find the value of x .

- A. $\frac{1}{3}$
- B. 1
- C. 2
- D. 3

4. Simplify: $\frac{9 \times 3^{n+1} - 3^{n+2}}{3^{n+1} - 3^n}$.

- A. 3
- B. 9
- C. 27
- D. 81

Consider the following statements:

x : All wrestlers are strong

y : Some wrestlers are not weightlifters

5. Which of the following is a **valid** conclusion?
- All strong wrestlers are weightlifters
 - Some strong Wrestlers are not weightlifters
 - Some weak wrestlers are weightlifters
 - All weight lifters are wrestlers
6. The functions $f: x \rightarrow 2x^2 + 3x - 7$ and $g: x \rightarrow 5x^2 + 7x - 6$ are defined on the set of real numbers, R. Find the values of x for which $3f(x) = g(x)$.
- $x = -3$ or -5
 - $x = -3$ or 5
 - $x = 3$ or -5
 - $x = 3$ or 5
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7. Express $\frac{4\pi}{5}$ radians in degrees.
- 288°
 - 200°
 - 144°
 - 120°
8. Given that $\frac{8x+m}{x^2-3x-4} = \frac{5}{x+1} + \frac{3}{x-4}$, find the value of m .
- 23
 - 17
 - 17
 - 23
9. If $x^2 + y^2 - 6y + 5 = 0$, evaluate $\frac{dy}{dx}$ when $x = 3$ and $y = 2$
- 2
 - 2
 - 4
 - 4
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10. Evaluate: $\int_0^1 x^2 (x^3 + 2)^3 dx$.
- $\frac{56}{12}$
 - $\frac{12}{65}$
 - 12
 - 65
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11. If $\begin{bmatrix} 2 & -3 \\ 1 & 4 \end{bmatrix} \begin{pmatrix} -6 \\ k \end{pmatrix} = \begin{pmatrix} 3 \\ -26 \end{pmatrix}$, find the value of k .
- 8
 - 5
 - 4
 - 3
12. A linear transformation T is defined by $T: (x, y) \rightarrow (3x - y, x + 4y)$. Find the image of $(2, -1)$ under T
- $(7, -2)$
 - $(5, -2)$
 - $(-2, 7)$
 - $(-7, 2)$
13. ${}^4P_2 + {}^4C_2 - {}^4P_3$
- 18
 - 6
 - 6
 - 18

14. Find the coefficient x^2 in the binomial expansion of $\left[x + \frac{2}{x^2}\right]^5$
- A. 10
B. 40
C. 32
D. 80
15. Given that $P = \{x : x \text{ is a multiple of } 5\}$,
 $Q = \{x : x \text{ is a multiple of } 3\}$ and
 $R = \{x : x \text{ is an odd number}\}$ are subsets of
 $\mu = \{x : 20 \leq x \leq 35\}$, find $(P \cup Q) \cap R$.
- A. $\{20, 21, 25, 30, 33\}$
 B. $\{21, 25, 27, 33, 35\}$
 C. $\{20, 21, 25, 27, 33, 35\}$
 D. $\{21, 25, 27, 30, 33, 35\}$
16. A particle moving with a velocity of 5 ms^{-1} accelerates at 2 ms^{-2} . Find the distance it covers in 4 seconds
- A. 16 m
B. 26 m
C. 36 m
D. 46 m
17. If $U_n = kn^2 + pn$. $U_1 = -1, U_5 = 15$, find the values of k and p .
- A. $k = -1, p = 2$
 B. $k = -1, p = -2$
 C. $k = 1, p = -2$
 D. $k = 1, p = 2$
18. In how many ways can six persons be paired?
- A. 5
B. 10
C. 15
D. 25
19. Solve: $3^{2x-2} - 28(3^{x-2}) + 3 = 0$.
- A. $x = -2$, or $x = 1$
 B. $x = 0$, or $x = -3$
 C. $x = 2$, or $x = 1$
 D. $x = 0$, or $x = 3$
20. Given that $P = (-4, -5)$ and $Q = (2, 3)$, express \overline{PQ} in the form (k, θ) , where k is the magnitude and θ the bearing.
- A. (10 units, 063°)
 B. (9 units, 049°)
 C. (10 units, 037°)
 D. (9 units, 027°)
21. If $\overline{PQ} = 2i + 5j$ and $\overline{RQ} = -i - 7j$, find \overline{PR}
- A. $-3i + 12j$
 B. $-3i - 12j$
 C. $-i + 12j$
 D. $i - 12j$

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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 $T = \{-2, -1, 1, 2\}$ by $p * q = p^2 + 2pq - q^2$ where $p, q \in T$
(a) Copy and complete the table.

*	-2	-1	1	2
-2		7		-8
-1		2	-2	
1	-7			1
2		-1		

(b) Using the table in 1(a), find the value of p such that $(-2 * p) * 2 = -7$.

2. Solve $2^{(2y+1)} - 5(2^y) + 2 = 0$
3. Two functions f and g are defined on the set of real numbers R , by $f: x \rightarrow x^2 + 2$ and $g: x \rightarrow \frac{1}{x+2}, x \neq -2$. Find the domain of $(g \circ f)^{-1}$.
4. Solve $3\cos 2x - \sin x = 0^\circ \leq x \leq 360^\circ$
- 5.

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7. A body of mass 18kg is suspended by an inextensible string from a rigid support and is pulled by a horizontal force, F until the angle of inclination of the string to the vertical is 35° . If the system is in equilibrium, calculate the:
(a) value of F ;
(b) tension in the string. [Take $g = 10 \text{ ms}^{-2}$]
8. Given that $p = (8N, 030^\circ)$ and $q = (9N, 150^\circ)$, find, in component form, the unit vector along $(p - q)$

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SECTION B

[52 marks]

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

PART 1
PURE MATHEMATICS

9. Given that $\binom{n}{4}$, $\binom{n}{5}$, and $\binom{n}{6}$ are the first 3 terms of a linear sequence (A.P) find the
(a) values of n
(b) common differences of the sequence.
10. A solid rectangular block has a base which measures $3x$ cm by $2x$ cm. The height of the block is y cm and its volume is 72 cm³.
(a) Express y in terms of x .
(b) Find:

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11.

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PART II
STATISTICS AND PROBABILITY

12. A basket contains 12 fruits: orange, apple and avocado pear, all of the same size. The number of oranges, apples and avocado pear forms three consecutive integers. **Two** fruits are drawn one after the other **without** replacement. Calculate the probability that:
(a) the first is an orange and the second is an avocado pear;
(b) both are of the same fruit;
(c) **at least** one is an apple.

13. The table shows the corresponding values of two variables X and Y

X	14	16	17	18	22	24	27	28	31	33
Y	22	19	15	13	10	12	3	5	3	2

- (a)
(b) **Want More WASSCE Past Questions**
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- (c) **WHATSAPP + 2348051311885**
(d)

Part III
VECTORS AND MECHANICS

14. (a) A particle initially at rest moves in a straight line with an acceleration of $(10t - 4t^2)\text{ms}^{-2}$. Find the:
- velocity of the particle after t seconds;
 - average acceleration of the particle during the 4th second.
- (b) A load of mass 120 kg is placed on a lift. Calculate the reaction between the floor of the lift and the load when the lift moves upwards:
- at a constant velocity;
 - with an acceleration of 3ms^{-2} . [Take $g = 10\text{ms}^{-2}$]
15. The vectors $6\mathbf{i} + 8\mathbf{j}$ and $8\mathbf{i} - 6\mathbf{j}$ are parallel to \overline{OP} and \overline{OQ} respectively. If the magnitude of \overline{OP} and \overline{OQ} are 80 units and 120 units respectively, express:
- \overline{OP} and \overline{OQ} in terms of \mathbf{i} and \mathbf{j} ;
 - $|\overline{PQ}|$, in the form $c\sqrt{k}$, where c and k are constants.

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