

- ❖ TOPIC BASE, MOCK & PAST QUESTIONS
- ❖ NOTES
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SC 401106  
 WASSCE 2025  
 FURTHER MATHEMATICS/  
 MATHEMATICS (ELECTIVE) I  
 Objective Test  
 1½ hours

Name.....

Index Number...

**THE WEST AFRICAN EXAMINATIONS COUNCIL**

**West African Senior School Certificate Examination  
 for School Candidates**

SC 2025

FURTHER MATHEMATICS/ MATHEMATICS (ELECTIVE) 1

1½ hours

OBJECTIVE TEST

[40 marks]

*Do not open this booklet until you are told to do so. While you are waiting, read and observe the following instructions carefully. Write your name and index number in the spaces provided above.*

*Answer all the questions on your Objective Test answer sheet.*

1. Use **2B** pencil throughout.
2. On the pre-printed answer sheet, check that the following details are **correctly** printed:
  - (a) In the space marked *Name*, check your **surname** followed by your **other names**.
  - (b) In the spaces marked *Examination, Year, Subject* and *Paper*, check 'WASSCE', 'SC 2025', 'FURTHER MATHEMATICS/ MATHEMATICS (ELECTIVE)', and '1' in that order.
  - (c) In the box marked *Index Number*; your **index number** has been printed vertically in the spaces on the left-hand side, and **each** numbered space has been shaded in line with **each** digit. **Reshade** each of the shaded spaces.
  - (d) In the box marked *Subject Code*, the digits 40112 are printed vertically in the spaces on the left-hand side. **Reshade** the corresponding numbered spaces as you did for your index number.
3. An example is given below. This is for a male candidate whose *name* is Ben Abu TETTEH. His *index number* is 7102143958 and he is offering *Further Mathematics/Mathematics(Elective) 1*

**THE WEST AFRICAN EXAMINATIONS COUNCIL  
 ANSWER SHEET**

PRINTED IN BLOCK LETTERS. <b>TETTEH BEN ABU</b> Name: _____	<b>GHA</b>
Examination: <b>WASSCE SC</b> Subject: <b>FURTHER MATHS. / MATHS. (ELECTIVE)</b>	Year: <b>2025</b> Paper: <b>1</b>

**INSTRUCTIONS TO CANDIDATES**

1. Use grade 2B pencil throughout.
2. Answer each question by choosing one letter and shading it like this:  A  B  C  D  E
3. Erase completely any answer you wish to change.
4. Leave extra spaces blank if the answer spaces provided are more than you need.
5. Do not make any markings across the heavy black marks at the right hand edge of your answer sheet.

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SUBJECT CODE	
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**For Supervisors only**  
 If candidate is absent shade this space.

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 ]



[ D ]

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

Do all rough work on this question paper.

Now answer the following questions.

1. If  $\alpha$  and  $\beta$  are the roots of  $3x^2 + 5x - 2 = 0$ , find the value of  $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right)$ .
  - A.  $-\frac{5}{2}$
  - B.  $-\frac{2}{3}$
  - C.  $\frac{5}{2}$
  - D.  $\frac{2}{3}$
2. Given that  $\frac{\log(4x-3)^{5x-2}}{\log(4x-3)} = 8$ , find the value of  $x$ .
  - A. 0
  - B. 1
  - C. 3
  - D. 2
3. Find:  $\lim_{x \rightarrow 1} \left( \frac{x^2 - 1}{x^2 - 6x + 5} \right)$ .
  - A. -1
  - B.  $-\frac{1}{2}$
  - C. 1
  - D.  $\frac{1}{2}$
4. If  $\begin{vmatrix} 2q & -1 \\ 2 & 1 \end{vmatrix} = 8$ , find the value of  $q$ .
  - A. 6
  - B. 4
  - C. 2
  - D. 3
5. Find the range of values of  $x$  for which  $x^2 - 2x - 8 < 0$ .
  - A.  $x < -2$  or  $x > 4$
  - B.  $x < -4$  or  $x > 2$
  - C.  $-4 < x < 2$
  - D.  $-2 < x < 4$

6. Given that  $f: x \rightarrow x^2 - 2x + 5$  and  $g: x \rightarrow 3x - 1$ , find  $f \circ g(2)$ .
- A. 20  
B. 15  
C. 5  
D. 10
7. Find the coefficient of the **third** term in the binomial expansion of  $(2x - 3)^6$  in descending powers of  $x$ .
- A. -2,160  
B. -864  
C. 2,160  
D. 864
8. Simplify:  $\frac{(5\sqrt{28} \times 2\sqrt{27})}{(\sqrt{50} \times \sqrt{21})}$ .
- A.  $6\sqrt{2}$   
B.  $5\sqrt{3}$   
C.  $2\sqrt{7}$   
D.  $8\sqrt{5}$
9. If  $8^{\frac{x}{2}} = (\sqrt{2})^{\frac{3}{8}} \times 4^{\frac{3}{2}}$ , find the value of  $x$ .
- A.  $2\frac{1}{8}$   
B.  $2\frac{1}{4}$   
C.  $2\frac{3}{4}$   
D.  $2\frac{3}{8}$
10. Given that  $x - 2 \equiv P(x - 4) + Q(x + 3)$ , where  $P$  and  $Q$  are constants, find the values of  $P$  and  $Q$ .
- A.  $P = \frac{5}{7}, Q = \frac{2}{7}$   
B.  $P = -\frac{5}{7}, Q = \frac{2}{7}$   
C.  $P = -\frac{5}{7}, Q = -\frac{2}{7}$   
D.  $P = \frac{5}{7}, Q = -\frac{2}{7}$
11. If two unbiased dice are rolled once, find the probability that the product of the outcome is a prime number.
- A.  $\frac{1}{12}$   
B.  $\frac{1}{6}$   
C.  $\frac{5}{6}$   
D.  $\frac{5}{12}$
12. Find the locus of points equidistant from  $P(4, 5)$  and  $Q(-6, -1)$ .
- A.  $3x - 5y - 7 = 0$   
B.  $3x + 5y + 1 = 0$   
C.  $5x + 3y - 1 = 0$   
D.  $5x - 3y + 7 = 0$
13. The **first** term in an Arithmetic Progression (*A.P.*) is 3 and the sum of the **first** term and the **sixth** term is 20. Find the **8<sup>th</sup>** term.
- A. 22.6  
B. 25.6  
C. 31.6  
D. 28.6

14. Find the coordinate of the point on the curve  $y = x^2 + 4x - 2$ , where the gradient is 0.
- A.  $(-2, 10)$   
 B.  $(-2, 2)$   
 C.  $(-2, -6)$   
 D.  $(-2, -2)$
15. Find the force required for a body of mass  $200 \text{ kg}$  initially at rest, to attain a speed of  $45 \text{ ms}^{-1}$  in one minute.
- A.  $100 \text{ N}$   
 B.  $150 \text{ N}$   
 C.  $250 \text{ N}$   
 D.  $200 \text{ N}$
16. Evaluate:  $\int_1^2 (3x^2 - 4x + 6) dx$ .
- A. 5  
 B. 6  
 C. 8  
 D. 7
17. If a particle of mass  $40.7 \text{ kg}$  starts from rest and reaches a velocity of  $3 \text{ ms}^{-1}$  in  $10 \text{ seconds}$ , find the impulse on the particle.
- A.  $407.00 \text{ Ns}$   
 B.  $122.10 \text{ Ns}$   
 C.  $12.21 \text{ Ns}$   
 D.  $30.00 \text{ Ns}$
18. Given that  $f(x) = \frac{3x - 5}{6x + 9}$ ,  $x \neq -\frac{3}{2}$ ,  
 find  $f^{-1}(x)$ .
- A.  $\frac{3 - 6x}{5 + 9x}$ ,  $x \neq -\frac{5}{9}$   
 B.  $\frac{3 + 6x}{5 - 9x}$ ,  $x \neq \frac{5}{9}$   
 C.  $\frac{5 - 9x}{3 + 6x}$ ,  $x \neq -\frac{1}{2}$   
 D.  $\frac{5 + 9x}{3 - 6x}$ ,  $x \neq \frac{1}{2}$
19. If  $(x - 1)$  and  $(x + 2)$  are factors of  $f(x) = x^3 - 2x^2 - 5x + 6$ , find the other factor.
- A.  $(x + 6)$   
 B.  $(x + 3)$   
 C.  $(x - 6)$   
 D.  $(x - 3)$
20. Find the difference between the 15<sup>th</sup> and 6<sup>th</sup> terms of a linear sequence (A.P.) whose common difference is 12.
- A. 108  
 B. 84  
 C. 48  
 D. 72
21. If  $\tan x = -\tan 20^\circ$ ,  $0^\circ < x < 360^\circ$ , find the values of  $x$ .
- A.  $160^\circ, 200^\circ$   
 B.  $200^\circ, 340^\circ$   
 C.  $200^\circ, 290^\circ$   
 D.  $160^\circ, 340^\circ$
22. Find the equation of the tangent to the circle  $x^2 + y^2 + 8x - 12y = 15$  at  $(2, 3)$ .
- A.  $2x - y - 1 = 0$   
 B.  $2x + y - 1 = 0$   
 C.  $2y + x - 1 = 0$   
 D.  $2y - x - 1 = 0$

The table shows the distribution of the task completion time in a learning experiment by students in a class.

Time (in minutes)	12.2	12.8	13.4	14.0	14.6	15.2	15.8	16.4
Number of Students	2	3	8	2	2	4	6	1

Use this information to answer questions 23 and 24.

23. Calculate the mean time.
- A. 14.26  
B. 14.37  
C. 14.73  
D. 14.53
24. If a student is chosen at random from the class, find the probability that the student spent more than the median time in completing the task.
- A.  $\frac{17}{28}$   
B.  $\frac{15}{28}$   
C.  $\frac{13}{28}$   
D.  $\frac{1}{2}$
25. If  $p$  and  $q$  are two simple statements, which of the following is equivalent to the statement:  $p \Rightarrow q$ ?
- A.  $\sim q \Rightarrow p$   
B.  $\sim p \Rightarrow q$   
C.  $\sim q \Rightarrow \sim p$   
D.  $\sim p \Rightarrow \sim q$
26. If the set  $X = \{0, 1, 2, 3, 4\}$ , find the number of proper subsets of  $X$ .
- A. 32  
B. 31  
C. 25  
D. 30
27. Given that  $(2x - 1)$  is one of the factors of  $f(x) = 4x^3 - 2x^2 + px - 4$ , find the value of  $p$ .
- A. 6  
B. 8  
C. 12  
D. 10
28. In how many ways can 2 blue, 3 red and 4 green balls be arranged in 9 holes?
- A. 2,520  
B. 1,260  
C. 630  
D. 960

29. Find the equation of the line parallel to  $6x - 2y = 4$  and passing through  $(-1, 7)$ .

A.  $y = -3x + 2$   
 B.  $y = 3x + 10$   
 C.  $y = -3x - 10$   
 D.  $y = 3x + 2$

30. In how many ways can four prefects be selected from a class of 25 students?

A. 11,650  
 B. 12,650  
 C. 303,600  
 D. 151,800

31. If a stone is thrown vertically upwards with a speed of  $18 \text{ ms}^{-1}$ , find the maximum height reached by the stone.

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

A. 25.6 m  
 B. 16.2 m  
 C. 10.8 m  
 D. 12.5 m

32. Find the coefficient of  $x^3$  in the binomial

expansion of  $\left(4x + \frac{3}{8}\right)^8$ .

A.  $\frac{567}{64}$   
 B.  $\frac{567}{32}$   
 C.  $\frac{1701}{16}$   
 D.  $\frac{1701}{64}$

33. Evaluate:  $\int_1^4 (\sqrt{x} + x) dx$ .

A.  $3\frac{1}{3}$   
 B.  $4\frac{2}{3}$   
 C.  $12\frac{1}{6}$   
 D.  $\frac{1}{6}$

34. If  $3 \sin \theta = 2 \tan \theta$  where  $0^\circ < \theta < 360^\circ$ , find the value of  $\cos 2\theta$ .

A.  $-\frac{1}{3}$   
 B.  $-\frac{1}{9}$   
 C.  $\frac{2}{3}$   
 D.  $\frac{4}{9}$

35. The binary operation  $*$  is defined on the set of  $x$  real numbers,  $R$ ,  $x * y = \frac{x+y}{xy}$ ,  $xy \neq 0$ .

Evaluate:  $(\sqrt{6} * \sqrt{4})$ .

A.  $\frac{3+\sqrt{6}}{6}$   
 B.  $\frac{2+\sqrt{3}}{6}$   
 C.  $\frac{3+\sqrt{3}}{6}$   
 D.  $\frac{2+\sqrt{6}}{6}$

36. If  $m = -2i + 5j$  and  $n = xi + 8j$ , find the value of  $x$  when the dot product of  $m$  and  $n$  is 26.
- A. 8  
B. 7  
C. 5  
D. 6
37. Find, correct to **two** decimal places, the angle between the vectors  $v = 2i + 5j$  and  $w = 4i + 6j$ .
- A.  $10.89^\circ$   
B.  $11.89^\circ$   
C.  $13.89^\circ$   
D.  $12.89^\circ$
38. If **three** forces  $F_1 = (10\text{ N}, 330^\circ)$ ,  $F_2 = (8\text{ N}, 060^\circ)$  and  $F_3 = (12\text{ N}, 150^\circ)$  act on a particle, find the vertical component of the resultant force.
- A.  $(1 + 4\sqrt{3})\text{ N}$   
B.  $(1 + 2\sqrt{3})\text{ N}$   
C.  $(2 + 4\sqrt{3})\text{ N}$   
D.  $(2 + \sqrt{3})\text{ N}$
39. If  $Q = \begin{pmatrix} x-12 & x-3 \\ x+3 & x-6 \end{pmatrix}$  and  $|Q| = 9$ , find the value of  $x$ .
- A. 8  
B. 7  
C. 3  
D. 4
40. The scores obtained by five candidates in an examination are 68, 87, 98, 86 and 86. Find the mean deviation.
- A. 7.2  
B. 6.8  
C. 4.6  
D. 5.4

***END OF PAPER***

SC4012  
 WASSCE 2025  
**FURTHER MATHEMATICS/  
 MATHEMATICS (ELECTIVE) 2**  
 Essay  
 2½ hours

**2**

CANDIDATE'S NAME	
INDEX NUMBER	SIGNATURE
DATE:	

**THE WEST AFRICAN EXAMINATIONS COUNCIL**  
**West African Senior School Certificate Examination**  
**for School Candidates**

SC 2025                      FURTHER MATHEMATICS/MATHEMATICS (ELECTIVE) 2                      2½ hours  
 ESSAY  
 [100 marks]

INSTRUCTIONS TO CANDIDATES

- In the spaces provided above, insert your name, full index number, normal signature and the date of examination.*
- This booklet consists of two sections: A and B. Answer all the questions in Section A (compulsory) and four questions from Section B.*
- In each question, all necessary details of working, including rough work, must be shown with the answer.*
- Give answers as accurately as data and tables allow.*
- The use of non-programmable, silent and cordless calculator is allowed.*
- Write your name, index number and the number of each question you answer, at the top of each page.*
- Write on both sides of the paper unless otherwise instructed on the question paper.*
- Begin each answer to a question on a fresh page. Leave two lines between answers where there are sub-sections to the same question.*
- On no account should you tear off any part of the booklet. It is an examination malpractice to do so. The answer booklet will be collected at the end of the examination.*
- Write in the space provided below, the question number of the questions you have answered, in the order in which you have answered them.*

For Examiner's Use Only	
Question Number	Mark
<b>TOTAL</b>	

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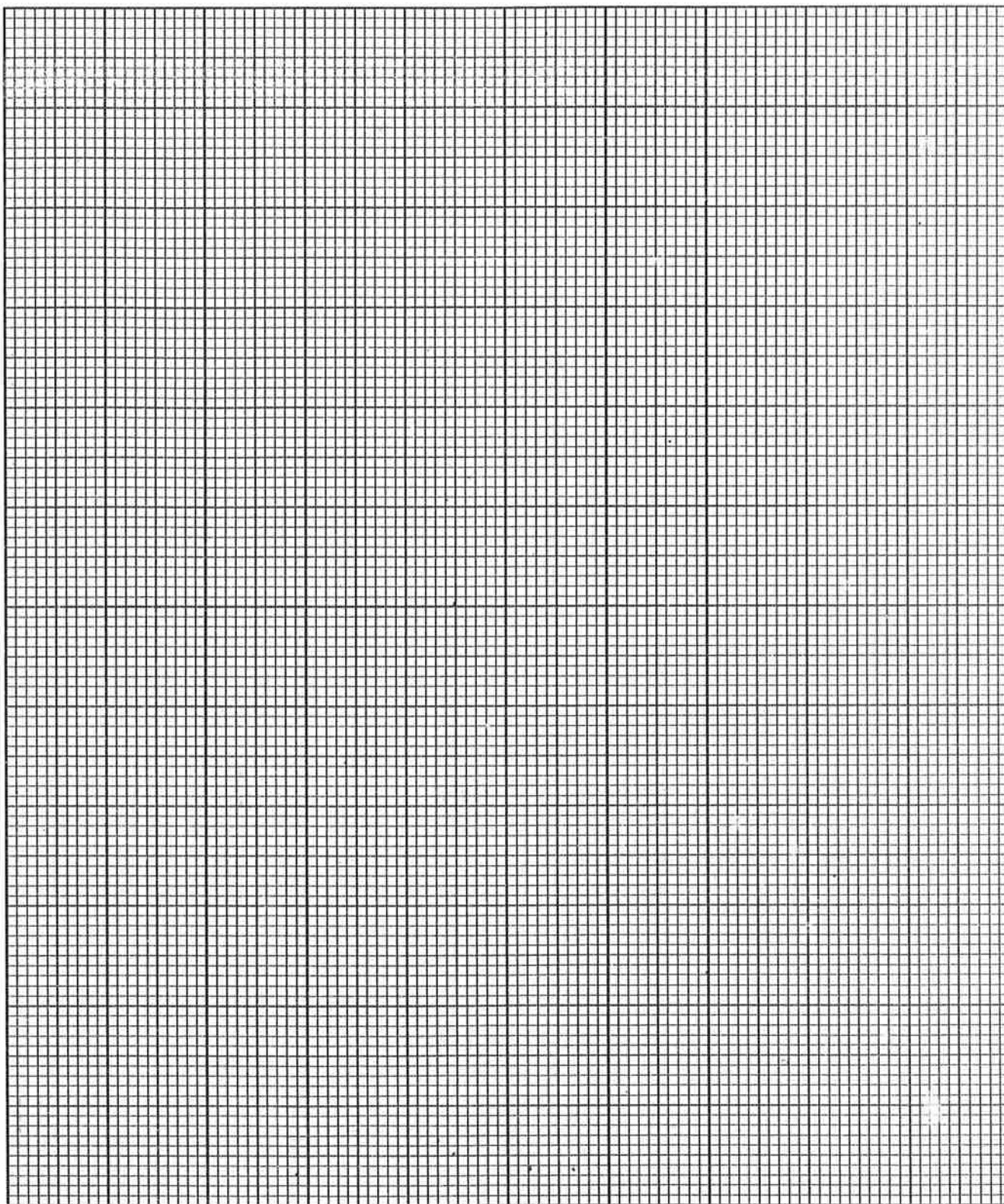






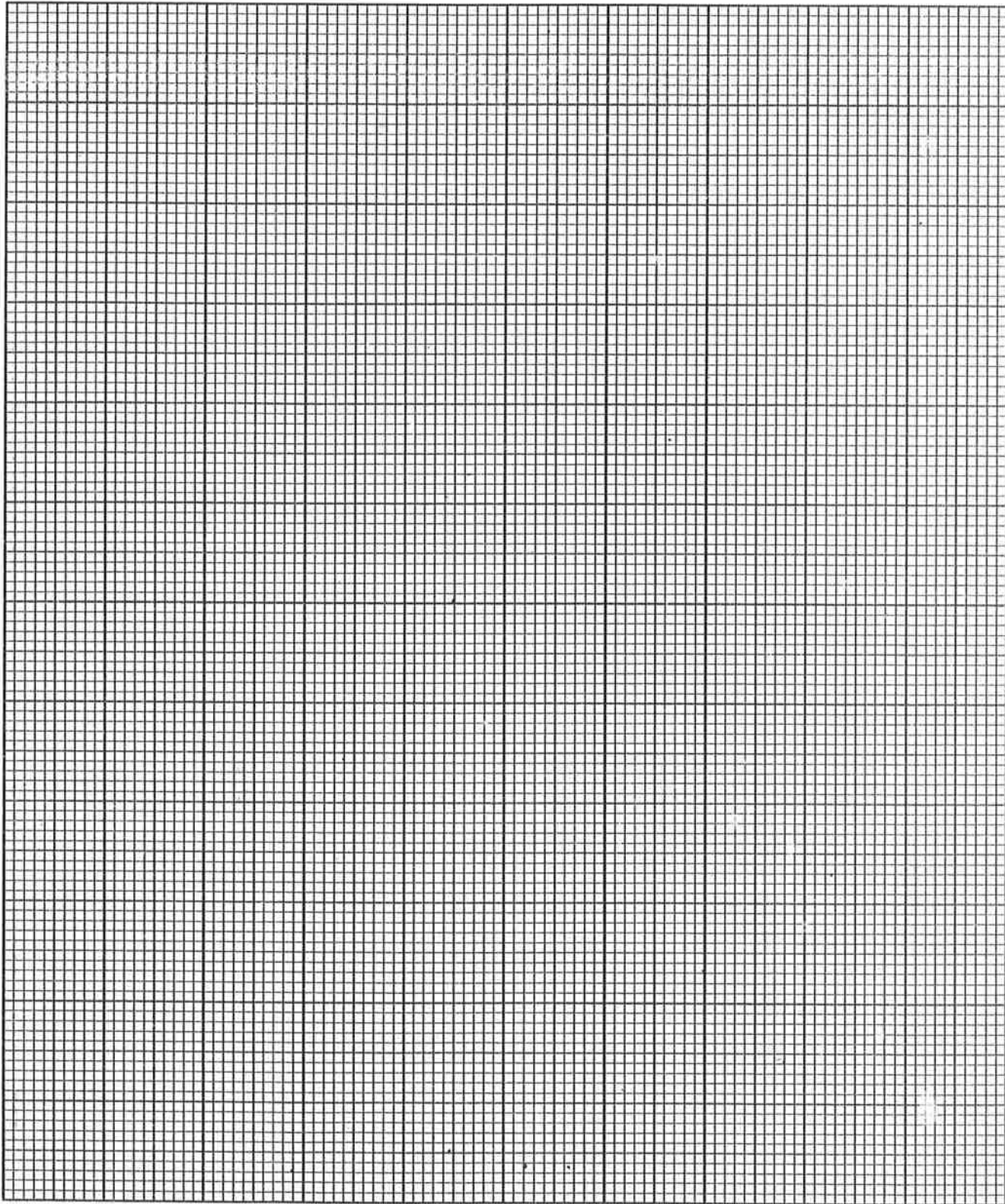
Index Number:.....

Question:.....



Index Number:.....

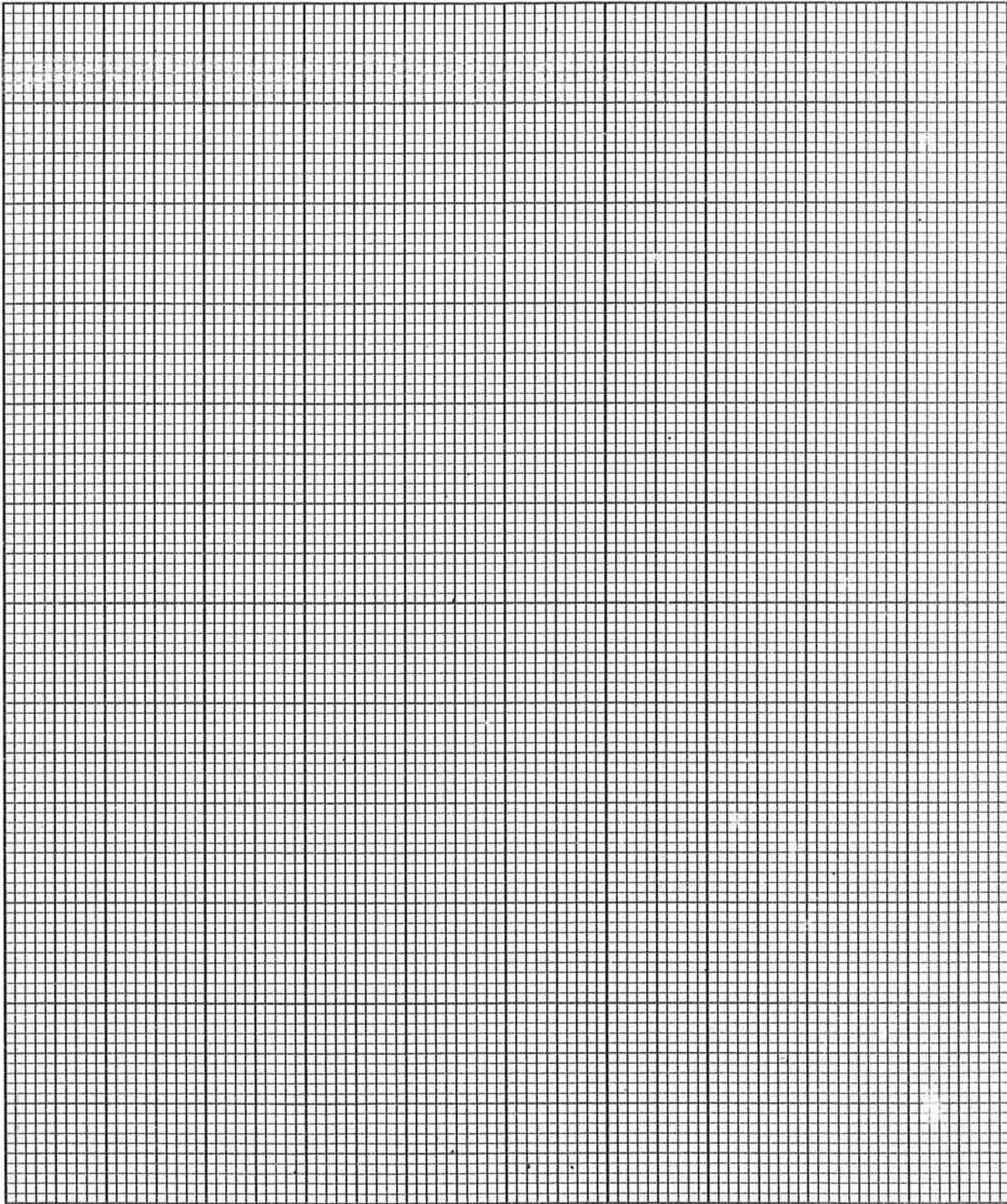
Question:.....





Index Number:.....

Question:.....



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6. Two fair dice with faces numbered 1, 2, 3, 4, 5 and 6 were thrown together. Find the probability of obtaining a sum of 7 or 11?

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7. (a) The position vectors of points  $F$  and  $G$  with respect to a fixed point  $O$  are  $(3i - 2j)$  and  $(i + j)$  respectively. If  $P$  divides  $FG$  in ratio  $5 : 3$ , find the position vector of  $P$ .

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- (b) In a triangle  $OPQ$ ,  $\overline{OP} = p$ ,  $\overline{OQ} = q$ . If  $M$  is the midpoint of  $\overline{PQ}$ , find in terms of  $p$  and  $q$ :  
(i)  $\overline{PM}$  ;

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SECTION B  
[52 marks]

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Answer **four** questions only from this section with at least one question from each part.

All questions carry equal marks.

PART I

PURE MATHEMATICS

9. Given that  $\frac{10}{7} {}^n C_6$ ,  ${}^n C_7$  and  ${}^n C_8$  are the **first three** consecutive terms of an exponential sequence (G.P.), find the:
- (a) value of  $n$ ;
  - (b) common ratio of the sequence;
  - (c) sum of the **first thirteen** terms of the sequence.
10. (a) Without using calculator or mathematical tables, evaluate  $\frac{3}{2-\sqrt{3}} - \frac{2}{3+\sqrt{3}}$  leaving the answer in the form  $m+n\sqrt{3}$ , where  $m$  and  $n$  are real numbers.
- (b) Given that  $\int_{-2}^m (4x^2 - 2x + 9)dx = \frac{172}{3}$ , where  $m$  is an integer, find the value of  $m$ .
11. (a) Given that  $f: x \rightarrow \frac{x}{x^2-1}$ ,  $x \neq \pm 1$  and  $g: x \rightarrow \frac{x}{x+2}$ ,  $x \neq -2$  where  $x \in R$ , find:
- (i)  $g^{-1}(x)$ ;
  - (ii)  $g^{-1} \circ f(x)$ ;
  - (iii) the largest domain of  $g^{-1} \circ f(x)$ .
- (b) Simplify:  $\frac{729^{-\left(1-\frac{5x}{6}\right)} + 243^{\left(x-\frac{1}{5}\right)}}{27^{\left(\frac{5x}{3}-1\right)}}$ .

PART II

STATISTICS AND PROBABILITY

12. An objective test contains 10 questions each with 4 possible options of which one is correct. Find, correct to **four** decimal places, the probability that a candidate who guesses the answers gets:
- (a) **at most** 2 questions;
  - (b) **less than** one question;
  - (c) **greater than** 40% of the questions, correct.

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write in  
this margin.

13. If the standard deviation of 3, 1,  $(2y - 2)$ ,  $(3y - 4)$  and 7 is  $2\sqrt{5}$ , find, correct to the nearest whole number, the positive value of  $y$ .

PART III

VECTORS AND MECHANICS

14. Four vectors  $\overline{OP} = xi + yj$  where  $x$  and  $y$  are negative constants,  $\overline{OQ} = 2i - j$ ,  $\overline{OR} = 4i + 3j$  and  $\overline{OS} = 2i + 2j$  are such that the magnitude of  $\overline{OP}$  is **three** times that of  $\overline{OQ}$  and  $\overline{OP}$  is parallel to  $(\overline{OR} - \overline{OS})$ .

- (a) Find the values of  $x$  and  $y$ .  
(b) Calculate the magnitude and direction of  $(\overline{OP} - \overline{OQ})$ .

15. (a) A car travelling along a straight road with constant retardation passes **two** posts 72 m apart at  $36 \text{ ms}^{-1}$  and  $28 \text{ ms}^{-1}$  respectively. Calculate the:

- (i) retardation of the car;  
(ii) distance beyond the second post at which the car will come to rest;  
(iii) retarding force acting on the car if the mass of the car is 1500 kg.

- (b) Two balls of masses 70 g and 60 g move with velocities  $3 \text{ ms}^{-1}$  and  $5 \text{ ms}^{-1}$  **respectively** in the same direction. The balls collide and the velocity of the **larger** ball becomes  $4 \text{ ms}^{-1}$  after collision. Find the final velocity of the **smaller** ball, if the balls move in the same direction.

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Do not  
write in  
this margin.

13. If the standard deviation of 3, 1,  $(2y - 2)$ ,  $(3y - 4)$  and 7 is  $2\sqrt{5}$ , find, correct to the nearest whole number, the positive value of  $y$ .

PART III

VECTORS AND MECHANICS

14. Four vectors  $\overline{OP} = xi + yj$  where  $x$  and  $y$  are negative constants,  $\overline{OQ} = 2i - j$ ,  $\overline{OR} = 4i + 3j$  and  $\overline{OS} = 2i + 2j$  are such that the magnitude of  $\overline{OP}$  is **three** times that of  $\overline{OQ}$  and  $\overline{OP}$  is parallel to  $(\overline{OR} - \overline{OS})$ .
- (a) Find the values of  $x$  and  $y$ .
- (b) Calculate the magnitude and direction of  $(\overline{OP} - \overline{OQ})$ .
15. (a) A car travelling along a straight road with constant retardation passes **two** posts 72 m apart at  $36 \text{ ms}^{-1}$  and  $28 \text{ ms}^{-1}$  respectively. Calculate the:
- (i) retardation of the car;
- (ii) distance beyond the second post at which the car will come to rest;
- (iii) retarding force acting on the car if the mass of the car is 1500 kg.
- (b) Two balls of masses 70 g and 60 g move with velocities  $3 \text{ ms}^{-1}$  and  $5 \text{ ms}^{-1}$  **respectively** in the same direction. The balls collide and the velocity of the **larger** ball becomes  $4 \text{ ms}^{-1}$  after collision. Find the final velocity of the **smaller** ball, if the balls move in the same direction.

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