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S1023

GENERAL  
MATHEMATICS

1 hour 45 minutes

III

Name:.....

Examination Number:.....

NATIONAL EXAMINATIONS COUNCIL

Senior School Certificate Examination

1 hour 45 minutes

GENERAL MATHEMATICS


PAPER III

Do not open this question booklet until you are told to do so. While waiting, read the following carefully.

1. Use HB pencil throughout.
2. Use of mobile phone is not allowed.
3. Use of scientific calculator is allowed.
4. All diagrams are not drawn to scale.
5. Take  $\pi$  to be  $\frac{22}{7}$  except otherwise stated.
6. Where your answer sheet is not customised, provide the following information:
  - (a) In the space marked *Candidate's Name*, write your **surname** in capital letters followed by your **other names**.
  - (b) In the space marked *School Name*, write the name of your **school**, and in the space marked *Subject Name*, write **General Mathematics III**.
  - (c) In the box marked *Subject Code*, write the digits **1023** in the spaces. There are numbered spaces in line with each digit. Shade carefully the space with the same number as each digit.
  - (d) In the box marked *Examination Number*, write your **examination number** in the spaces at the top of the box. Shade the corresponding numbered spaces in the same way as for Subject Code.
7. An example is given below. This is for a candidate whose name is **GAMBO Bamidele Uche**, with serial number **0010**, examination number **65432100BD**, and who is taking **General Mathematics III (1023)**.

**National Examinations Council**  
**SSCE ANSWER SHEET**

Candidate's Name:	GAMBO Bamidele Uche
School Name:	Government Secondary School, Minna
Subject Name:	General Mathematics III

Use HB pencil to complete this form. Mark like this . Erase all errors thoroughly.

Serial Number				
0	0	1	0	
(1)	(1)	(1)	(1)	
(2)	(2)	(2)	(2)	
(3)	(3)	(3)	(3)	
(4)	(4)	(4)	(4)	
(5)	(5)	(5)	(5)	
(6)	(6)	(6)	(6)	
(7)	(7)	(7)	(7)	
(8)	(8)	(8)	(8)	
(9)	(9)	(9)	(9)	

Subject Code			
1	0	2	3
(1)	(1)	(1)	(1)
(2)	(2)	(2)	(2)
(3)	(3)	(3)	(3)
(4)	(4)	(4)	(4)
(5)	(5)	(5)	(5)
(6)	(6)	(6)	(6)
(7)	(7)	(7)	(7)
(8)	(8)	(8)	(8)
(9)	(9)	(9)	(9)

Examination Number											
6	5	4	3	2	1	0	0	B	D		
(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(A)	(A)		
(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(B)	(B)		
(2)	(2)	(2)	(2)	(2)	(2)	(2)	(2)	(C)	(C)		
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(D)	(D)		
(4)	(4)	(4)	(4)	(4)	(4)	(4)	(4)	(E)	(E)		
(5)	(5)	(5)	(5)	(5)	(5)	(5)	(5)	(F)	(F)		
(6)	(6)	(6)	(6)	(6)	(6)	(6)	(6)	(G)	(G)		
(7)	(7)	(7)	(7)	(7)	(7)	(7)	(7)	(H)	(H)		
(8)	(8)	(8)	(8)	(8)	(8)	(8)	(8)	(I)	(I)		
(9)	(9)	(9)	(9)	(9)	(9)	(9)	(9)	(J)	(J)		



PAPER III

Answer all questions.

Each question is followed by five options lettered A – E. Find out the correct option for each question and shade in pencil on your answer sheet the answer space that bears the same letter as the option you have chosen. Give only one answer to each question and erase completely any answer you wish to change. Do all rough on this paper.

An example is given below.

The product of three numbers is 3876. Two of the numbers are 17 and 19. What is the third number?

- A. 57
- B. 12
- C. 6
- D. 3
- E. 2

The correct answer is '12' which is lettered B. Therefore, answer space B would be shaded.

[A]

☒ [B]

[C]

[D]

[E]

1. Express 0.0030752 to three significant figures.

- A. 0.003
- B. 0.003075
- C. 0.00308
- D. 0.0031
- E. 0.00375

2. Simplify  $1\frac{1}{9} \div 1\frac{1}{3} \times 3\frac{3}{5}$ .

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

3. Find the 15th term of a sequence whose  $n$ th term is given by

$$T_n = \frac{5n - 5}{5}$$

- A. 12
- B. 13
- C. 14
- D. 15
- E. 16

4. If  $3^{(6-9x)} = 27^{(1-2x)}$ , find the value of  $x$ .

- A.  $\frac{1}{3}$
- B.  $\frac{1}{2}$
- C. 1
- D. 3
- E. 5

5. Simplify  $2\sqrt{18} - 4\sqrt{32} + 3\sqrt{50}$ .

- A.  $3\sqrt{2}$
- B.  $4\sqrt{2}$
- C.  $5\sqrt{2}$
- D.  $6\sqrt{2}$
- E.  $9\sqrt{2}$

6. Simplify  $\frac{9^{\frac{1}{4}} \times 27^{\frac{1}{4}}}{81^{\frac{1}{4}}}$ .

- A. 9
- B. 7
- C. 5
- D. 3
- E. 1

7. Approximate 8.5326 to the nearest hundredth.

- A. 8.50
- B. 8.53
- C. 9.00
- D. 9.53
- E. 9.55

8. Given that  $\log 2 = 0.30103$  and  $\log 3 = 0.47712$ , calculate without using tables;  $\log 6 - \log 0.3$ .

- A. 0.25527
- B. 0.52288
- C. 0.55280
- D. 0.77815
- E. 1.30103

9. A toy train starts at the station and moves around a circular track of 220 cm. How many rotations will it move along the track when it has covered 440 cm?

- A. 2
- B. 3
- C. 4
- D. 5
- E. 6



10. A square of side 10 cm is measured by a student as 9.9 cm. If he uses her measurement to calculate the area of the square, calculate the percentage error.

A. 0.15  
B. 0.99  
C. 1.15  
D. 1.19  
E. 1.99

11. The  $n$ th term of an Arithmetic Progression (A.P.) is defined by  $T_n = (2n + \frac{1}{2})$ . Find the sum of the first ten terms of the A.P.

A. 11.5  
B. 23.0  
C. 57.0  
D. 115.0  
E. 230.0

12. The 5th and 11th terms of an Arithmetic Progression (A.P.) are 13 and 31 respectively. Find the sum of its first term and common difference.

A. 4  
B. 8  
C. 16  
D. 31  
E. 44

13. The 6th term of a Geometric Progression (G.P.) is 486. Find the common ratio if its first term is 2.

A. -4  
B. -3  
C. 1  
D. 3  
E. 5

14. Evaluate  $(\frac{256}{81})^{\frac{-3}{4}}$ .

A.  $\frac{3}{4}$   
B.  $\frac{17}{32}$   
C.  $\frac{17}{64}$   
D.  $\frac{27}{64}$   
E.  $\frac{37}{64}$

15. Simplify  $110011_{\text{two}} \times 101_{\text{two}}$ .

A.  $11111111_{\text{two}}$   
B.  $11100001_{\text{two}}$   
C.  $10011111_{\text{two}}$   
D.  $10011001_{\text{two}}$   
E.  $10000111_{\text{two}}$

16. Simplify  $\frac{3}{\sqrt{3}+6}$ .

- A.  $\frac{1}{33}(-15\sqrt{3})$
- B.  $\frac{1}{11}(6 - \sqrt{3})$
- C.  $\frac{1}{11}(6 + \sqrt{3})$
- D.  $\frac{1}{11}(\sqrt{3} - 6)$
- E.  $\frac{1}{33}(21\sqrt{3})$

17. The value of a car depreciates by 20% at the beginning of each year. If the car costs ₦1million, find the value of the car after 2 years.

- A. ₦ 512,000.00
- B. ₦ 600,000.00
- C. ₦ 640,000.00
- D. ₦ 800,000.00
- E. ₦ 830,000.00

18. Given that  $A = \begin{pmatrix} 2 & \frac{-2}{3} \\ 3 & 4 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 2 \\ 3 & 6 \end{pmatrix}$ , calculate AB.

- A.  $\begin{pmatrix} 1 & 2 \\ 15 & 30 \end{pmatrix}$
- B.  $\begin{pmatrix} -1 & -2 \\ 9 & 18 \end{pmatrix}$
- C.  $\begin{pmatrix} -1 & 2 \\ 5 & 15 \end{pmatrix}$
- D.  $\begin{pmatrix} 1 & -2 \\ 15 & 30 \end{pmatrix}$
- E.  $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

19. Find the values of x for which  $\frac{3x^2 + 6x - 2}{(x+2)(x-4)}$  is undefined.

- A.  $x = 2$  or  $4$
- B.  $x = 2$  or  $-4$
- C.  $x = -2$  or  $4$
- D.  $x = 0$  or  $4$
- E.  $x = 0$  or  $2$

20. Find the quadratic equation whose roots are 2 and  $-3\frac{1}{2}$ .

- A.  $2x^2 + 3x + 14 = 0$
- B.  $2x^2 + 5x + 7 = 0$
- C.  $2x^2 + 5x - 7 = 0$
- D.  $2x^2 + 3x - 14 = 0$
- E.  $2x^2 - 3x - 14 = 0$

21. Simplify  $\frac{a^2 - 4}{a^2 - a - 6}$ .

- A.  $\frac{2a+2}{a+3}$
- B.  $\frac{a+2}{a+3}$
- C.  $\frac{2a-2}{a+3}$
- D.  $\frac{2a+2}{a-3}$
- E.  $\frac{a-2}{a-3}$



22. Given the quadratic equation  $3x^2 - 5x = -2$ . Find the product of its roots.

A.  $\frac{2}{3}$   
 B.  $1\frac{1}{3}$   
 C.  $1\frac{4}{9}$   
 D.  $1\frac{2}{3}$   
 E.  $2\frac{7}{9}$

23. Simplify  $\frac{m^2 + m}{m(m+1)(m+2)}$ .

A.  $\frac{1}{m(m+2)}$   
 B.  $\frac{1}{m(m+1)}$   
 C.  $\frac{1}{m+2}$   
 D.  $\frac{1}{m+1}$   
 E.  $\frac{1}{m}$

Use the truth table below to answer questions 24 and 25.

p	q	x	y
T	T	T	T
T	F	F	T
F	T	F	T
F	F	F	F

24. Which of the following symbolic statements illustrate  $x$ ?

A.  $p \wedge q$   
 B.  $p \vee q$   
 C.  $p \Rightarrow q$   
 D.  $\sim p \wedge \sim q$   
 E.  $\sim p \vee \sim q$

25. Which of the following symbolic statements illustrate  $y$ ?

A.  $\sim p \wedge \sim q$   
 B.  $\sim p \vee \sim q$   
 C.  $p \vee q$   
 D.  $p \wedge q$   
 E.  $p \Rightarrow q$

26. The perimeter of a rectangle is 44 m and its area is  $120 \text{ m}^2$ . Find the dimensions of the rectangle.

A. 11 m, 11 m  
 B. 12 m, 10 m  
 C. 15 m, 8 m  
 D. 16 m, 6 m  
 E. 18 m, 4 m

27. Find the values of  $x$  in the equation  $3x^2 - 8x - 3 = 0$ .

A.  $\frac{1}{3}, -3$   
 B.  $\frac{-1}{3}, -3$   
 C.  $\frac{1}{3}, 3$   
 D.  $\frac{-1}{3}, 3$   
 E.  $-3, 0$

28. Factorize  $5y^2 + 2ay - 3a^2$ .

A.  $(2a - y)(5y - 3a)$   
 B.  $(y - a)(5y - 3a)$   
 C.  $(y - a)(5y + 3a)$   
 D.  $(y + a)(5y - 3a)$   
 E.  $(2y - a)(5y - 3a)$

29. Evaluate  $\frac{xy^2 - z^2}{2yz} + \frac{x^2}{2y+z}$   
when  $x = 2$ ,  $y = -3$  and  $z = -2$ .

A.  $\frac{7}{6}$   
~~B.  $\frac{2}{3}$~~   
 C.  $\frac{-1}{6}$   
 D.  $\frac{-1}{2}$   
 E.  $\frac{-2}{3}$

30. Let  $p$  : I pass mathematics  
 $q$  : I pass physics

Conclusion: I pass mathematics if  
 and only if I pass physics.  
 Translate the conclusion into  
 symbol.

A.  $p \Rightarrow q$   
 B.  $p \Leftarrow q$   
~~C.  $p \Leftrightarrow q$~~   
 D.  $p \Leftrightarrow \sim q$   
 E.  $\sim p \Leftrightarrow \sim q$

31. Given that  $V = \frac{1}{3} \pi r^2 (2r + h)$ ,  
 make  $h$  the subject of the formula.

A.  $\frac{3v}{\pi r^2} + 2r$   
~~B.  $\frac{3v}{\pi r^2} - 2r$~~   
 C.  $\frac{3v - 2\pi^2}{\pi r^2}$   
 D.  $\frac{3v + 2\pi^2}{\pi r^2}$   
 E.  $\frac{3v - 2\pi r}{\pi r^2}$

32. A varies inversely as the square of B  
 and B varies directly as the square of  
 C. Find the equation connecting A  
 and C, where K is a constant.

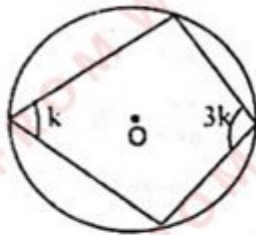
A.  $A = KC^2$   
 B.  $A = \frac{K}{C^2}$   
 C.  $A = KC$   
~~D.  $A = \frac{K}{C^4}$~~   
 E.  $A = KC^4$

33. If M varies inversely as N and  
 $M = \frac{15}{2}$  when  $N = 4$ , find the value  
 of N when  $M = \left(\frac{1}{20}\right)^{-1}$ .

A.  $\frac{1}{3}$   
 B.  $\frac{2}{3}$   
~~C.  $1\frac{1}{2}$~~   
 D.  $2\frac{2}{3}$   
 E.  $3\frac{1}{4}$



34. Find the value of  $k$  in the figure below.



- A.  $133^\circ$
- B.  $67^\circ$
- C.  $45^\circ$
- D.  $30^\circ$
- E.  $22^\circ$

35. Given the line  $2x - 3y = 9$ , determine its gradient.

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

36. In an isosceles triangle MNO, where  $\overline{MN} = \overline{MO} = 6$  cm and  $\angle MNO = 112^\circ$ . Calculate  $\overline{NO}$ , correct to 2 significant figures.

- A. 10.0 cm
- B. 9.9 cm
- C. 7.9 cm
- D. 5.0 cm
- E. 4.9 cm

37. Find the total surface area of the cuboid drawn below.



- A.  $270 \text{ cm}^2$
- B.  $298 \text{ cm}^2$
- C.  $308 \text{ cm}^2$
- D.  $318 \text{ cm}^2$
- E.  $516 \text{ cm}^2$

38. Find the acute angle between the lines  $x + 4y = 12$  and  $2y - x = -6$ .

- A.  $39.4^\circ$
- B.  $40.6^\circ$
- C.  $42.4^\circ$
- D.  $49.4^\circ$
- E.  $51.6^\circ$

39. Find the equation of a straight line passing through the point  $(-1, 4)$  and parallel to the line  $y = 3x + 2$ .

- A.  $y - 3x = -7$
- B.  $y - 3x = 7$
- C.  $y + 3x = 7$
- D.  $y - 3x = -1$
- E.  $y - 3x = 1$

40. A sector of a circle subtends angle of  $90^\circ$  at the centre of the circle. If the area of the sector is  $11 \text{ cm}^2$ , find its radius correct to two decimal places.

A. 2.65 cm  
B. 3.74 cm  
C. 7.00 cm  
D. 7.65 cm  
E. 13.75 cm

41. Find the curved surface area of a cone of height 4 cm and base radius 3 cm, correct to 2 decimal places.

A.  $5.00 \text{ cm}^2$   
B.  $13.63 \text{ cm}^2$   
C.  $47.14 \text{ cm}^2$   
D.  $75.43 \text{ cm}^2$   
E.  $108.51 \text{ cm}^2$

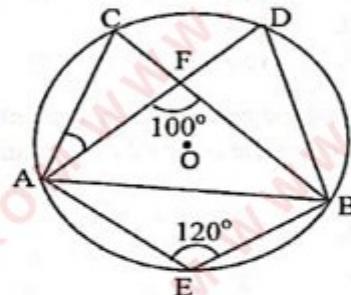
42. The angle of elevation of the top B of a wall from a point A on the ground is  $30^\circ$ . If  $AB = 50 \text{ m}$ , how far is A from the foot of the wall, correct to 2 significant figures?

A. 25 m  
B. 42 m  
C. 43 m  
D. 44 m  
E. 45 m

43. Given that  $\sin \theta = \frac{3}{5}$  where  $\theta$  is an acute angle, what is the value of  $\frac{\sin \theta + \cos \theta}{1 - \tan \theta}$ ?

A.  $1\frac{2}{5}$   
B.  $3\frac{3}{5}$   
C.  $4\frac{1}{2}$   
D.  $5\frac{3}{5}$   
E.  $8\frac{3}{4}$

44. In the figure below, O is the centre of the circle. Find  $\angle CAF$ .



A.  $30^\circ$   
B.  $40^\circ$   
C.  $50^\circ$   
D.  $60^\circ$   
E.  $80^\circ$

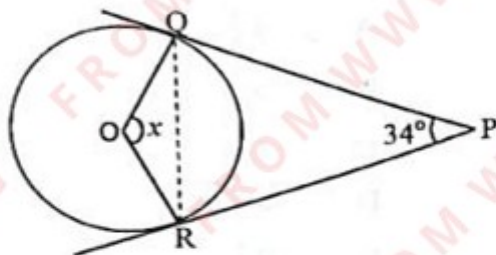
45. X and Y are two places on the equator and their longitudes are  $165^\circ\text{E}$  and  $67^\circ\text{W}$  respectively. What is the shortest distance between them?

(Take  $R = 6400 \text{ km}$ )

A. 10951.1 km  
B. 14303.5 km  
C. 25925.1 km  
D. 30925.1 km  
E. 44303.5 km



46. In the figure below, PQ and PR are tangents from P to a circle with centre O. If  $\angle QPR = 34^\circ$ , find the angle marked  $x$ .



- A.  $136^\circ$   
 B.  $140^\circ$   
 C.  $146^\circ$   
 D.  $148^\circ$   
 E.  $150^\circ$
47. Find the gradient of a straight line joining the points A(3, -5) and B(1, 3).
- A. -4  
 B.  $-\frac{1}{4}$   
 C. 0  
 D.  $\frac{1}{4}$   
 E. 4
48. A plastic spherical ball of radius 6 cm was melted and reshaped into a cube. Find the length of the cube, correct to the nearest centimetres.

- A. 5  
 B. 6  
 C. 9  
 D. 10  
 E. 12

The mean age of seven children is 10 years. The ages(in years) of six of the children are 3, 6, 8, 14, 15 and 16. Use the information to answer questions 49 to 51.

49. Calculate the age of the seventh child.

- A. 6 years  
 B. 7 years  
 C. 8 years  
 D. 10 years  
 E. 14 years

50. Find the modal age.

- A. 6 years  
 B. 8 years  
 C. 14 years  
 D. 15 years  
 E. 16 years

51. What is the median age?

- A. 6 years  
 B. 7 years  
 C. 8 years  
 D. 10 years  
 E. 14 years

The mean of the following set of data; 5, 7, 9,  $x$  and 6 is 6. Use this information to answer questions 52 and 53.

52. Determine the value of  $x$ .

- A. 0  
 B. 3  
 C. 5  
 D. 6  
 E. 9

53. Find the variance.

- A. 2.4
- B. 4.0
- C. 6.0
- D. 8.0
- E. 12.8

Two fair dice are thrown together.  
Use the information to answer  
questions 54 and 55.

54. Calculate the probability that the  
sum obtained is less than 8.

- A.  $\frac{5}{18}$
- B.  $\frac{5}{12}$
- C.  $\frac{4}{9}$
- D.  $\frac{5}{9}$
- E.  $\frac{7}{12}$

55. Find the probability that the sum  
obtained is a multiple of 6.

- A.  $\frac{1}{6}$
- B.  $\frac{1}{3}$
- C.  $\frac{2}{3}$
- D.  $\frac{3}{4}$
- E.  $\frac{5}{6}$

56. Find the mode of the distribution  
below, correct to one decimal place.

20 - 24	25 - 29	30 - 34
3	7	2

- A. 24.2
- B. 24.5
- C. 25.7
- D. 26.2
- E. 26.7

57. Find the range of the following set of  
numbers; 8, 10, 2, 6, 16, 24, 12, 20.

- A. 8
- B. 10
- C. 12
- D. 18
- E. 22

58. What is the derivative of  $f(x) = C$ ,  
where  $C$  is a constant?

- A. -1
- B. 0
- C. 1
- D.  $C$
- E.  $-C$



59. When a stone is dropped into water, the radius of a circular wave is increasing at the rate of  $0.2 \text{ ms}^{-1}$ . Find the rate at which the area is increasing when the radius is  $0.07 \text{ m}$ .

A.  $44.000 \text{ m}^2\text{s}^{-1}$   
 B.  $8.800 \text{ m}^2\text{s}^{-1}$   
 C.  $0.440 \text{ m}^2\text{s}^{-1}$   
 D.  $0.088 \text{ m}^2\text{s}^{-1}$   
 E.  $0.014 \text{ m}^2\text{s}^{-1}$

60. Evaluate  $\int 3\sqrt{x} \, dx$ .

A.  $4\sqrt{x^3} + c$   
 B.  $3\sqrt{x^3} + c$   
 C.  $2\sqrt{x^3} + c$   
 D.  $2\sqrt{x^2} + c$   
 E.  $\sqrt{x^3} + c$

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