S1023
GENERAL MATHEMATICS III
1 hour 45 minutes

Name:.....

Registration 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 π 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 *Registration Number*, write your **registration 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, registration number 8765432100BD,** and who is taking **General Mathematics III (1023).**

National Examinations Council **ANSWER SHEET**

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

Examination Type: SSCE ▬ BECE (I) (II) ▭ ▭ Other ▭ If Other, write exam type in the box below ▭ Absent ▭

Candidate's Serial No. in School: 0 0 1 0

Subject Code: 1 0 2 3

Registration Number: 8 7 6 5 4 3 2 1 0 0 B D

Candidate's Name	GAMBO Bamidele Uche
School Number	0210231
School Name	Government Secondary School, Minna
Subject Name	General Mathematics III

PAPER III

Answer **all** questions.

Each question is followed by **five** options lettered **A** to **E**. Choose 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 work on this question 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 option is '12' which is lettered **B**. Therefore, answer space **B** would be shaded as shown below:

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

1. Express 384.126 to the nearest hundred.

   A. 480
   B. 400
   C. 384
   D. 380
   E. 300

2. If A = {natural numbers between 3 and 15}, find n(A).

   A. 15
   B. 14
   C. 13
   D. 11
   E. 10

3. Evaluate $3241_{five} - 1342_{five}$.

   A. 2341_{five}
   B. 1344_{five}
   C. 1342_{five}
   D. 1324_{five}
   E. 1234_{five}

4. Simplify $(4\sqrt{3}-6)(4\sqrt{3}+6)$.

   A. 12
   B. 4
   C. $2\sqrt{3}$
   D. 2
   E. $\sqrt{3}$

5. The third term of a Geometric Progression is – 5 and the seventh term is – 80. Find the common ratio.

   A. 16
   B. 8
   C. 5
   D. 3
   E. 2

6. A man with an annual salary of ₦1,300,000.00 is to pay an income tax of 22%. Calculate his tax, if his allowances amount to ₦137,000.00.

A. ₦254,760.00
B. ₦255,860.00
C. ₦258,860.00
D. ₦350,140.00
E. ₦907,140.00

7. A wire of length 25 cm was measured by a student to be 24.4 cm. Find the percentage error.

A. 4.4
B. 3.4
C. 2.4
D. 1.4
E. 0.4

8. How many years will ₦12,000.00 saved in a bank amount to ₦12,960.00 at 2% per annum simple interest?

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

9. Rationalize $\frac{5}{\sqrt{2}+\sqrt{3}}$.

A. $5(\sqrt{3}-\sqrt{2})$
B. $5(\sqrt{2}+\sqrt{3})$
C. $5(\sqrt{2}-\sqrt{3})$
D. $\sqrt{3}+5\sqrt{2}$
E. $\sqrt{3}+2\sqrt{5}$

10. In a class of 80 students, every student studies Mathematics or Geography or both. If 65 students study Mathematics and 50 study Geography, how many study both subjects?

A. 45
B. 35
C. 30
D. 20
E. 15

11. The 11th term of an Arithmetic Progression is 63. Find the first term, if its common difference is 3.

A. 65
B. 63
C. 35
D. 33
E. 30

12. Evaluate $15 \otimes 26$ in modulo 5.

A. 0 (mod 5)
B. 1 (mod 5)
C. 2 (mod 5)
D. 4 (mod 5)
E. 5 (mod 5)

13. Solve $2^{3x} = 16^{\frac{3}{4}}$.

A. 8
B. 4
C. 3
D. 2
E. 1

14. If Olu, Tony and Tunde share ₦240,000.00 in the ratio 2:3:5 respectively, what is two-thirds of Tunde's share?

A. ₦120,000.00
B. ₦80,000.00
C. ₦72,000.00
D. ₦48,000.00
E. ₦40,000.00

15. Arrange the following fractions in ascending order of magnitude;
$\frac{2}{3}, \frac{3}{5}, \frac{5}{12}, \frac{4}{15}, \frac{3}{10}$.

A. $\frac{4}{15}, \frac{3}{10}, \frac{5}{12}, \frac{3}{5}, \frac{2}{3}$
B. $\frac{3}{10}, \frac{4}{15}, \frac{5}{12}, \frac{3}{5}, \frac{2}{3}$
C. $\frac{4}{15}, \frac{5}{12}, \frac{3}{10}, \frac{3}{5}, \frac{2}{3}$
D. $\frac{4}{15}, \frac{5}{12}, \frac{3}{5}, \frac{3}{10}, \frac{2}{3}$
E. $\frac{2}{3}, \frac{3}{5}, \frac{5}{12}, \frac{4}{15}, \frac{3}{10}$

16. Find the values of x, y and z respectively for which $\begin{bmatrix} x & 2y \\ z & 9 \end{bmatrix} = \begin{bmatrix} 4 & 12 \\ 3 & 9 \end{bmatrix}$.

A. (6, 4, 3)
B. (4, 6, 3)
C. (6, 3, 4)
D. (3, 4, 6)
E. (4, 4, 6)

17. If $P = \begin{bmatrix} -1 & 2 \\ 3 & 1 \end{bmatrix}$ and $Q = \begin{bmatrix} 2 & 3 \\ 2 & 1 \end{bmatrix}$, find PQ.

A. $\begin{bmatrix} 2 & 1 \\ -8 & -10 \end{bmatrix}$
B. $\begin{bmatrix} 2 & 1 \\ 8 & 10 \end{bmatrix}$
C. $\begin{bmatrix} -2 & 1 \\ 8 & 10 \end{bmatrix}$
D. $\begin{bmatrix} -2 & -1 \\ 8 & 10 \end{bmatrix}$
E. $\begin{bmatrix} 2 & -1 \\ 8 & 10 \end{bmatrix}$

18. Evaluate $\log_4 16 + \log_3 27 - \log_8 4096$.

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

19. Solve the equation $\frac{4x}{5} - \frac{7}{3} = \frac{5x}{12}$.

A. $-6\frac{2}{23}$
B. $-3\frac{1}{2}$
C. $5\frac{2}{23}$
D. $6\frac{2}{23}$
E. $6\frac{3}{23}$

20. If $f(x) = 3x^2 - 9x - 5$, find $f(-3)$.

A. −5
B. 5
C. 27
D. 49
E. 54

21. Find u in terms of f and v in the relation $\frac{1}{v} = \frac{1}{f} - \frac{1}{u}$.

A. $u = \frac{-f}{(v-f)}$
B. $u = \frac{fv}{(f-v)}$
C. $u = \frac{fv}{(v+f)}$
D. $u = \frac{fv}{(v-f)}$
E. $u = \frac{fv}{2(f+v)}$

22. Find the quadratic equation whose roots are –1 and 5.

A. $x^2 - 4x - 5 = 0$
B. $x^2 - 4x + 1 = 0$
C. $x^2 - 4x + 5 = 0$
D. $x^2 + 4x - 5 = 0$
E. $x^2 + 4x + 5 = 0$

23. The product of two numbers is 40 and their sum is 13, find the numbers.

A. 2 and 20
B. 2 and 8
C. 4 and 10
D. 4 and 8
E. 5 and 8

24. If $(x+6)$ is a factor of $x^2 + 4x - 12$, find the other factor.

A. $(x - 2)$
B. $(x - 6)$
C. $(x + 2)$
D. $(x + 4)$
E. $(x + 6)$

25. Calculate the mid-point of the line joining (8, − 3) and (−2, 3).

A. (− 3, 0)
B. (0, 5)
C. (3, 0)
D. (0,3)
E. (5, 0)

26. Calculate the gradient of a line joining the points (− 2, − 5) and (4, 8), correct to 1 decimal place.

A. 4.2
B. 3.4
C. 3.2
D. 2.2
E. 2.1

27. Given the statements:
p: All terrorists are guilty
q: All terrorists are criminals
Write the following statement in symbolic form; "All terrorists are **not** guilty but criminals".

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

28. Simplify $\dfrac{x+\frac{1}{3}}{x+\frac{1}{2}}$.

A. $\dfrac{2(3x+1)}{3(2x+1)}$

B. $\dfrac{2+x}{3+x}$

C. $\dfrac{x+1}{x-1}$

D. $\dfrac{3x+1}{2x-1}$

E. $\dfrac{x^2}{x-1}$

29. Find the equation of a line whose gradient is 6 and y-intercept is -7.

A. $y = 8 + 7x$
B. $y = -7 - 6x$
C. $y = 7 - 6x$
D. $y = -7 + 6x$
E. $y = 7 + 6x$

30. Find the sum of the roots of the quadratic equation $x^2 - 5x + 6 = 0$.

A. 10
B. 5
C. -2
D. -3
E. -5

31. Find the roots of the equation $8x^2 - 6x - 9 = 0$.

A. $x = \frac{3}{2}$ or $\frac{-4}{3}$

B. $x = \frac{3}{2}$ or $\frac{-3}{4}$

C. $x = \frac{3}{2}$ or $\frac{3}{4}$

D. $x = \frac{-3}{2}$ or $\frac{3}{4}$

E. $x = \frac{-3}{2}$ or $\frac{-3}{4}$

32. Expand $(2x - 3)(3x + 4)$.

A. $6x^2 - 17x - 12$
B. $6x^2 - x - 12$
C. $6x^2 - x + 12$
D. $6x^2 + x - 12$
E. $6x^2 + 17x - 12$

33. The difference between the present ages of two brothers is 6 and their product is 135. What is the sum of their ages?

A. 27
B. 24
C. 22
D. 21
E. 15

34. In **Fig. 3.1**, PQS is a circle with centre O. RST is a tangent at S and $\angle SOP = 120^{\circ}$. Find $\angle PST$.

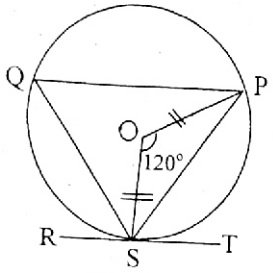

Fig. 3.1

A. 64°
B. 60°
C. 35°
D. 31°
E. 29°

35. In **Fig. 3.2**, A, B, C and D are points on a circle with centre O. $\overline{BA}$ is produced to M.
If $\angle MAD = 82^{\circ}$ and $\angle ADO = 74^{\circ}$, find $\angle ABO$.

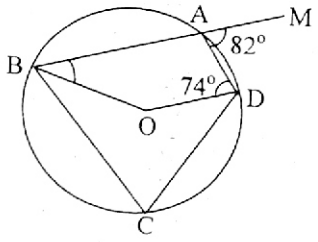

Fig. 3.2

A. 24°
B. 74°
C. 82°
D. 98°
E. 164°

36. Calculate the area of trapezium ABCD in **Fig. 3.3**.

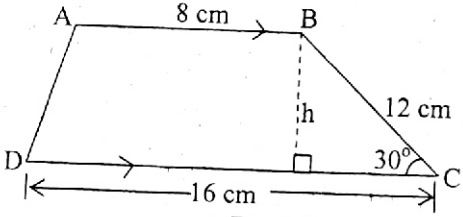

Fig. 3.3

A. $27\ cm^2$
B. $36\ cm^2$
C. $72\ cm^2$
D. $92\ cm^2$
E. $144\ cm^2$

37. A boy walks 4 km due West. He then changes direction and walks on a bearing of 214° until he is South-West of his starting point. How far is he from his starting point? Correct your answer to one decimal place.

A. 5.1 km
B. 8.3 km
C. 11.1 km
D. 15.7 km
E. 17.4 km

38. Two points P and Q lie on the same great circle. P is on latitude 70°N and Q is on latitude 55°N. Calculate their difference in latitudes.

A. 15°
B. 25°
C. 45°
D. 65°
E. 125°

39. A bird which is on top of a building 35 m high observes a prey 25 m away from the foot of the building. Calculate the angle of depression of the prey from the bird.

A. 75.00°
B. 60.00°
C. 54.46°
D. 35.25°
E. 10.00°

40. Calculate the length of an arc which subtends an angle of 66° at the centre of a circle of radius 8 cm, correct to one decimal place.

A. 3.4 cm
B. 5.2 cm
C. 7.4 cm
D. 9.2 cm
E. 12.3 cm

41. Find the value of y in **Fig. 3.4**.

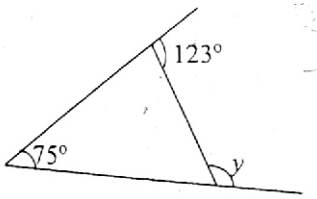

Fig. 3.4

A. 48°
B. 57°
C. 105°
D. 132°
E. 198°

42. The base radius and height of a cone are 4 cm and 6 cm respectively. Calculate its volume, correct to the nearest whole number.

A. 75 cm^3
B. 86 cm^3
C. 98 cm^3
D. 101 cm^3
E. 110 cm^3

43. Find the distance between the points (3, −4) and (−5, 2).

A. 18
B. 16
C. 14
D. 12
E. 10

44. Calculate the surface area of a sphere with diameter 10.4 cm, correct to 3 significant figures. (Take $\pi = 3.142$)

A. 439 cm^2
B. 400 cm^2
C. 340 cm^2
D. 339 cm^2
E. 338 cm^2

45. Obi walks 400 m to the top of a hill which slopes at angle 30° to the horizontal. Determine the height of the hill.

A. 430 m
B. $400\sqrt{3}$m
C. $200\sqrt{3}$ m
D. 200 m
E. 100 m

53. Calculate the variance of the following set of numbers;
30, 28, 35, 25, 37.

A. 31.0
B. 25.1
C. 19.6
D. 19.5
E. 15.3

54. If the tickets numbered 1 to 16 inclusive are mixed up and a ticket is drawn at random, what is the probability that the ticket drawn is a multiple of 2 or 3?

A. $\frac{5}{16}$
B. $\frac{1}{2}$
C. $\frac{5}{8}$
D. $\frac{11}{16}$
E. $\frac{13}{16}$

55. The following are the lucky numbers in a raffle draw; 4, 5, 12, 20, 2, 8, 3, 6, 10, 9, 7, 25, 12, 10, 14, 27.
If a number is picked at random, what is the probability that it is a perfect cube?

A. $\frac{11}{16}$
B. $\frac{5}{8}$
C. $\frac{7}{16}$
D. $\frac{3}{8}$
E. $\frac{1}{8}$

56. The probability that it will rain in Lagos and Oyo on the same day are $\frac{3}{4}$ and $\frac{1}{2}$ respectively. Find the probability that it will not rain in both towns on the same day.

A. $\frac{1}{12}$
B. $\frac{1}{8}$
C. $\frac{1}{6}$
D. $\frac{1}{4}$
E. $\frac{1}{2}$

57. **Table 3.1:** Ages of students

Age (years)	16	17	18
No of students	4	8	6

Table 3.1 shows the ages of students in a particular class. What is the probability that a student chosen at random is less than 18 years?

A. $\frac{9}{10}$
B. $\frac{4}{5}$
C. $\frac{2}{3}$
D. $\frac{1}{2}$
E. $\frac{1}{3}$