KITH & KIN INTERNATIONAL COLLEGE

7/11 Kaoli Olusanya Street, Owode Ibeshe, Ikorodu, Lagos State.

FIRST TERM EXAMINATION 2025/2026 ACADEMIC SESSION

NAME					
SUBJECT	**FURTHER MATHEMATICS (OBJECTIVE)**	**CLASS**	**SS3**	**DURATION**	**2 ½ HOURS**

Instruction : Answer all the questions in this section

[40MARKS]

1. Find the distance between the points A(3,2) and B (4,6)
   A. $\sqrt{17}$
   B. 7
   C. $\sqrt{12}$
   D. $\sqrt{6}$

2. Find the mid point between the point A (3,5) and B (1,3)
   A. (4,8)
   B. (2,2)
   C. (2,4)
   D. (4,2)

3. Find the gradient of the line joining (3,2) and (7,10)
   A. 2
   B. 1
   C. ½
   D. -1

4. Find the angle of slope of the line y=x+4
   A. 32.9^0
   B. 45^0
   C. 56.7^0
   D. 58.7^0

5. Find the coefficient of x^4 in the binomial expansion of $(2 + x)^6$.
   A. 120
   B. 80
   C. 60
   D. 15

6. Find the equation of a straight line of slope 2 if it passes through the point (3,-2)
   A. y=x-6
   B. y=2x-8
   C. y=-2x+3
   D. y=3x

7. Solve the equation $4^{x-1}=32$
   A. x=1 ½
   B. x = 2 ½
   C. x =3 ½
   D. x= 4
   E. x = 5 ½

8. Differentiate the function $y=5x^3-4x^2+3x$ with respect to x
   A. $8x^2-4x+3$
   B. $15x^2-8x+3$
   C. 15x-8
   D. $5x^2-8x+3$

9. Solve the equation $x^2-6x+9=0$
   A. x=-3 or 2
   B. x=3 or 3
   C. x = 1 or 4
   D. x = -2 or 3

10. If $y = 3x^2+6x+2$. Find $\frac{dy}{dx}$ at the point x = 1
    A. 3
    B. 4

C. 12
D. 8

11. Without tables or calculator evaluate $\frac{\tan 60 + \tan 45}{1 - \tan 60 \tan 45}$

A. $-(4+2\sqrt{3})$

B. $-(2+\sqrt{3})$

C. $-\frac{1}{2}(1+\sqrt{3})$

D. $3+\sqrt{2}$

12. Find the derivative of y with respect to x in $x^2+xy+y^2=9$

A. $\frac{2x-y}{x-2y}$

B. $\frac{-(2x+y)}{x-2y}$

C. $\frac{-2x-y}{x+2y}$

D. $\frac{2x-y}{x+2y}$

13. A binary operation * is defined on the set of integers (z) by a*b = $\frac{a^2-b^2}{a-b}$ for all a, b, EZ. Find the value of x if 3*x = 23

A. 26
B. 23
C. 20
D. 17

14. The probability of a girl passing further mathematics is 3/5 and probability of failing physics is 2/7. Find the probability of the passing both subjects

A. 3/7
B. 2/5
C. 5/7
D. 3/5

15. If (x +3) is a factor of the polynomial $x^3 + 3x^2 + nx - 12$, where n is a constant, find the value of n.

A. -1
B. -2
C. -3
D. -4

16. Simplify $\frac{n!}{(n-2)!}$

A. n
B. n-1
C. n (n-1)
D. m(n-1) (n-2)

17. Simplify $\frac{\sqrt{3}}{\sqrt{3}-1}+\frac{\sqrt{3}}{\sqrt{3}+1}$

A. ½
B. ½ $\sqrt{3}$
C. 3
D. 2 $\sqrt{3}$

18. Evaluate $x \to 3\left(\frac{x^2-2x-3}{x-3}\right)$

A. 4
B. 3
C. 2
D. 0

19. Which of the following is the same as sin (270+x)?

A. sin x
B. tan x
C. –sin x
D. –cos x

20. Given that $\alpha+\beta$ =3 and $\alpha\ \beta$ =2. Find the equation

A. $x^2-3x+2=0$
B. $x^2-2x+34=0$
C. $x^2+3x-2=0$
D. $x^2+3x-2=0$

21. The nth term of the sequence 2,6,18,54……. Is 4,374. find the value of n

A. 6
B. 7
C. 8
D. 9

22. Rationalize $\frac{3\sqrt{2}-5}{1-2\sqrt{2}}$

A. $1+\sqrt{2}$
B. $1-\sqrt{2}$
C. $-1+\sqrt{2}$
D. $-(1+\sqrt{2})$

23. Express $\frac{5\pi}{6}$ radians in degree
A. 75
B. 85
C. 87
D. 150

24. In an Arithmetic Progression d = 3, a = -7 and Sn = 65. Find the value of n.
A. 15
B. 11
C. 10
D. 9

25. Evaluate cos 165^0 and leave your answer in surd form.
A. $\frac{1}{4}(\sqrt{6}-\sqrt{3})$
B. $\frac{1}{4}(\sqrt{6}+\sqrt{2})$
C. $\frac{1}{4}(\sqrt{6}-\sqrt{2})$
D. $-\frac{1}{4}(\sqrt{6}+\sqrt{2})$

26. Evaluate $\int \cos 8x\, dx$
A. -8sin8x + c
B. -8cos8x + c
C. $-\frac{1}{8}$sin8x + c
D. $\frac{1}{8}$sin8x + c

27. Find the equation of a circle whose diameter has the end points. (-3,2) and (4, -6).
A. $x^2 - y^2 = 0$
B. $x^2 - y^2$ - x + y= 0
C. $x^2 + y^2$ - x + 4y -24 = 0
D. $x^2 + y^2$ -2 x + 4y -24 = 0

28. The 1st and 3rd terms of a Geometric Progression are 32 and 8 respectively. Find the 6th term.
A. 16
B. 8
C. 4
D. 1

29. Given the partial fractions $\frac{4-x}{(1-x)^2} = \frac{A}{(1-x)} + \frac{B}{(1-x)^2}$, find the value of A + B.
A. 7
B. 4
C. 3
D. 1

30. If α and β are the roots of the equation $2x^2 - 7x - 3 = 0$, find the value of $\alpha\beta^2 + \alpha^2\beta$.
A. $\frac{7}{2}$
B. 2
C. 1
D. $-\frac{21}{4}$

31. Determine the nature of the roots of $3x^2 - 4x + 7 = 0$
A. Distinct and equal
B. Distinct and imaginary
C. Imaginary only
D. Real and equal

32. Find the integral of $\frac{4}{(8x-3)^4}$dx
A. $\frac{1}{6}(8x+3)^3$ + c
B. $-\frac{1}{6}(8x+3)^{-3}$ + c
C. $\frac{1}{10}(8x+3)^3$ + c
D. $\frac{1}{6}(8x+3)^2$ + c

33. A particle of mass 50kg is acted upon by a force P. If the particle moves an upward distance of 200m in the line of action of the force, calculate the work done. (Take g = 10m/s^2)
A. 500J
B. 25,000J
C. 36,000J
D. 100,000J

34. What is the coordinates of the center of the circle. $5x^2 + 5y^2 - 15x + 25y - 3 = 0$
A. $(\frac{15}{2}, -\frac{25}{2})$
B. $(\frac{3}{2}, -\frac{5}{2})$
C. $(\frac{-3}{2}, \frac{5}{2})$
D. $(-\frac{15}{2}, \frac{25}{2})$

35. Two particles of masses 3kg and 4kg are connected by a light inextensible string over a fixed smooth pulley. Find the tension in the string.
A. 54.3N
B. 33.6N
C. 29.4N
D. 23 .4N

36. If $\begin{vmatrix} 3 & x \\ 2 & x-2 \end{vmatrix}$ = -2, find the value of x.
A. -8
B. -4
C. 4
D. 8

37. Find the length of $\bar{a}$ if $a = \begin{bmatrix} 1 \\ -6 \\ 4 \end{bmatrix}$

A. 36
B. 16
C. $\sqrt{53}$
D. $\sqrt{37}$

38. A boy starts from rest and moves in a straight line with a uniform acceleration of $7m/s^2$. How far does it go in 8 seconds?
A. 50m
B. 100m
C. 175m
D. 224m

39. The function f over the set of real numbers is defined by $f(x) = \frac{1}{2}x-3$. Find $f^{-1}(x)$
A. -2 (X-3)
B. 2 (X+3)
C. 3 (X-3)
D. 5(X+3)

40. Simplify $(1 + 2\sqrt{3})^2 - (1 - 2\sqrt{3})^2$
A. 0
B. $8\sqrt{3}$
C. 13
D. $2 - 4\sqrt{3}$

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FIRST TERM 2025/2026 ACADEMIC SESSION

NAME					
SUBJECT	FURTHER MATHEMATICS (THEORY)	CLASS	SS 3	DURATION	2 ½ HOURS

Answer all the questions in this section [40MKS]

1. A binary operation *is defined on the set, R, of real numbers by m*n = m + n + 2. Find the
   (a) Identity element under the operation *
   (b) Inverse of n under the operation*

2. Points (2,1) and (6,7) are opposite vertices of a square which is inscribed in a circle. Find the:
   a. Center of the circle
   b. Equation of the circle

3. Expand $(2 + \frac{1}{2x})^4$ and simplify each term, hence, use the expansion to find the approximate value of $(2.01)^4$, correct to three decimal places.

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

5 If $f(x) = \frac{4-5x}{2}$ and $g(x) = x + 6$, $x \in R$, find fog^{-1}.

6. When $f(x) = 2x^3 + mx^2 + nx + 11$ is divided by $x^2 + 5x + 1$, the quotient is $2x - 5$ and the remainder is $30x + 16$. Find the values of m and n.

7. If two fair dice are thrown together twice, find the probability of obtainning a product of six in the first thrown and a sum of eight in the second throw.

8. A light inextensible string passes over a smooth pulley and carries masses 4kg and 3kg at its ends. If the masses are released from rest, calculate:
   a. their acceleration b. their speed after 3 seconds

PART B

PART 1 – PURE MATHEMATICS [60MKS]

ANSWER FIVE QUESTIONS. EACH QUESTION CARRIES EQUAL MARKS. YOU MUST ANSWER AT LEAST ONE QUESTIONFROM EACH PART.

9a. Given that $\int_{-1}^{m}(2x^2 - x - 3)dx = \frac{-9}{2}$, where m is an interger, find the value of m.

b. Solve $2(\log_3 x - 1) = \log_3 x$ and $y = \sqrt{x} + 1$ simultaneously.

10a. Given that ${}^8C_x$, ${}^7C_x$ and $\frac{7}{6}({}^6C_x)$ form the first three consecutive terms of an exponential sequence (G.P), find

a. The value of x b. commom ratio of the sequence c. sum of the first ten terms

11a. Express $\frac{5+\sqrt{2}}{3-\sqrt{2}} - \frac{5-\sqrt{2}}{3+\sqrt{2}}$ in the form $a + b\sqrt{2}$.

b. Solve the following equations simultaneously using the determinant method:

$3x - y - z = -2$

$x + 5y + 2z = 5$

$2x + 3y + z = 0$

STATISTICS AND PROBABILITY

12. The table below shows the frequency distribution of the intelligence quotients (I.Q) x of students in an institution.

X	82-85	86-89	90-93	94-97	98-101	102-105	106-109	110-113
F	6	19	32	49	71	92	75	56

a. Calculate, correct to the nearest whole number and using an assumed mean of 99.5.

i. The mean (correct to 2 d.p)

ii. Standard deviation (correct to 2 d.p)

b. If a student is randomly selected, what is the probability that his I.Q is at least 94? Correct to 2 d.p

13a. In how many ways can a committee of 3 students be formed from a class of 15 students

b. The probability that a person gets a reaction from a new drug in the market is 0.001. If 3000 people are treated with the drug, use Poisson probability distribution to find the probability that

i. Exactly four people will get a reaction

ii. More than two persons will get a reaction

Give your answer to 3.d.p

VECTIOR AND MECHANICS

14a. A body p of mass qkg is suspended by two light inextensible strings AB and DB attached to a horizontal table.
The strings are inclined at 30^0 and 60^0 respectively to the horizontal and the tension in AB is 48N. if the system is in equilibrium:

(i) Sketch a diagram to represent the information;
(ii) Calculate the tension in DB
(iii) Find the value of q. [take g = 10m/s^2]

b.A ball is thrown vertically upwards with a velocity of 20m/s. Find, correct to two decimal places the:

i. Maximum height reached by the ball;
ii. Time taken to reach the maximum height. [take g = 10m/s^2]

15a. Given that m = (6i + 8j) and n = (-8i + 7/8j), find the :

i. Magnitude and directions of m and n;
ii. Angle between m and n.

b.The position vectore of points P,Q,R,S are $\begin{pmatrix}-2\\3\end{pmatrix}$, $\begin{pmatrix}10\\4\end{pmatrix}$, $\begin{pmatrix}3\\12\end{pmatrix}$ and $\begin{pmatrix}4\\0\end{pmatrix}$ respectively. Show that $\overrightarrow{PQ}$ is perpendicular to $\overrightarrow{RS}$

1. A
2. C
3. A
4. B
5. C
6. B
7 C
8 B
9 B
10 C
11 B
12 C
13 C
14 A
15 D
16 C
17 C
18 A
19 D
20 A
21 C
22 C
23 D
24 C
25 D
26 D
27 C
28 D
29 B
30 D
31 B
32 B
33 D
34 B
35 B
36 C
37 C
38 D
39 D
40 B