KITH AND KIN INTERNATIONAL COLLEGE

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

THIRD TERM EXAMINATION 2024/2025 ACADEMIC SESSION



|  |  |
| --- | --- |
| **NAME** |  |
| **SUBJECT** |  **FURTHER MATHEMATICS** | **CLASS** | **SS 1** | **DURATION** | **2 HOURS** |

**THEORY**

**(100 Marks)**

**INSRUCTIONS**

1. **Write your name in the space provided at the top of this question.**
2. **This paper is divided into two Parts: A and B.**
3. **Answer 10 questions; all in Part A, and 2 questions from Part B.**

**PART A**

 **Attempt all questions in this part.**

1. If$ 2^{2x -3y }=32 $and$ log\_{y} x=2$, find the values of $x$ and$ y$**. WAEC 2006/2 (5 marks)**
2. A binary operation **A** is defined on the set of real numbers, **R**, by$ a ∆ b=a^{3}-b^{3}$ . Without using calculator, find the value of $\left(\sqrt{3}+ \sqrt{2} \right) ∆ \left(\sqrt{3}-\sqrt{2} \right)$ leaving the answer in surd form.

**WAEC 2015/1 (5 marks)**

1. (a) Express $\frac{2\sqrt{2}}{\sqrt{48} - \sqrt{8} - \sqrt{27} }$ in the form$ p+q\sqrt{r}$, where $p,q$ and $r$ are rational numbers.
2. (b) If$ V=Alog\_{10}\left(M+N\right)$, express $N$ in terms of $M,V$ and $A$**. WAEC 2010/1 (5 marks)**
3. Solve $2^{\left(2y+2\right)}-9\left(2^{y}\right)=-2$ **WAEC 2011/4 (5 marks)**
4. Solve: **tan (2**$x-$**15)°**$-1=0$, for values of $x$ such that  $0°\leq x\leq 360°$ **WAEC 2015/4 (5 marks)**
5. The position vectors of points **A**, **B** and **C** are $i+5j, 3i+9j$ and $-i+j$ respectively.
6. Show that points **A**, **B** and **C** are collinear;
7. Determine the ratio $\left|AB\right|: \left|BC\right|$ **WAEC 2011/4 (5 marks)**
8. The management of a National Petroleum Cooperation intends to assign four different tankers at different depots **A**, **B**, **C** and **D** to four distribution outlets **I, II, III** and **IV**. The assignment costs are shown in the matrix below in thousands of naira.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | I | II | III | IV |
| A | 15 | 18 | 16 | 17 |
| B | 13 | 17 | 12 | 10 |
| C | 19 | 16 | 14 | 15 |
| D | 12 | 11 | 13 | 18 |

1. Assign depots to distribution outlets that will minimize the total cost.
2. Find the minimum assignment cost. **(5 marks)**

**PART B**

***Answer only two [2] questions only in this part.***

1. (a) The sum of the first $n$ terms of a sequence is given by $ S\_{n}=\frac{5n^{2}}{2}+\frac{5n}{2}$. Write down the first four terms of the sequence and an expression for the nth term.

(b)  A binary operation **\*** is defined on the set of real numbers **R**, by $p$**\***$q$$=$$p$ **+** $q$ **-**$\frac{pq}{2}$, where

$p$**,** $q$$\in R$. Find the inverse of **-1** under **\*** given that the identity clement is zero.

 **WAEC 2008/7 (10 marks)**

1. The table shows the distribution of ages of marks obtained by students in an examination.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Marks |  50 - 54 |  55 – 59 |  60 – 64 |  65 – 69 |  70 - 74 |  75 – 79 |  80 - 84 |  85 – 89 |
| Frequency |  5 |  15 |  20 |  28 |  12 |  9 |  7 |  4 |

 Using an assumed mean of 67, calculate, correct to one decimal place, the :

 (a) mean ;

 (b) standard deviation of the distribution**. WAEC 2019/12 (10 marks)**

1. The coordinates of the vertices of triangle ABC are A(-2, 1), B(4, -2) and C(1, 8) respectively. If D(x, y) is the

 foot perpendicular from A to BC, find

 (a) an equation connecting $x$ and $y$ ;

 (b) the unit vector in the direction of BC. **WAEC 2009/7 (10 marks)**

12. The position vectors of points **A**, **B** and **C** are $i+5j, 3i+9j$ and $-i+j$ respectively.

 (a) Show that points A, B and C are collinear;

 (b) Determine the ratio $\left|AB\right|: \left|BC\right|$ **WAEC 2011/4 (10 marks)**

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| **NAME** |  |
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**OBJECTIVE TEST**

 **(40 marks)**

Answer **all** questions

*Each* question is followed by *four* options lettered **A** to **D**. 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.

1. Given that P and Q are two non-empty subsets

 of the universal set,$ U$.Find P $∩ $(Q $∪$ Q’)

 A. P’

 B. P

 C. Q

 D. Q’

1. If P = $\left\{x:1\leq x\leq 6\right\}$ and Q = $\left\{x:2\leq x\leq 9\right\}$,

 where $x\in $ R, find P$ ∩ $Q

A. $ \left\{x:2\leq x\leq 6\right\}$

 B. $ \left\{x:2\leq x<6\right\}$

 C. $ \left\{x:2<x\leq 6\right\}$

 D. $\left\{x:1\leq x\leq 6\right\}$

3. If $Q$ = (all perfect squares less than 30) and

$ P$ = ( all odd numbers from 1 to 10). Find $Q ∩P.$

 A. $ \left\{1, 4, 9, 16, 25\right\}$

 B. $∅$

 C. $\left\{1, 3 , 4, 5, 7, 9, 16 , 25\right\}$

 D. $ \left\{1, 9\right\}$

4. Simplify $\left(\frac{16}{81}\right)^{\frac{1}{4}} ÷ \left(\frac{9}{16}\right)^{-\frac{1}{2}} $

 A. $-2$

 B. 2

 C.$ - \frac{1}{2}$

 D. $ \frac{1}{2}$

 5. If $16^{3x}= \frac{1}{4}\left(32^{x-1}\right)$ , find the value of $x.$

 A. $ -1$

 B. $ -\frac{1}{3}$

 C. $-\frac{3}{7}$

 D. $-\frac{5}{19}$

6. Simplify $\sqrt{\left(-\frac{1}{64}\right)^{-\frac{2}{3}}}$

* 1. $-4$
	2. $-\frac{1}{4}$
	3. $\frac{1}{8}$
	4. 4

7. If $log\_{3}a-2=3log\_{3}b$. Express $a$ in terms of $b$.

 A. $ a=b^{3}-3$

 B. $a=\frac{b^{3}}{9}$

 C. $ a=b^{3}-9$

 D. $ a=9b^{3}$

8. Given that $log\_{2 }y^{\frac{1}{2}}=$ $log\_{5}125$.

 Find the value of $y.$

1. 16
2. 36
3. 25
4. 64

9. Simplify $(216)^{-\frac{2}{3}}× \left(0.16\right)^{-\frac{3}{2}}$

 A. $ \frac{2}{ 125}$

 B. $ \frac{4}{225}$

 C. $\frac{2}{225}$

 D. $ \frac{125}{288}$

 10. Find the 21st term of the Arithmetic

 Progression (A.P.):  -4, -1.5, 1, 3.5,...

1. 48.5
2. 51
3. 50.5
4. 46

11. Simplify $\left(1-\sin(θ)\right)\left(1+sinθ\right)$

 A. $ sin^{2}θ$

 B. $ sec^{2}θ$

 C. $tan^{2}θ$

 D. $cos^{2}θ$

 12. Solve the inequality;

 $2x^{2}+5x-3\geq 0$

 A. $x\leq -\frac{1}{2}$ or $x\geq 3$

 B. $ -3\leq x\leq $ $\frac{1}{2}$

 C. $ -\frac{1}{2}\leq x\leq 3$

 D. $x\leq -3$ or $x\geq \frac{1}{2}$

13. Two functions f and g are defined by

 $ f:x $→ 3$-1$and $g :x $→ $2x^{3}$evaluate$ fg\left(-2\right)$

 A. $-9$

 B. $ -47$

 C. $ -10$

 D. $-49$

14. The function $f$: $f:x\rightarrow \sqrt{4-2x}$ is defined on

 the set of real numbers R. Find the domain of

 $f.$

 A. $ x<2$

 B. $ x=2$

 C. $x>-2 $

$ D. x\leq 2$

15. Given that $f\left(x\right)=\frac{x+1}{2}, $find $f^{1}\left(-2\right)$

1. $5$
2. $-3$
3. $-\frac{1}{2}$
4. $-5$

16. If $f\left(x\right)=\frac{4}{x}-1, x\ne 0,$ find $f^{-1}\left(7\right)$

 A. $ \frac{-3}{7}$

 B. 0

 C. 1

 D. $\frac{1}{2}$

 17. If $ y=4x-1$, list the range of the

 domain $-2\leq x\leq 2 $where $x$ is an integer.

 A. $ \left\{-9,-1, 2 , 3 , 4\right\}$

 B. $ \left\{-9,-2, 0 , 1 , 7\right\}$

 C. $ \left\{-5,-4 , -3 , -2\right\}$

 D. $ \left\{-9,-5, -1, 3 , 7\right\}$

18. The sum of the first $n$ terms of a linear

 sequence is $ S\_{n}= n^{2}+2n$. Find the

 common difference of the sequence.

 A. 5

 B. 4

 C. 3

 D. 2

19. Given that $\sin(x=\frac{4}{5})$ and $\cos(y)=$ $\frac{12}{13}$ ,

 where $x$ is an obtuse angle and $y$ is an acute

 angle. Find the value of sin $\left(x-y\right).$

1. $\frac{16}{ 65}$

B. $ \frac{48}{65}$

C. $ \frac{56}{65}$

D. $ \frac{63}{65}$

 20. If$ \cos(x=-0.7133)$, find the values of $x$

 between$ 0°$ and $360°$.

 A. 44.5$°$, 224.5$°$

 B. 123.5$°$, 190.5$°$

 C. 135.5$°$, 213.5$°$

 D. 135.5$°$, 224.5$°$

 21. Evaluate:$log\_{10}\left(\frac{1}{3}+\frac{1}{4}\right)+2log\_{10}2+log\_{10}\frac{3}{7}$

 A. $ -3$

 B. 0

 C. $ \frac{5}{6}$

 D. 1

 22. Given that $log\_{2}y^{\frac{1}{2}}=$ $log\_{5}125$. Find the value

 of $y.$

 A. 36

 B. 64

 C. 25

 D. 16

23. Simplify $log\_{3}\left(x-y\right)=1$ and

$ log\_{3 }\left(2x+y\right)=2$, find the value of $x$.

 A. 3

 B. 4

 C. 5

 D. 6

24. Simplify $\frac{1- 2\sqrt{5}}{2 + 3\sqrt{2}}$

 A. $14\left(2\sqrt{2}+6\sqrt{5}-4\sqrt{10}\right)$

 B. $\frac{1}{4}\left(2-3\sqrt{2}-4\sqrt{5} -6\sqrt{10}\right)$

 C. $\frac{1}{14}\left(3\sqrt{2}+4\sqrt{5}-6\sqrt{10}-2\right)$

 D.$ 14\left(2+3\sqrt{2}-6\sqrt{5}+4\sqrt{10}\right)$

 25. Evaluate:  $\frac{cos^{2} 300° - 4sin^{2}120°}{tan^{2}135°}$

 A. $ -3\frac{3}{4}$

 B. $ -2\frac{3}{4}$

 C. $-2\frac{1}{4}$

 D. $-2\frac{1}{4}$

 26.



 g∘h  is

 A.  one- to- one

 B.   onto

 C.  a relation

 D.   a series

 27. Solve: sin $θ=$ tan $θ$

 A.  200°

 B.   0°

 C.  60°

 D.  90°

 28. If $\sin(x= -\sin(70° , 0°<x<360°,))$

 determine the two possible values of $x$

 A. $ 100°, 250°$

 B. $250°, 290°$

 C. $ 200°, 250°$

 D. $ 200°, 290°$

 29. The mean age of $n$ men in a club is 50 years.

 Two men aged 55 and 63 years left the club,

 and the mean age reduced by 1 year. Find the

 value of $n$.

 A.  30

 B.  20

 C.  18

 D.  14

 30.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Age in years | 10 – 14 | 15- 19 | 20 - 24 |  25 - 29 |  30 - 34 |
| Frequency |  6 |  8 |  14 | 10 |  12 |

 Find the mean of the distribution.

 A.  23

 B.  23.4

 C.  24.3

 D.  24.6

 31. Given that the straight lines $kx-5y+6=0$

 and $mx+ny-1=0$ are parallel, find a

 relationship connecting the constants $m,n$ and $ k.$

 A. $ 5n-km=0$

 B. $ 5m+kn=0$

 C. $ 5n+km=0$

 D.  $kn-5m=0$

 32. The line $y=mx-3$  is a tangent to the

 curve $y=1-3x+2x^{3}$ at (1, 0). Find the value

 of the constant $m$.

1. $-4$
2. $ 3$

 C.  $-1$

 D.  $-3$

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Number of babies | 3 | 5 | 6 | 7 | 8 |
| Number of villages | 1 | $$x^{2}$$ | $$x$$ | 3 | 2 |

 The table shows the number of babies born in some villages on a certain day in a district. The mean of the distribution is 6. Use this information to answer questions 39 and 40.

33. Find the median of the distribution

 A. 1

 B. 2

 C. 3

 D. 6

34. Find the mode of the distribution

 A. 6

 B. 5

 C. 4

 D. 3

35. Find the equation of the line passing through

 $\left(0,-1\right)$ and parallel to the y- axis.

 A.  $y=-1$

 B.  $y=0$

 C.  $x=0$

 D.   $x=-1$

36. A line passes through the origin and the

 point $\left(1\frac{1}{4}, 2\frac{1}{2}\right)$, what is the gradient of the line?

 **A.**  1

 **B.**  2

 **C.**  3

 **D.**  4

**37.** If $x=i-3j$ and $y=6i+j$, calculate the angle

between $x$ and $y$.

 A.  60°

 B.  75°

 C.  81°

 D.  85°

38. Given that $ r=2i-j$, $s=3i+5j$ and $t=6i-2j$,

 find the magnitude of $2r+s-t$.

 A.  $\sqrt{15}$

 B.   4

 C. $ \sqrt{24}$

 D.  $\sqrt{26}$

39. Find the distance between the points (2, 5) and

 (5, 9).

 A.   4 units

 B.  5 units

 C.  12 units

 D.  14 units

40. Solve $9^{2x+1}=81^{3x-2}$

 A. $-\frac{5}{4}$

 B. $-\frac{2}{3}$

 C. $ \frac{5}{4}$

 D. $\frac{3}{2}$