



CELLULE D'APPUI A L'ACTION PEDAGOGIQUE
 ANTENNE REGIONALE DU NORD OUEST

BP 2183 MANKON BAMENDA
 TEL 233 362 209
 Email : trubamenda@yahoo.co.uk

P.O. BOX: 2183 MANKON BAMENDA
 TEL 233 362 209
 Email : trubamenda@yahoo.co.uk

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<p>The Teachers' Resource Unit and the Regional Inspectorate of Pedagogy, in collaboration with MTA</p>	<p>SUBJECT CODE NUMBER 0770</p>	<p>PAPER NUMBER 1</p>
<p>GENERAL CERTIFICATE OF EDUCATION REGIONAL MOCK EXAMINATION</p>		<p>SUBJECT TITLE PURE MATHEMATICS WITH STATISTICS</p>
<p>CANDIDATE NAME: CANDIDATE NUMBER: CENTRE NUMBER:</p>		
<p>ADVANCED LEVEL</p>		

Time Allowed: One and a half hours
INSTRUCTIONS TO CANDIDATES:

Mobile phones are **NOT ALLOWED** in the examination room.

1. USE A SOFT HB PENCIL THROUGHOUT THIS EXAMINATION.
2. DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO.

Before the Examination begins:

3. Check that this question booklet is headed "Advanced level - 0765 code and subject title Pure Mathematics with mechanics Paper 1".
4. Insert the information required in the spaces above.
5. Without opening the booklet, pull out the answer sheet carefully from inside the front cover of this booklet. Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.
6. Insert the information required in the spaces provided on the answer sheet using your HB pencil.

Candidate Name, Centre Number, Candidate Number, Subject Code Number, and Paper number

How to answer questions in this examination:

7. Answer ALL the 50 questions in this examination. All questions carry equal marks.
8. Non-programmable calculators are allowed.
9. For each question there are four suggested answers, A, B, C and D. Decide which answer is correct. Find the number of the question on the Answer Sheet and draw a horizontal line across the letter to join the square brackets for the answer you have chosen. For example, if C is your correct answer, mark C as shown below:
 [A] [B] [C] [D]
10. Mark only one answer for each question. If you mark more than one answer, you will score zero for that question. If you change your mind about an answer, erase the first mark carefully, and then mark your new answer.
11. Avoid spending much time on any question. If you find a question difficult, move to the next question. You can come back to this question later.
12. Do all rough work in this booklet using, where necessary, the blank spaces in the question booklet.
13. You must not take this booklet and answer sheet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.

1. The polynomial $x^2(x-1) - 3(x+2)$ when divided by $(x-2)$ leaves the remainder:

- A -12
- B -8
- C 8
- D 0

2. If the roots of the equation $2x^2 - 3x - 3 = 0$ are α and β then the value of $\alpha^3\beta + \alpha\beta^3$ is:

- A $-\frac{9}{8}$
- B $-\frac{63}{8}$
- C $\frac{63}{8}$
- D $\frac{9}{8}$

3. Given that $\frac{5x}{(x+2)(x-3)} \equiv \frac{a}{x+2} + \frac{b}{x-3}$ the values of a and b are:

- A $a = 2, b = 3$
- B $a = -2, b = 3$
- C $a = 2, b = -3$
- D $a = -2, b = -3$

4. Given that the function f is such that $f(-x) = f(x)$, a true statement is:

- A the graph of $y = f(x)$ is symmetrical about the line $y = 0$
- B the graph of $y = f(x)$ is symmetrical about the line $y = x$.
- C the graph of $y = f(x)$ is symmetrical about the origin
- D the graph of $y = f(x)$ is symmetrical about the $x = 0$

5. $2(3^3) + 3^3 =$

- A $6^3 + 3^3$
- B 3^9
- C $2(3^6)$
- D 3^4

6. The function $g(x) = x^3 + 3x^2 - 9x + 10$ is strictly increasing within the range:

- A $]-\infty, -3[\cup]1, +\infty[$
- B $]-3, 1[$
- C $]-\infty, -3] \cup]1, +\infty[$
- D $[-3, 1]$

7. Given the two statements p and q where

p : Ngwa lives in Douala

q : Ngwa speaks French

The proposition "It is not true that Ngwa speaks French and does not live in Douala" in symbolic form is:

- A $q \wedge \sim p$
- B $\sim(\sim q \vee p)$
- C $\sim q \wedge \sim p$
- D $\sim(q \wedge \sim p)$

8. The coefficient of the term in x^4 in the expansion of

$(x - \frac{1}{x})^{10}$ is:

- A -960
- B -120
- C 120
- D 960

9. The length of the tangent from the point $(-3, -2)$ to the circle

$$x^2 + y^2 - 4x - 2y + 1 = 0$$
 is:

- A $\sqrt{4}$ units
- B $\sqrt{30}$ units
- C $\sqrt{34}$ units
- D $\sqrt{38}$ units

10. If α is a periodic function with period 4 where $\alpha(x) = \begin{cases} 4-x^2, & 0 \leq x \leq 2 \\ x-2, & 2 \leq x \leq 4 \end{cases}$ then $\alpha(-1) =$

- A 1
- B 0
- C 3
- D -5

11. The value of m for which the function $h(x) = \begin{cases} 2m-x^2, & 0 \leq x < 3 \\ 2x-1, & 3 \leq x \leq 5 \end{cases}$ is continuous is:

- A 3
- B 4
- C 5
- D 7

12. The value of $(\log_3 32)(\log_4 81)$ is:

- A 20
- B 10
- C $\frac{\log 3}{\log 2}$
- D $(\log 2)(\log 3)$

13. The sum of the first n terms of a sequence is $\frac{n}{2}(3n+1)$. The 10th term of the sequence is:

- A 32
- B 29
- C 126
- D 155

14. The relation R defined on the set $\{1, 2, 3\}$ as $R = \{(1, 1), (2, 2), (2, 3), (3, 2)\}$ is:

- A reflexive
- B transitive
- C symmetric
- D anti-symmetric

15. The number of arrangement of the letters of the word BANANA in which the A's are together is:

- A 60
- B 48
- C 24
- D 12

16. A family consists of a father, mother and four children. The number of ways a friend can invite three members of this family to a party if at least one parent must be invited is:

- A 4
- B 12
- C 16
- D 20

17. An arc of a circle of radius 4cm subtends an angle of 60° at the centre of the circle. The length of the arc is:

- A 4.19cm
- B 8.34cm
- C 16.76cm
- D 25.13cm

18. $\frac{\sin 2\theta}{1 - \cos 2\theta} =$

- A $\tan \theta$
- B $\cot \theta$
- C $2 \tan \theta$
- D $\cos \theta$

19. $\lim_{x \rightarrow \infty} \frac{2x^2 + 3x - 200}{3x^2 + 2x + 1}$

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

20. If $y = \sin x^2$ then $\frac{dy}{dx} =$
- A $2x \sin x^2$
 - B $2x \cos x^2$
 - C $2 \cos x^2$
 - D $2 \sin x^2$

21. The equation of the normal to the curve defined by $x = 3t + 1$, $y = t^2$ at the point where $t = -1$ is:
- A $3x - 2y + 8 = 0$
 - B $2x + 3y + 1 = 0$
 - C $2x - 3y + 7 = 0$
 - D $3x + 2y + 4 = 0$

22. Given that $y = c\sqrt{x}$, where c is a constant, the percentage error in the value of y if an error of 2% is made in the measurement of x is:
- A 1.5%
 - B 1%
 - C 2%
 - D 2.5%

23. The image of the line $3x - 2y - 6 = 0$ under the transformation represented by matrix $\begin{pmatrix} 3 & 0 \\ 1 & 2 \end{pmatrix}$ is:
- A $3x - 4y - 24 = 0$
 - B $3x + 4y + 18 = 0$
 - C $4x - 3y - 18 = 0$
 - D $3x - 4y + 24 = 0$

24. $\int_1^2 \frac{x}{x^2+1} dx =$
- A $\frac{1}{2} \ln \left(\frac{2}{5}\right)$
 - B $\frac{1}{2} \ln \left(\frac{5}{2}\right)$
 - C $\frac{1}{2} \ln \left(\frac{2}{3}\right)$
 - D $\frac{1}{2} \ln \left(\frac{3}{2}\right)$

25. The volume of solid generated when the area in the first quadrant bounded by the curve $y = \sqrt{x+2}$, and the lines $x = 0$ and $x = 2$ is rotate completely about the x -axis is:
- A 2π
 - B 4π
 - C 8π
 - D 6π

26. The solution of the differential equation $x \frac{dy}{dx} = 3y$ given that $y = 4$ when $x = 1$ is:
- A $y = 3 \ln x + 4$
 - B $y = 3 \ln x$
 - C $y = x^3$
 - D $y = 4x^3$

27. The shortest distance from the point $(1, 2)$ to the line $y = 2x + 3$ is:
- A $\frac{3}{\sqrt{5}}$ units
 - B $\frac{3}{5}$ units
 - C $\frac{7}{\sqrt{5}}$ units
 - D $\frac{7}{5}$ units

28. The maximum value of the expression $\frac{4}{5-3\cos x}$ is:
- A 2
 - B 4
 - C 0.5
 - D 1

29. Expressed in the form $x + iy$, the complex number $4 \left(\cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4} \right)$ becomes:

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

30. Given that the vectors u and v are such that $|u| = 3|v| = 5$ units and that $u \cdot v = -14$, the value of $|u + v|$ is:
- A $\sqrt{62}$ units
 - B $\sqrt{6}$ units
 - C 6 units
 - D 62 units

31. When reduced to a linear relationship, the relation $y = ae^{bx}$ becomes:
- A $y = ax + b$
 - B $y = \ln a + bx$
 - C $\ln y = \ln a + b \ln x$
 - D $\ln y = \ln a + bx$

32. Given that 3.40 is an approximation to a root of the equation $x^2 - 3x - 2 = 0$, a better approximation of the root using Newton-Raphson method is:
- A 3.50
 - B 3.23
 - C 3.57
 - D 3.56

33. The cofactor of -3 in the matrix $\begin{pmatrix} 2 & -1 & 0 \\ -2 & 1 & -3 \\ 3 & 4 & -1 \end{pmatrix}$ is:
- A 11
 - B -5
 - C -11
 - D 2

34. The range of values of x for which $\frac{3-x}{x+1} > 1$ is
- A $x < 1$
 - B $-1 < x < 1$
 - C $x < -1 \cup x > 1$
 - D $-1 < x \cup x > 3$

35. The points P and Q have coordinates $(2, 1, -4)$ and $(-2, 4, -2)$ respectively. The direction ratios of the line passing through P and Q are:
- A $\frac{4}{29}, \frac{3}{29}, \frac{2}{29}$
 - B $\frac{2}{21}, \frac{1}{21}, \frac{4}{21}$
 - C $\frac{4}{\sqrt{29}}, \frac{3}{\sqrt{29}}, \frac{2}{\sqrt{29}}$
 - D $\frac{2}{\sqrt{21}}, \frac{1}{\sqrt{21}}, \frac{4}{\sqrt{21}}$

36. The variable X has the following frequency distribution:

x	11 - 15	16 - 20	21 - 25	26 - 30
Freq	4	6	10	11

The modal class of the distribution is

- A 11 - 15
- B 16 - 20
- C 21 - 25
- D 26 - 30

37. A hypothesis test which looks for a positive change in a population parameter may be called:
- A a two-tailed test
 - B a one-tailed test
 - C a positive change test
 - D a right and left hand test

38. A discrete random variable has probability mass function

$$p(x) = \begin{cases} ax^2, & x = 0, 1, 2, 3 \\ 0, & \text{otherwise} \end{cases}$$

The value of the constant a is:

- A $\frac{5}{6}$
- B $\frac{5}{14}$
- C $\frac{5}{5}$
- D $\frac{15}{14}$

39. Two judges rank six dance groups in a competition as shown in the table

Group	A	B	C	D	E	F
Judge 1	6	5	4	3	2	1
Judge 2	4	6	2	3	5	1

The Spearman's rank correlation coefficient for the data is:

- A $\frac{7}{55}$
- B $\frac{18}{35}$
- C $\frac{17}{35}$
- D $-\frac{18}{35}$

40. Given that $X \sim \text{Bin}\left(n, \frac{2}{5}\right)$ and that $E(X) = \frac{32}{5}$, the value of n is:

- A 16
- B 10
- C 8
- D 4

41. If for a set of bivariate data the least squares regression lines are $y = 0.27x + 0.6$ and $x = 3y + 2$, then the product moment correlation coefficient is:

- A -0.81
- B -0.90
- C 0.90
- D 0.81

42. A and B are two events such that $P(A) = \frac{3}{4}$, $P(B) = \frac{2}{3}$ and $P(A \cap B) = \frac{7}{12}$. The probability that only one of the two will occur is:

- A $\frac{1}{4}$
- B $\frac{1}{6}$
- C $\frac{11}{12}$
- D $\frac{5}{6}$

43. The variance of a set of numbers is 72. If 4 is subtracted from each of the number, the variance of the resulting set of numbers is:

- A 68
- B 56
- C 76
- D 72

44. The number of buses passing through a certain junction within 3 hours is a Poisson variable with mean 2. The

probability that at least 2 busses will pass the junction within 3 hours is:

- A $5e^{-2}$
- B $1 - 3e^{-2}$
- C $1 - 5e^{-2}$
- D $3e^{-2}$

45. The covariance of the set of bivariate data $\{(2,2), (0,2), (3,1), (1,1), (2,3)\}$ is:

- A -11.6
- B 11.6
- C 0.08
- D -0.08

46. The significance level of a test is associated with the probability assigned to:

- A rejecting the null hypothesis
- B rejecting the alternative hypothesis
- C accepting the null hypothesis
- D accepting the alternative hypothesis

47. A sample of size 10 taken from a population gives the following summary of statistics:

$\sum x = 130$, and $\sum x^2 = 2610$. Using this sample the unbiased estimate for the population variance is:

- A 102.0
- B 102.2
- C 10.2
- D 84

48. X and Y are independent random variables such that $\text{Var}(X) = 2$ and $\text{Var}(Y) = 18$. The variance of the variable $Z = Y - 2X$ is:

- A 20
- B 10
- C 36
- D 26

49. Given the frequency distribution

x	20-23	24-27	28-31	32-35	36-39
f	8	10	15	13	6

An estimate of the lower quartile of the distribution is:

- A 25.0
- B 25.5
- C 26.0
- D 26.5

50. A random sample of size 4 is drawn from a population whose variance is 9. The sample mean is found to be 20. The 95% confidence interval for the population mean is:

- A (18.77, 21.23)
- B (18.53, 21.47)
- C (17.53, 22.47)
- D (17.06, 22.94)

END