Additional Mathematics 1
0575

GENERAL CERTIFICATE OF EDUCATION BOARD
General Certificate of Education Examination

Centre Number	
Centre Name	
Candidate Identification Number	
Candidate Name	

Mobile phones are NOT allowed in the examination room.

MULTIPLE CHOICE QUESTION PAPER

Duration: One and a Half Hours

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you start answering the questions in this paper. Make sure you have a soft HB pencil and an eraser for this examination.

1. USE A SOFT HB PENCIL THROUGHOUT THE 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 "ORDINARY LEVEL – 0575 ADDITIONAL MATHEMATICS 1"

4. Fill in the information required in the spaces above.

5. Fill in the information required in the spaces provided on the answer sheet using your HB pencil:
   Candidate Name, Exam Session, Subject Code and Candidate Identification Number.
   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.

How to answer the questions in this examination

6. Answer **ALL** the **50** questions in this Examination. All questions carry equal marks.

7. **Non-programmable Calculators are allowed, but formulae booklets are NOT allowed.**

8. Each question has FOUR suggested answers: **A, B, C** and **D**. Decide which answer is appropriate. 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]

9. Mark only one answer for each question. If you mark more than one answer, you will score a zero for that question. If you change your mind about an answer, erase the first mark carefully, then mark your new answer.

10. Avoid spending too much time on any one question. If you find a question difficult, move on to the next question. You can come back to this question later.

11. Do all your rough work in this booklet using the blank spaces in the question booklet.

12. **At the end of the examination, the invigilator shall collect the answer sheet first and then the question booklet. DO NOT ATTEMPT TO LEAVE THE EXAMINATION HALL WITH IT.**

_____Turn Over

1. $\left(\frac{1}{3}\right)^{-1}$ is the same as:

   A $\quad \frac{1}{3}$

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

   C $\quad 3$

   D $\quad -3$

2. $\log\left(\frac{p}{q}\right) =$

   A $\quad \log p - \log q$

   B $\quad \log p + \log q$

   C $\quad \frac{\log p}{\log q}$

   D $\quad (\log p) \times (\log q)$

3. $\left(1 + 3\sqrt{2}\right)\left(1 - 3\sqrt{2}\right) =$

   A: $\quad -35$

   B: $\quad -17$

   C: $\quad 17$

   D: $\quad 35$

4. The sum of the roots of the equation $bx^2 - cx + a = 0, where \ b \neq 0$, is:

   A $\quad \frac{c}{b}$

   B $\quad \frac{a}{b}$

   C $\quad -\frac{a}{b}$

   D $\quad -\frac{b}{a}$

5. Given that $(x - 2)$ is a factor of the polynomial $x^3 - kx^2 - 5x + 10$, the value of k is:

   A: $\quad 5$

   B: $\quad 2$

   C: $\quad -2$

   D: $\quad -5$

6. The value of p for which the quadratic equation $x^2 - px + 16 = 0$ has equal roots is:

   A $\quad 8$

   B $\quad 16$

   C $\quad 32$

   D $\quad 64$

7. The value of k when the polynomial $x^3 + kx^2 - 3x + 1$ is divisible by $(x - 1)$ is:

   A: $\quad 3$

   B: $\quad 1$

   C: $\quad -3$

   D: $\quad 0$

8. Given that $f(x) = x^3 + 2x^2 - x - 2$. The remainder when $f(x)$ is divided by $(x - 2)$ is:

   A $\quad -20$

   B $\quad -4$

   C $\quad 0$

   D $\quad 12$

9. Given that $T_n = (-1)^{n-1} 3^n$ is the nth term of a sequence, then $T_2 =$

   A $\quad 9$

   B $\quad 6$

   C $\quad -6$

   D $\quad -9$

10. The geometric mean of 1 and $\frac{4}{9}$ is:

    A $\quad \frac{2}{3}$

    B $\quad \frac{13}{9}$

    C $\quad \frac{4}{9}$

    D $\quad \frac{4}{3}$

11. Given that the fourth term of an arithmetic progression is 12 with first term -3, the value of the common difference is:

    A: $\quad 15$

    B: $\quad 9$

    C: $\quad 5$

    D: $\quad 3$

12. Given that the sum to infinity of a geometric progression with common ratio $\frac{1}{3}$ is 9, the first term is:

    A $\quad 27$

    B $\quad 6$

    C $\quad 4$

    D $\quad 3$

13. The number of terms in the binomial expansion of $(1 + 3x)^9$ is:

    A $\quad 9$

    B $\quad 10$

    C $\quad 12$

    D $\quad 27$

14. The first three terms of the binomial expansion of $(1 + x)^{-2}$ are:
   - A $\quad 1 + 2x + 3x^2$
   - B $\quad 1 - 2x + 3x^2$
   - C $\quad 1 + 2x - 3x^2$
   - D $\quad 1 - 2x - 3x^2$

15. The number of ways in which the letters of the word "**CORONA**" can be arranged is:
   - A $\quad 6!$
   - B $\quad \dfrac{6!}{2!}$
   - C $\quad \dfrac{6!}{2!\,2!}$
   - D $\quad \dfrac{4!}{2!}$

16. In how many ways can 2 boys be selected from a class of 5 boys?
   - A $\quad 120$
   - B $\quad 60$
   - C $\quad 20$
   - D $\quad 10$

17. The quadrants in which $tan x$ is positive are:
   - A $\quad$ First and second
   - B $\quad$ Second and Third
   - C $\quad$ First and third
   - D $\quad$ First and Fourth

18. $1 - 2sin^2 x \equiv$
   - A $\quad sin2x$
   - B $\quad cos2x$
   - C $\quad \cos^2 x + 1$
   - D $\quad \cos^2 x - 1$

19. The exact value of $sin120°$ is:
   - A $\quad \dfrac{1}{2}$
   - B $\quad -\dfrac{1}{2}$
   - C $\quad \dfrac{\sqrt{3}}{2}$
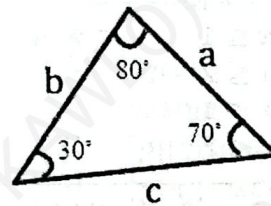   - D $\quad -\dfrac{\sqrt{3}}{2}$

20. The length of the minor arc AB that subtends an angle θ at the centre of the circle with radius r is given as:
   - A $\quad r\theta$
   - B $\quad \dfrac{1}{2}r\theta$
   - C $\quad r^2\theta$
   - D $\quad \dfrac{1}{2}r^2\theta$

21. The maximum value of $y = 3\sin x$ is:
   - A $\quad 3$
   - B $\quad -1$
   - C $\quad 1$
   - D $\quad -3$

22.

From the diagram, $a =$
   - A $\quad a = \dfrac{b \sin 30°}{\sin 70°}$
   - B $\quad a = \dfrac{c \sin 30°}{\sin 70°}$
   - C $\quad a = \dfrac{b \sin 80°}{\sin 30°}$
   - D $\quad a = \dfrac{c \sin 80°}{\sin 30°}$

23. The points P and Q have coordinates $(4, 2)$ and $(6, -4)$ respectively. The coordinates of the midpoint of PQ is:
   - A $\quad (5, 1)$
   - B $\quad (-5, 1)$
   - C $\quad (5, -1)$
   - D $\quad (-5, -1)$

24. The tangent of the acute angle between the line $y = 3x + 2$ and the $x\text{-}axis$ is:
   - A $\quad 2$
   - B $\quad 3$
   - C $\quad \dfrac{2}{3}$
   - D $\quad \dfrac{3}{2}$

25. The equation of the line which is parallel to $2x - y = 3$ and passing through the point $(1, 0)$ is:
 - A $y = -2x + 2$
 - B $y = 2x - 2$
 - C $y = 2x + 2$
 - D $y = -2x - 2$

26. The perpendicular distance from the point $P(2, -4)$ to the line $4x - 3y = 0$ is:
 - A   25
 - B $\frac{4}{5}$
 - C   4
 - D $\frac{4}{25}$

27. The range of values of x for which $-5 < 1 - 3x \leq 4$ is:
 - A $-2 < x \leq 1$
 - B $-1 < x \leq 2$
 - C $-2 \leq x < 1$
 - D $-1 \leq x < 2$

28. The range of values of x for which $(2x + 1)(x - 2) > 0$
 - A $-\frac{1}{2} < x < 2$
 - B $-2 < x < \frac{1}{2}$
 - C $x < -2 \text{ or } x > \frac{1}{2}$
 - D $x < -\frac{1}{2} \text{ or } x > 2$

29. The values of x for which $|2x - 5| = 7$ are:
 - A -1 and 6
 - B -6 and 1
 - C -6 and -1
 - D 1 and 6

30. Sih went to a shop and bought x pencils at 100FCFA and y exercise books at 300FCFA each. Given that the maximum amount of money she spent was 1200FCFA, the inequality satisfying her expenditure is:
 - A $x + 3y \geq 12$
 - B $x + 3y \leq 12$
 - C $x + 3y < 12$
 - D $x + 3y > 12$

31. The statements "x is at most thrice y" and "y is less than half of x" is represented by the inequalities:
 - A $3x \geq y, 2y < x$
 - B $x \leq 3y, 2y < x$
 - C $3x \leq y, 2y < x$
 - D $x \geq 3y, 2y < x$

32. Given that the functions, f and g are defined by $f(x) = x - 3$ and $g(x) = x^2 - 1$, $fg(x) =$
 - A $x^2 - 2$
 - B $x^2 - 4$
 - C $x^2 - 6x + 8$
 - D $x^2 - 6x + 9$

33. The function, f is defined by
$$f: \mapsto \begin{cases} 1 - 2x, & \text{for } x > 0 \\ 3x, & \text{for } x \leq 0 \end{cases}$$
Then $f(-2) =$
 - A -3
 - B -6
 - C 5
 - D 6

34. The function, f is defined by $f: x \mapsto 3x + 2$, then $f^{-1}(11)$ is:
 - A -4
 - B -3
 - C 3
 - D 4

35. A linear transformation, T is defined by $T: (x, y) \mapsto (x - 2y, y)$. The 2×2 matrix representing T is:
 - A $\begin{pmatrix} -2 & 1 \\ 0 & 1 \end{pmatrix}$
 - B $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$
 - C $\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$
 - D $\begin{pmatrix} -2 & -1 \\ 0 & 1 \end{pmatrix}$

36. Given that the matrix $M = \begin{pmatrix} 3 & 2 \\ 5 & 4 \end{pmatrix}$, the determinant of $2M$ is:
 - A   2
 - B   4
 - C   8
 - D   16

37. An invariant line under the transformation, T, defined by the matrix $\begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$ is:

A $x + y = 0$
B $2x - y = 0$
C $x - y = 0$
D $2x + y = 0$

38. The binary operation * is defined over the set of real numbers as $x * y = (2x + 3y)(mod\ 7)$, $5 * 6 =$

A   2
B   0
C   4
D   6

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*	a	b	c	d
a	a	b	c	d
b	b	a	d	c
c	c	d	a	b
d	d	c	b	a

Given the operation table above, the set $S = \{a, b, c, d\}$ forms a group under *. The inverse of b is:

A   a
B   b
C   c
D   d

40.

*	a	b	c	d
a	b	c	d	a
b	c	d	a	b
c	d	a	b	c
d	a	b	c	d

The set $S = \{a, b, c, d\}$ forms a group under the operation *. A sub group under the operation * is:

A $\{(a,b), *\}$
B $\{(a,c), *\}$
C $\{(c,d), *\}$
D $\{(b,d), *\}$

41. The vector equation of the line segment passing through the points $(2, 1)$ and $(-1, 7)$ is:

A $r = 2i + j + \lambda(-i + 7j)$
B $r = 2i + j + \lambda(-3i + 6j)$
C $r = 2i + j + \lambda(3i + 6j)$
D $r = 2i + j + \lambda(-3i - 6j)$

42. The vector equation of a line is given by $r = i - 5j + t(3i - 4j)$ The direction vector is:

A $2i - j$
B $3i - 4j$
C $2i + j$
D $-2i - j$

43. $p \cdot q =$
A $pq\cos\theta$
B $pq\sin\theta$
C $|p||q|\sin\theta$
D $|p||q|\cos\theta$

44. If the vectors $a = 2pi - 3j$ and $b = 3i + 8j$ are perpendicular, then the value of p is:
A   4
B   6
C $\frac{3}{2}$
D $-\frac{9}{16}$

45. $\frac{d}{dx}(5x^2) =$
A: $10x^2$
B: $\frac{5}{3}x^3$
C: $10x$
D: $\frac{3}{5}x^3$

46. $\frac{d}{dx}(\cos 5x) =$
A $sin5x$
B $5sin5x$
C $-5sin5x$
D $-sin5x$

47. The gradient of the tangent to the curve
$y = x^2 + 2x$ at the point $(1, 0)$ is:

    A   0
    B   2
    C   3
    D   4

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48. $\int (x^2 - 2)\, dx$

    A: $x^3 - 2x + k$

    B: $\dfrac{x^3}{3} + k$

    C: $x^3 + k$

    D: $\dfrac{x^3}{3} - 2x + k$

[where k is an arbitrary constant]

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49. $\int \cos ax\, dx =$

    A: $a \sin ax + k$

    B: $-a \sin ax + k$

    C: $\dfrac{1}{a} \sin ax + k$

    D: $-\dfrac{1}{a} \sin ax + k$

[where k is an arbitrary constant]

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50. The area bounded by the curve $y = 3x^2$, the $x-axis$, in the range $1 \leq x \leq 2$ is:

    A   5
    B   7
    C   8
    D   9

STOP
GO BACK AND CHECK YOUR WORK