GENERAL CERTIFICATE OF EDUCATION (GCE) BOARD

General Certificate Of Education Examination

0575 ADDITIONAL MATHEMATICS 1

JUNE 2021 **ORDINARY LEVEL**

Centre Number	Edukamer
Centre Name	
Candidate Identification Number	
Candidate Name	

Mobile phones are NOT allowed in the examination room.

MULTIPLE CHOICE QUESTION PAPER

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.
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. $\frac{1}{a^n}$ is the same as:

A a^n
B a^{-n}
C $\sqrt[n]{a}$
D $a^{-\frac{1}{n}}$

2. Given that $\log_q p = r$ then:

A $p = q^r$
B $q = p^r$
C $p = rq$
D $q = rp$

3. $\sqrt{54}$ is the same as:

A $9\sqrt{6}$
B $9\sqrt{2}$
C $6\sqrt{2}$
D $3\sqrt{6}$

4. Given that α and β are roots of the quadratic equation $3x^2 + 2x - 5 = 0$, then the product of the roots is:

A $\frac{5}{3}$
B $\frac{2}{3}$
C $-\frac{2}{3}$
D $-\frac{5}{3}$

5. The condition for which the quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$, has real and distinct roots, where a, b and c are constants is:

A $b^2 - 4ac \geq 0$
B $b^2 - 4ac > 0$
C $b^2 - 4ac = 0$
D $b^2 - 4ac < 0$

6. The quadratic equation whose sum and product of the roots are 4 and -5 respectively is:

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

7. Given that $(x + 2)$ is a factor of $x^3 + kx^2 - 4x - 4$, then the value of k is :

A: -5
B: -1
C: 1
D: 5

8. The remainder when $x^3 + 4x - 7$ is divided by $(x + 1)$ is:

A -12
B -10
C -4
D -2

9. $U_n = \frac{2^{n+1}}{n+1}$, then $U_3 =$

A 1
B 2
C 4
D 8

10. The geometric mean of 4 and 16 is:

A 64
B 20
C 10
D 8

11. $\sum_{r=1}^{5}(r-1) =$

A 6
B 8
C 10
D 15

12. The sum to infinity of a geometric progression with first term 6 and common ratio $\frac{1}{3}$ is:

A 18
B 9
C 3
D 2

13. The first three terms in the binomial expansion of $(1 + x)^{-2}$ are:

A $1 + 2x + 3x^2$
B $1 - 2x + 3x^2$
C $1 + 2x - 3x^2$
D $1 - 2x - 3x^2$

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14. The number of terms in the binomial expansion of $(1 + 3x)^5$ is:

A 8
B 9
C 10
D 11

15. The number of ways in which the letters of the word "**TANGENT**" can be arranged is:

A $7!$
B $\frac{7!}{2!}$
C $\frac{7!}{4!}$
D $\frac{7!}{2!\,2!}$

16. The number of ways in which 5 girls can be selected from a class of 8 girls is:

A $\frac{8!}{5!}$
B $\frac{8!}{3!}$
C $\frac{8!}{5!3!}$
D $\frac{5!}{3!}$

17. $\tan 30° =$

A $\frac{\sqrt{3}}{2}$
B $\frac{1}{2}$
C $\frac{\sqrt{2}}{2}$
D $\frac{\sqrt{3}}{3}$

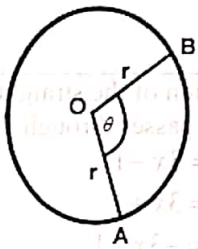
18. 240^0 in radians is:

A $\frac{4\pi}{3}$
B $\frac{5\pi}{3}$
C $\frac{2\pi}{3}$
D $\frac{7\pi}{3}$

19. The quadrant in which $\sin x$ and $\cos x$ are both negative is:

A First quadrant
B Second quadrant
C Third quadrant
D Fourth quadrant

20.



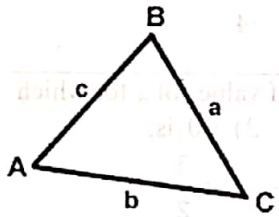
The area of the minor sector OAB of a circle with radius r that subtends an angle θ at the centre, O, is:

A $r\theta$
B $2r\theta$
C $r^2\theta$
D $\frac{1}{2}r^2\theta$

21. $\cos(P - Q) \equiv$

A $\cos P \cos Q + \sin P \sin Q$
B $\cos P \cos Q - \sin P \sin Q$
C $\sin P \cos Q + \sin Q \cos P$
D $\sin P \cos Q - \sin Q \cos P$

22.



From the diagram, the side b is given as:

A $b^2 = a^2 + c^2 - 2bc\cos A$
B $b^2 = a^2 + c^2 - 2ac\cos B$
C $b^2 = a^2 + c^2 + 2ac\cos B$
D $b^2 = a^2 + c^2 + 2bc\cos A$

23. The midpoint of the line joining the points P(3,7) and $Q(5,9)$ is:

A (3,7)
B (4,8)
C (5,9)
D (1,1)

24. The perpendicular distance from the point $(3,7)$ to the line $4x - 3y + 21 = 0$ is:

A $\frac{12}{5}$

B $\frac{12}{25}$

C $\frac{54}{5}$

D $\frac{54}{25}$

25. The equation of the straight line with gradient -3 which passes through the point $(1,-2)$ is:

A $y = 3x - 1$

B $y = 3x + 1$

C $y = -3x + 1$

D $y = -3x - 1$

26. Two lines l_1 and l_2 with gradients m and n respectively are said to be parallel if and only if :

A $m \equiv -n$

B $m \equiv n$

C $mn \equiv 1$

D $mn = -1$

27. The range of values of x for which $-3 + 2x \leq 5$ is:

A $x \leq 4$

B $x \leq -4$

C $x \geq 4$

D $x \geq -4$

28. The range of values of x for which $(2x+3)(x-2) > 0$ is:

A $-2 < x < \frac{3}{2}$

B $-\frac{3}{2} < x < 2$

C $x < -2$ or $x < -\frac{3}{2}$

D $x < -\frac{3}{2}$ or $x > 2$

29. The range of values of x for which $|2x - 3| < 3$ is:

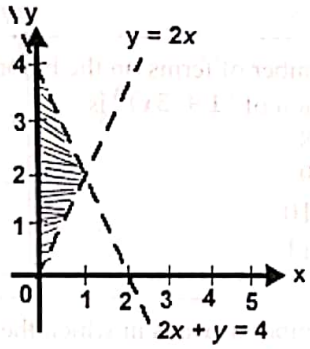
A $x < -3$ or $x > 0$

B $x < 0$ or $x > 3$

C $-3 < x < 0$

D $0 < x < 3$

30.



The set of inequalities that satisfies the shaded region is:

A $\{x \geq 0, y \geq 2x, 2x + y \leq 4\}$

B $\{x \geq 0, y > 2x, 2x + y < 4\}$

C $\{x \geq 0, y \leq 2x, 2x + y \leq 4\}$

D $\{x \geq 0, y < 2x, 2x + y < 4\}$

31. The inequalities that represent the statements "y must be at most $3x$" and "y must be at least $2x$" are:

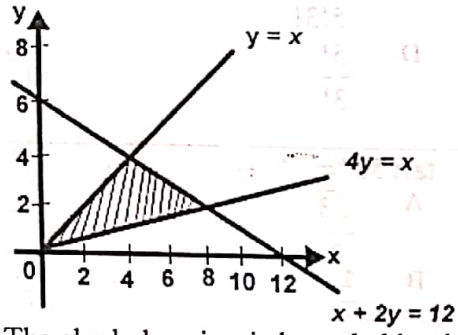
A $y \leq 3x$ and $y \geq 2x$

B $y \leq 2x$ and $y \geq 3x$

C $3y \leq x$ and $2y \geq x$

D $2y \leq x$ and $3y \geq x$

32.



The shaded region is bounded by the inequalities $y \leq x, 4y \geq x$ and $x + 2y \leq 12$. Within the shaded region, the maximum value of the constraint $2x + y$ is:

A 12

B 10

C 16

D 18

33. Given that the functions f and g are such that $f: x \mapsto 2x+1$ and $g: x \mapsto x^2$, where $x \in \Re$, then $gf: x \mapsto$

A $(2x+1)^2$

B $4x^2+1$

C $4x^2+2x+1$

D $2x^2+1$

34. The function, f, is defined by:

$$f(x) = \begin{cases} 2-x, for\ x < 0 \\ 2+x, for\ x \geq 0 \end{cases}$$

The value of $f(-2)$ is:

A -4

B 0

C 2

D 4

35. Given that the matrix $\begin{pmatrix} -1 & 3 \\ 2 & 1 \end{pmatrix}$ is represented by the transformation T then T is:

A $T: (x,y) \rightarrow (-x+2y,\ 3x+y)$

B $T: (x,y) \rightarrow (-x+y,\ 2x+3y)$

C $T: (x,y) \rightarrow (-x+3y,\ 2x+y)$

D $T: (x,y) \rightarrow (-x+3y,\ x+2y)$

36. The image of the point $(3, -2)$ under the transformation, T, where, $T: (x, y) \rightarrow (2x+y, 2x+3y)$ is:

A $(4, 0)$

B $(0, 4)$

C $(4, 12)$

D $(8, 0)$

37. Given that $M = \begin{pmatrix} 2 & 1 \\ 5 & 3 \end{pmatrix}$, then M^{-1} is:

A $\begin{pmatrix} -3 & 5 \\ 1 & -2 \end{pmatrix}$

B $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$

C $\begin{pmatrix} 3 & -1 \\ -5 & 2 \end{pmatrix}$

D $\begin{pmatrix} 3 & -5 \\ -1 & 2 \end{pmatrix}$

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

A 0

B 1

C 5

D 6

39. Given that the binary operation $*$ is defined over the set of real numbers, $\Re$ as $x * y = x + y + 2$. The identity element under this operation is:

A -4

B -2

C 2

D 4

40.

$*$	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 that from the operation table the set $\{a, b, c, d\}$ forms a group under $*$, then the order of the group is:

A 16

B 8

C 4

D 1

41. Given that the vector equation of a line is $r = -3i + 2j + t(-i + 5j)$, then the direction vector of the line is:

A $-3i + 2j$

B $2i + 3j$

C $-4i + 7j$

D $-i + 5j$

42. A unit vector in the direction of a vector $\underline{a}$ is:

A $\dfrac{1}{\underline{a}}$

B $\dfrac{\underline{a}}{|\underline{a}|}$

C $\dfrac{|\underline{a}|}{\underline{a}}$

D $\dfrac{1}{|\underline{a}|}$

43. Given that $\underline{u} = 2\underline{i} - 3\underline{j}$ and $\underline{v} = -\underline{i} + 4\underline{j}$, then $\underline{u}.\underline{v} =$

A -14
B 14
C 10
D -10

44. The vector equation of the line joining the points A and B with position vectors $\underline{a}$ and $\underline{b}$ respectively is:

A $\underline{r} = \underline{a} + t(\underline{b} - \underline{a})$
B $\underline{r} = \underline{b} + t(\underline{b} + \underline{a})$
C $\underline{r} = \underline{b} + t\underline{a}$
D $\underline{r} = \underline{a} + t\underline{b}$

45. $\frac{d}{dx}(3x^2) =$

A $6x$
B $3x$
C x^3
D $3x^3$

46. $\frac{d}{dx}(\cos 2x) =$

A $\sin 2x$
B $-\sin 2x$
C $2\sin 2x$
D $-2\sin 2x$

47. The value of x at which the function $y = 5 + 2x - x^2$ has maximum value is:

A 1
B 2
C 4
D 6

48 $\int x^3 dx =$

A: $3x^2 + k$
B: $\frac{x^3}{3} + k$
C: $\frac{x^4}{4} + k$
D: $x^4 + k$

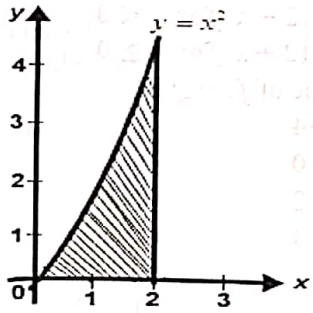
[Where, k is an arbitrary constant of integration]

49. $\int \sin 2x \, dx$

A: $2\cos 2x + k$
B: $-\frac{1}{2}\cos 2x + k$
C: $\frac{1}{2}\sin 2x + k$
D: $-2\sin 2x + k$

[Where, k is an arbitrary constant of integration]

50.



The area bounded by the curve $y = x^2$, and the x-axis in the range $0 \leq x \leq 2$ is:

A 4
B $\frac{4}{3}$
C 8
D $\frac{8}{3}$

GO BACK AND CHECK YOUR WORK