



0575 Additional Mathematics 1

APRIL 2021

ORDINARY LEVEL

CENTRE NO & NAME	Alpha Study Group
Candidate No	040222032023
Candidate Name	www.alstug.com

0575 ADDITIONAL MATHEMATICS 1: MULTIPLE CHOICE QUESTIONS 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.

- USE A SOFT HB PENCIL THROUGHOUT EXAMINATION**
- DO NOT OPEN THIS QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.**

Before the examination begins:

- Check that this question booklet is headed "Ordinary Level-0575 Additional Mathematics 1"
- Insert the information required in the spaces above
- Insert the information required in the provided on the answer sheet using your HB pencil:
Candidate Name, Exam Session, Subject Code, Centre Number and Candidate Number, Take care that you do not crease or fold the answer sheet or make any mark on it other than those asked for in these instructions.

How to answer questions in the examination:

- Answer **ALL** the **50** questions. All questions carry equal marks.
- Calculators are not allowed.
- Each question has **FOUR** suggested answers: **A, B, C and D**. Decide on which answer is correct. Find the number of the question on the answer sheet and draw horizontal line across the letter to join the square bracket to the answer you have chosen.

For example, if C is your correct answer, mark C as shown here.

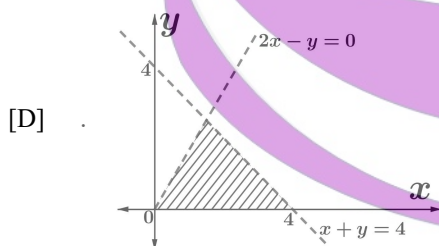
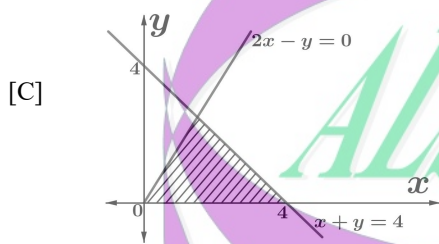
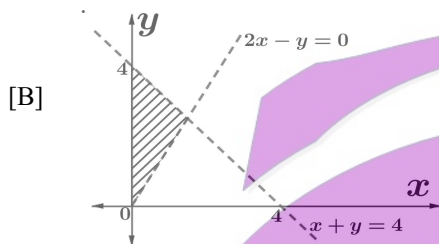
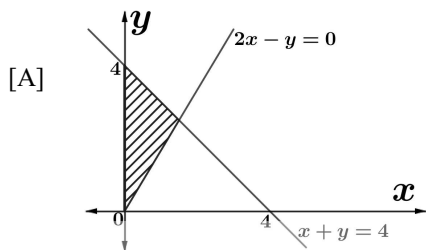
[A] [B] [~~C~~] [D]

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- 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.
- 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.
- Do all rough work in this booklet, using, where necessary, the blank spaces in the question booklet.
- Mobile phones are **NOT** allowed in the examination room.
- You must not take this booklet out of the examination room. All question booklets and answer sheets will be collected at the end of the examination.**

1. a^{-n} is equivalent to [A] a^n [B] $\frac{n}{a}$ [C] $\frac{1}{a^n}$ [D] 1	7. A geometric progression with first term a and common ratio r where $a \neq 0$ and $r \neq 0$ [A] Always converges [B] Never converges [C] converges depending on r [D] converges depending on a
2. The value of x which $8^x = \frac{1}{2}$ is: [A] 16 [B] $\frac{1}{4}$ [C] $-\frac{1}{3}$ [D] -4	8. $\sum_{k=1}^{10} (k+4) =$ [A] 105 [B] 95 [C] 85 [D] 75
3. $\log xy =$ [A] $\log x + \log y$ [B] $\log x \log y$ [C] $\log x - \log y$ [D] $\frac{\log x}{\log y}$	9. The function $f(x) = ax^2 + bx + c$ has maximum value when: [A] $a = 0$ [B] $a = 1$ [C] $a > 0$ [D] $a < 0$
4. The value of $\frac{\log 27}{\log 9}$ is equal to: [A] $\frac{3}{2}$ [B] 3 [C] $\frac{2}{3}$ [D] $\log 3$	10. The equation $ax^2 + bx + c = 0$ has repeated roots only when [A] $b^2 + 4ac \geq 0$ [B] $b^2 - 4ac = 0$ [C] $b^2 + 4ac = 0$ [D] $b^2 - 4ac \geq 0$
5. $(-1 + \sqrt{2})(1 + \sqrt{2}) =$ [A] 2 [B] 1 [C] -1 [D] 3	11. The sum of the roots of the quadratic equation $2 + 11x - x^2 = 0$ is: [A] 2 [B] -2 [C] 11 [D] -11
6. The sum of the 1 st n terms of a G.P with first term a and common ratio r where $r > 1$ is $S_n =$ [A] $\frac{a(r^n - 1)}{r - 1}$ [B] $\frac{a}{r - 1}$ [C] $\frac{a(1 - r^n)}{1 - r}$ [D] $\frac{a(r^n + 1)}{r + 1}$	12. The set of values x for which $(x - 5)(3x + 1) \geq 0$ is [A] $\left\{x : -\frac{1}{3} \leq x \leq 5\right\}$ [B] $\left\{x : -\frac{1}{3} \leq x \leq 5\right\}$ [C] $\left\{x : -5 \leq x \leq \frac{1}{3}\right\}$ [D] $\left\{x : x \leq -\frac{1}{3} \text{ or } x \geq 5\right\}$
	13. The values of x for which $ x + 4 = 5$ are [A] 9 or 1 [B] 9 or -1 [C] -9 or 1 [D] -9 or -1

14. Which of the following diagrams satisfy the inequalities $y \geq 0$, $2x - y \leq 0$ and $x + y \leq 4$.



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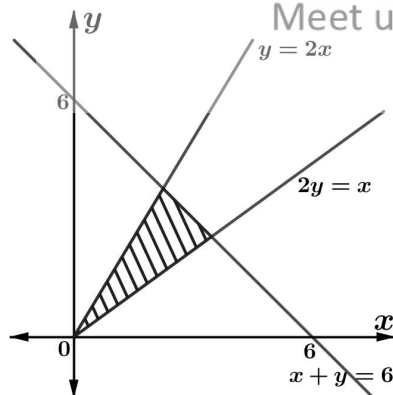


Figure 1

The maximum value of the expression $4x + 2y$ satisfying the constraints $x + y \leq 6$, $y \geq x$ and $y \leq 2x$ shown in the shaded area in figure 1 is:

- [A] 24
[B] 20
[C] 16
[D] 12

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16. A family is planning a touring holiday, during which x -days will be spent walking and the rest of the time, y -days in travelling by bus. Each day they can walk 30km or travel 80km by bus. The wish to travel at least 600km all together. The inequality that represents the above information is

- [A] $3x + 8y = 60$
[B] $3x + 8y \leq 60$
[C] $3x + 8y > 60$
[D] $3x + 8y \geq 60$

17. The remainder when $2x^3 - 3x^2 + 4x$ is divided by $(2x - 1)$ is:

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

18. $(x + 3)$ is a factor of $f(x) = 3x^3 + 2x^2 - 19x + 6$. The remainder when $f(x)$ is divided by $(x + 3)$ is

- [A] 6
[B] -19
[C] 0
[D] -6

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19. The value of p for which $(x - 1)$ is a factor of $2x^3 + px^2 - 2x + 3$ is:

- [A] 3
[B] -3
[C] 2
[D] -2

20. The properties under which $(S, *)$ forms a group are;

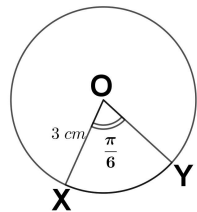
- [A] Closure, an identity exist, associativity
[B] Closure, an identity exist, every element has an inverse, associativity
[C] Closure, an identity exist, associativity
[D] Closure, commutativity, every element has an inverse, associativity

- 21.

*	T_1	T_2	T_3	T_4
T_1	T_3	T_4	T_1	T_2
T_2	T_4	T_3	T_2	T_1
T_3	T_1	T_2	T_3	T_4
T_4	T_2	T_1	T_4	T_3

From the operation table above, the inverse of T_2 is:

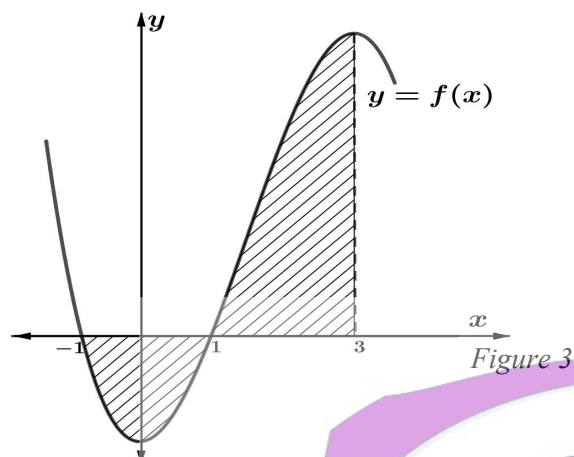
- [A] T_1
[B] T_4
[C] T_3
[D] T_2

22. The binary operation $*$ is defined over the set of positive integers as $x * y = x^2 + y^2$. Given that $x * x = 18$, the value of x is:
 [A] 3
 [B] 9
 [C] -3
 [D] 2
23. Which of the following is true for two lines $l_1 : m_1x + c_1$ and $l_2 : m_2x + c_2$ that are perpendicular
 [A] $m_1 = m_2$
 [B] $c_1 = c_2$
 [C] $m_1m_2 = -1$
 [D] $m_1m_2 = 1$
24. $(2, 6)$ is the midpoint of $(k, 1)$ and $(5, 13)$ the value of k is
 [A] -2
 [B] -1
 [C] 1
 [D] 2
25. The perpendicular distance from the point $(1, -2)$ to the line $x + y - 7 = 0$ is
 [A] $4\sqrt{2}$ units
 [B] $2\sqrt{2}$ units
 [C] $8\sqrt{2}$ units
 [D] 8 units
26. T defined as $T : (x, y) \rightarrow (x + 2y, x + y)$ has transformation matrix $M =$
 [A] $\begin{pmatrix} 1 & 1 \\ -2 & 1 \end{pmatrix}$
 [B] $\begin{pmatrix} 1 & 1 \\ 2 & 1 \end{pmatrix}$
 [C] $\begin{pmatrix} 1 & 2 \\ 1 & 1 \end{pmatrix}$
 [D] $\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix}$
27. Which of the following transformations are isometries?
 [A] Rotations, Reflection, and translations
 [B] Shears and stretches and rotations
 [C] Reflections, translations and shears
 [D] Rotations, reflections and enlargements
28. Given that the matrix for the transformation T is $\begin{pmatrix} 1 & -3 \\ 1 & 1 \end{pmatrix}$, then the invariant point under T is:
 [A] $(0, 0)$
 [B] $(-2, 2)$
 [C] $(0, -2)$ visit www.alstug.com for more papers
 [D] $(2, -2)$
29. The image of the point $(2, -1)$ under the transformation T defined as $T : (x, y) \rightarrow (-x + 4y, 2x - y)$ is:
 [A] $(2, 3)$
 [B] $(6, -5)$
 [C] $(-2, 5)$
 [D] $(-6, 5)$
30. The value of θ within the range $180^\circ \leq \theta \leq 360^\circ$ for which $\tan \theta = -1$
 [A] 245°
 [B] 225°
 [C] 335°
 [D] 315°
31. In the vector equation of the line $\mathbf{r} = (2\mathbf{i} + \mathbf{j}) + t(\mathbf{i} - \mathbf{j})$ where t is the parameter, the direction vector is
 [A] $\mathbf{i} + \mathbf{j}$
 [B] $-\mathbf{i} + 2\mathbf{j}$
 [C] $2\mathbf{i} + \mathbf{j}$
 [D] $\mathbf{i} - \mathbf{j}$
32. The derivative of $\frac{1}{x^2}$ is:
 [A] $-\frac{2}{x^3}$
 [B] $-\frac{2}{x}$ visit www.alstug.com for more papers
 [C] $\frac{2}{x^3}$
 [D] $-\frac{1}{x}$
33. Two angles that sum up to 90° are:
 [A] Complimentary angles
 [B] Supplementary angles
 [C] Perpendicular angles
 [D] Right angles
34. $2 \cos^2 \theta - 1$ simplifies to:
 [A] 1
 [B] $\sin 2\theta$
 [C] $\cos 2\theta$
 [D] $1 - \sin 2\theta$
35. In figure 2 below, the arc XY subtends an angle of $\frac{\pi}{6}$, at the centre O of a circle of radius 3cm

 Figure 2

The length of the arc XY is: [A] $\frac{1}{4}\pi$ [B] $\frac{3}{2}\pi$ [C] $\frac{3}{4}\pi$ [D] $\frac{1}{2}\pi$	[C] $\frac{2-2x}{2}, x \in \mathbb{R}$ [D] $\frac{3x-2}{2}, x \in \mathbb{R}$
36. $\sin(180^\circ - \theta) =$ [A] $-\sin \theta$ [B] $-\cos \theta$ [C] $\cos \theta$ [D] $\sin \theta$	42. With the real valued functions $f(x) = x + 1$ and $g(x) = x^2 - 3$, their composition $g \circ f =$ [A] $x^2 + 2x - 2$ [B] $x^2 + 2x + 2$ [C] $x^2 + 2x - 1$ [D] $x^2 + 2x + 1$
37. How many different arrangements of the letters of the word PERMUTATIONS are possible [A] $12!$ [B] $\frac{12!}{2!}$ [C] $\frac{12!}{2!10!}$ [D] $11!$	43. The length of the line segment joining the points $(6, 3)$ and $(-2, -3)$ is: [A] 4 [B] 8 [C] 10 [D] 21
38. The number of terms in $(1-2x)^{13}$ are [A] 12 [B] 14 [C] 13 [D] 15	44. The equation of the vertical asymptote of the function $y = \frac{3x+1}{x-2}$ is [A] $x = 2$ [B] $y = 2$ [C] $x = -\frac{1}{3}$ [D] $y = -\frac{1}{3}$
39. The first three terms in $(1-x)^{-1}$ are [A] $1 - x + x^2 - \dots$ [B] $1 + x + x^2 + \dots$ [C] $1 + x - x^2 + \dots$ [D] $1 - x - x^2 - \dots$	45. The equation of the tangent to the curve $y = 2x^2 - x - 3$ at the point $(-1, 0)$ is: [A] $5x + y + 5 = 0$ [B] $5x + y + 6 = 0$ [C] $5x - y + 5 = 0$ [D] $5y - x + 1 = 0$
40. A function f is defined by $f : x \rightarrow \begin{cases} 2x+1, & x < -1 \\ x^2+1, & x \geq -1 \end{cases}$ The value of $f\left(\frac{1}{2}\right)$ is [A] -1 [B] $\frac{5}{4}$ [C] $\frac{3}{2}$ [D] 2	46. The number of stationary points for the graph of $y = 2x^3 + 3x^2 - 12x + 1$ is(are): [A] 3 [B] 1 [C] 2 [D] 4
41. The inverse of the function $f(x) = \frac{3x+2}{2}, x \in \mathbb{R}$ is [A] $\frac{2x-2}{3}, x \in \mathbb{R}$ [B] $\frac{2x+2}{3}, x \in \mathbb{R}$	47. $\int \sin 2\theta d\theta =$ [A] $\frac{1}{2} \sin 2\theta + k$ [B] $-\sin 2\theta + k$ [C] $2 \cos 2\theta + k$ [D] $-\frac{1}{2} \cos 2\theta + k$ 48. $\int_1^3 2x dx =$ [A] 26 [B] 8 [C] -8 [D] 10

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49.



The shaded area in figure 3 is the area bounded by the curve of $y = f(x)$ and the x -axis from $x = -1$ to $x = 3$.

It's value can be obtained using

- [A] $\int_{-1}^3 f(x) dx$
 [B] $\int_1^3 f(x) dx + \int_{-1}^1 f(x) dx$
 [C] $-\int_{-1}^1 f(x) dx + \int_1^3 f(x) dx$
 [D] $-\int_{-1}^1 f(x) dx - \int_1^3 f(x) dx$

50. Given that the vector $3\mathbf{i} + p\mathbf{j}$ is parallel to the vector $-6\mathbf{i} + 12\mathbf{j}$, the value of p is:

- [A] -6
 [B] -2
 [C] 2
 [D] 6

END!

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