Name	Index Number	Class

WOODGROVE SECONDARY SCHOOL

A COMMUNITY OF FUTURE-READY LEARNERS AND THOUGHTFUL LEADERS

N-LEVEL PRELIMINARY EXAMINATIONS 2025

LEVEL & STREAM	: SECONDARY 4 NORMAL ACADEMIC
SUBJECT (CODE)	: ADDITIONAL MATHEMATICS (4051)
PAPER	: 02
DATE (DAY)	: 01 AUGUST 2025 (FRIDAY)
DURATION	: 1 HOUR 45 MINUTES

READ THESE INSTRUCTIONS FIRST

Write your name, index number and class in the spaces at the top of this page.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.

Answer **all** the questions.
Give non-exact numerical answers correct to three significant figures, or 1 decimal place in the case of angles in degree, unless a different level of accuracy is specified in the question.
The use of an approved scientific calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answer.

The number of marks is given in brackets [ ] at the end of each question or part question.

The total number of marks in this paper is 70.

DO NOT TURN OVER THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO.

Student's Signature		**Parent's Signature**	
Date		**Date**	

70

This document consists of 13 printed pages including this cover page.
Setter: Mdm Tan Hwee Lin

Mathematical Formulae

1. ALGEBRA

Quadratic Equation

For the equation $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

2. TRIGONOMETRY

Identities

$$\sin^2 A + \cos^2 A = 1$$
$$\sec^2 A = 1 + \tan^2 A$$
$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$
$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$
$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$
$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$
$$\sin 2A = 2\sin A \cos A$$
$$\cos 2A = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A$$
$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$$

Formulae for ΔABC

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a^2 = b^2 + c^2 - 2bc\cos A$$
$$\Delta = \frac{1}{2}bc\sin A$$

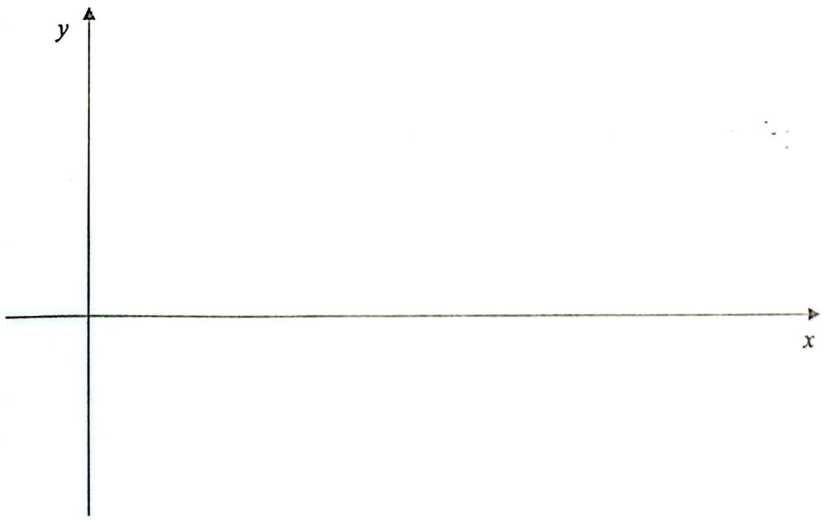
1 Solve the simultaneous equations.

$$y = x^2 + 4x - 5$$
$$x - y - 1 = 0$$

[4]

2 **(a)** State the amplitude and period of the graph of $y = 3\sin 2x + 1$ [2]

(b) On the axes below, sketch the graph of $y = 3\sin 2x + 1$ for $0 \leq x \leq 2\pi$. [3]



3 Show that the quadratic expression $x^2 - px + p^2 + 1$ is always positive for all real values of x. [3]

4 A curve is defined by equation $y = 3x^2 + 1$. Find the rate at which y is changing when $x = 2$, given that x is increasing at a rate of 0.5 units per second. [3]

5 (a) Differentiate $\left(5-x^2\right)^7$ with respect to x. [2]

(b) Hence, find $\int x\left(5-x^2\right)^6 dx$. [3]

6 The area and length of a rectangle are 2 cm^2 and $\frac{2+\sqrt{3}}{2-\sqrt{3}}$ cm respectively.

Express, in the form $a+b\sqrt{3}$,

(a) the breadth, [3]

(b) the perimeter of the rectangle. [3]

7 **(a)** Factorise $8x^3 + 125$. [1]

(b) Hence,

(i) Express 1125 as a product of two integers, [2]

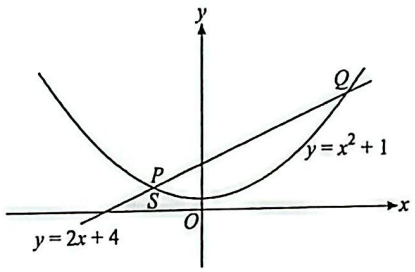
(ii) Solve $8x^3 + 125 = 39(2x + 5)$ [4]

8 The equation of a curve is $y=(x+1)(2x^2-5x-31)$.

(a) Find the coordinates of the stationary points of the curve. [5]

(b) Determine the nature of the stationary points. [3]

9 The diagram shows part of the curve $y = x^2 + 1$, the line $y = 2x + 4$.
The curve and the line intersect at the points P and Q.
Region S is bounded by the curve $y = x^2 + 1$, the line $y = 2x + 4$, the x-axis and the y-axis.



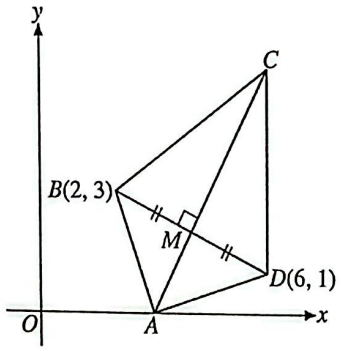
(a) Find the coordinates of P and Q. [3]

(b) Find the area of the shaded region S. [6]

10 **(a)** Show that $(\operatorname{cosec} 2x)(\cos 2x + 1) = \cot x$. [5]

(b) Hence or otherwise, solve the equation $(\operatorname{cosec} 2x)(\cos 2x + 1) = \sqrt{3}$ for $-180° \leq x \leq 180°$. [4]

11 In the diagram below, $ABCD$ is a quadrilateral where B is $(2,3)$, D is $(6,1)$ and A lies on the x-axis. AC is the perpendicular bisector of BD, M is the mid-point of BD and CD is parallel to y-axis.



Find

(a) the coordinates of M, [2]

(b) the equation of AC, [4]

(c) the coordinates of A and C, [3]

(d) the area of $ABCD$. [2]

END OF PAPER