2024-2025 S4
1st TERM EXAM
MATH CP
PAPER 1

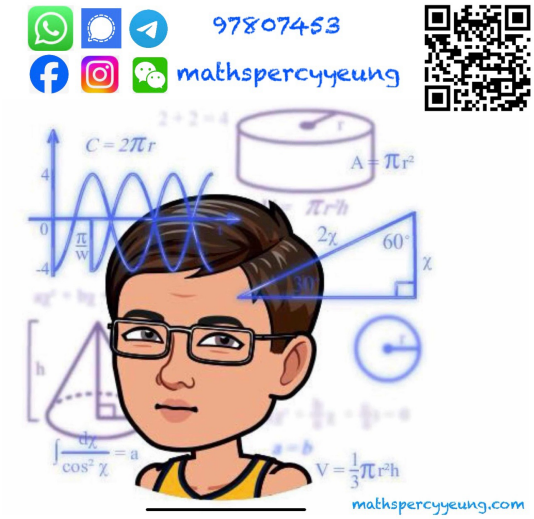
2024 – 2025
S4 First Term Examination

MATHEMATICS Compulsory Part

PAPER 1

Question–Answer Book

7th January, 2025
8:15 am – 9:15 am (1 hour)
This paper must be answered in English



Sections	Marks
A (1 – 3)	
A (4 – 6)	
A Total	**/34**
B Total	**/16**
TOTAL	**/50**

INSTRUCTIONS

1. Write your name, class and class number in the spaces provided on this cover.

2. This paper consists of THREE sections, A(1), A(2) and B.

3. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question – Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

4. Unless otherwise specified, all working must be clearly shown.

5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

6. The diagrams in this paper are not necessarily drawn to scale.

Section A(1) (14 marks)

1. Simplify $\dfrac{(3a^2b^0)^2}{a^{-3}b^3}$ and express your answer with positive indices. (3 marks)

2. Factorize

(a) $4m^2+12mn+9n^2$,

(b) $4m^2+12mn+9n^2-2m-3n$.

(4 marks)

3. Make t the subject of $s=\dfrac{2t}{1-t}$. (3 marks)

Answers written in the margins will not be marked

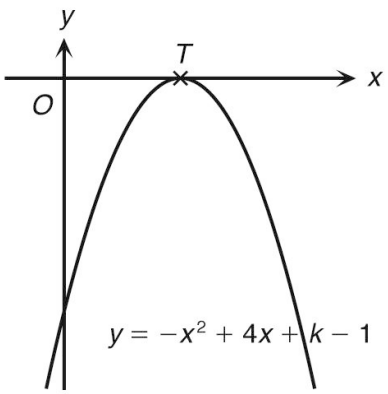
4. It is given that 3 is a root of the quadratic equation $kx^2 + x - (8k + 5) = 0$.

(a) Find the value of k. (2 marks)

(b) Hence, find the other root of the equation. (2 marks)

Section A(2) (20 marks)

5. In the figure, the graph of $y = -x^2 + 4x + k - 1$ touches the x-axis at T.



(a) Find the value of k. (3 marks)

(b) Find the length of OT. (2 marks)

Answers written in the margins will not be marked

6. It is given that the two straight lines $L_1: 2x-(a+2)y+5=0$ and $L_2: 3ax+2y+(b-3)=0$ are perpendicular to each other, and L_2 passes through (1, –2). A is the intersection of L_1 and L_2.

(a) Find the values of a and b. (4 marks)

(b) Find the coordinates of A. (3 marks)

(c) If L is the straight line passing through A and with the same y-intercept as $L_3: 7x+4y-10=0$, find the equation of L. (3 marks)

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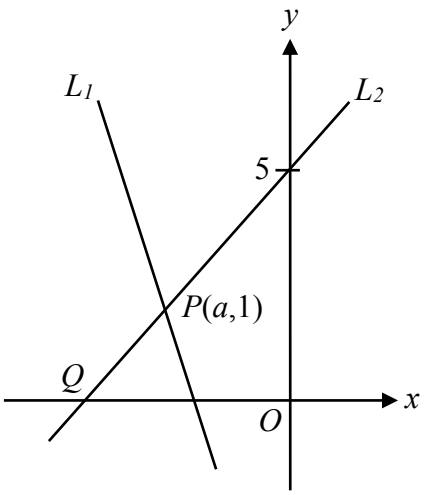
7. In the figure, the straight lines L_1: $y = -4x - 7$ and L_2 intersect at $P(a,1)$. L_2 cuts the x-axis at Q, and has y-intercept 5.



(a) Find the value of a. (2 marks)

(b) Find the coordinates of Q. (3 marks)

Answers written in the margins will not be marked

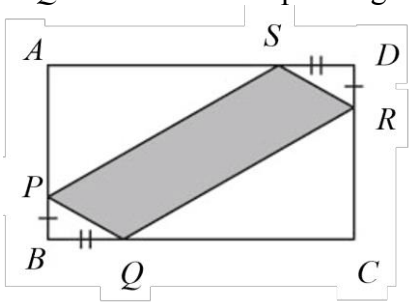
Section B (16 marks)

8. The figure shows a rectangle $ABCD$, where $AB = 20\,\text{cm}$ and $AD = 30\,\text{cm}$. $PB = RD = 2x\,\text{cm}$ and $BQ = DS = 3x\,\text{cm}$. Let $W\,\text{cm}^2$ be the area of the shaded region $PQRS$.

(a) Express W in terms of x. (3 marks)

(b) If the area of $PQRS$ is $108\,\text{cm}^2$, find the value(s) of x. (2 marks)

(c) Find the maximum area of $PQRS$ and the corresponding value of x. (3 marks)



Answers written in the margins will not be marked

9. Let $f(x)=2x^3+ax^2-5x+3b$. It is given that $f(x)$ is divisible by $x+1$, and when $f(x)$ is divided by $x-2$, the remainder is 12.

(a) Find the values of *a* and *b*. (3 marks)

(b) Factorize $f(x)$. (2 marks)

(c) Joe claims that the equation $f(x)+(x+1)(2x+9)=0$ has imaginary roots. Do you agree? Explain your answer and find all the roots. (3 marks)

END OF PAPER

Answers written in the margins will not be marked