2023-2024 S4
1st TERM EXAM
MATH CP
PAPER 1

2023 – 2024
S4 First Term Examination

MATHEMATICS Compulsory Part

PAPER 1

Question–Answer Book

5th January, 2024
8:15 am – 9:15 am (1 hour)
This paper must be answered in English

INSTRUCTIONS

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

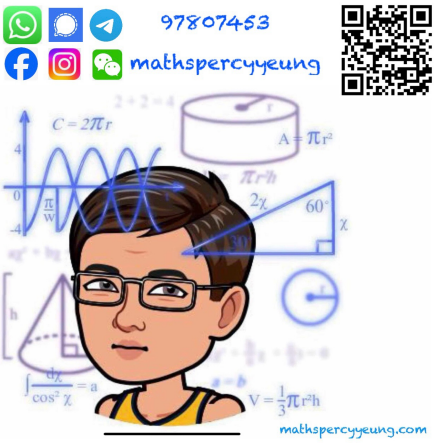
2. This paper consists of THREE sections, A(1), A(2) and B.

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.



Sections	Marks
A (1 – 4)	
A (5 – 6)	
A Total	**/27**
B Total	**/23**
TOTAL	**/50**

Section A(1) (13 marks)

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

2. Factorize

(a) $r^2 - 10r + 25$,

(b) $9s^2 - r^2 + 10r - 25$.

(4 marks)

3. Make k the subject of $\dfrac{k}{3h} = \dfrac{2-k}{a}$. (3 marks)

Answers written in the margins will not be marked

4. (a) Write down all positive integers m such that $m+2n=5$, when n is a positive integer.

(b) Write down all values of k such that $2x^2+5x+k \equiv (2x+m)(x+n)$, where m and n are positive integers.

(3 marks)

Section A(2) (14 marks)

5. The straight line $L_1: 2x-3y+k+1=0$ passes through $A(2k-1,\ k+3)$ and cuts the y-axis at B. P is a point on line segment AB such that $AP:PB=2:1$.

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

(b) Find the coordinates of P. (4 marks)

Answers written in the margins will not be marked

6. Let $f(x)$ be a polynomial. When $f(x)$ is divided by $x-1$, the quotient is $6x^2+17x-2$. It is given that $f(1)=4$.

(a) (i) Find $f(x)$.

(ii) Find $f(-3)$.

(4 marks)

(b) Someone claims that all the roots of the equation $f(x)=0$ are rational numbers. Is the claim correct? Explain your answer. (4 marks)

Answers written in the margins will not be marked

Section B (23 marks)

7. It is given that m is a constant and the sum of roots of the equation $10x^2 + 3mx + 2 = 0$ is greater than the product of roots by $\frac{7}{10}$.

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

(b) From the result of (a), solve the equation $10x^2 + 3mx + 2 = 0$. (2 marks)

Answers written in the margins will not be marked

8. In Figure 1, AP is an altitude of the ΔABC. It cuts the y-axis at H.

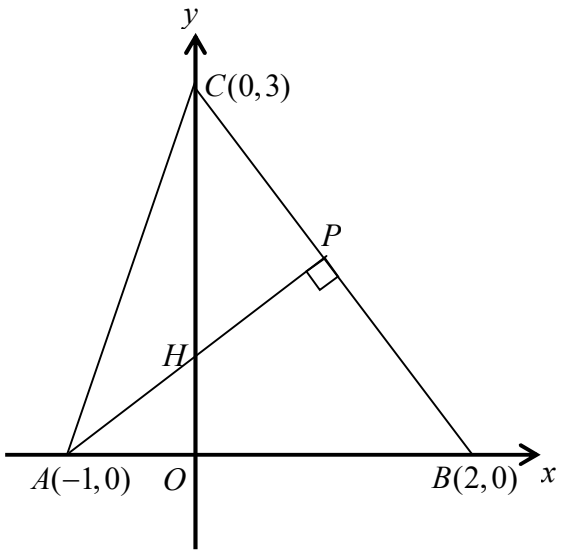


Figure 1

(a) Find the equation of AP. (4 marks)

(b) (i) Find the coordinates of H.

(ii) Prove that the three altitudes of the triangle ABC pass through the same point.

(5 marks)

(c) Find the ratio of the area of ΔAPB to the area of ΔACB. (3 marks)

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9. Figure 2 shows a rectangular paper with the perimeter of $80\,\text{cm}$. A square with sides of $5\,\text{cm}$ each is cut from each corner of the rectangular paper, the remaining part can be folded up along the dotted lines to form a container of the volume $A\,\text{cm}^3$ without a lid.

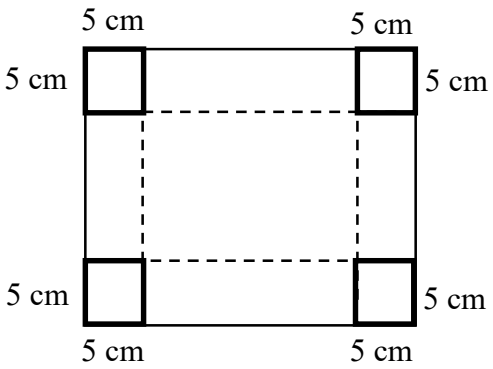

Figure 2

(a) Let the width of the container be x cm. Express A in terms of x. (3 marks)

(b) If the container is filled with $510\,\text{cm}^3$ of water, will the container overflow? Explain briefly. (3 marks)

END OF PAPER

Answers written in the margins will not be marked