2022-2023 S5
1st TERM UT
MATH CP
PAPER 1

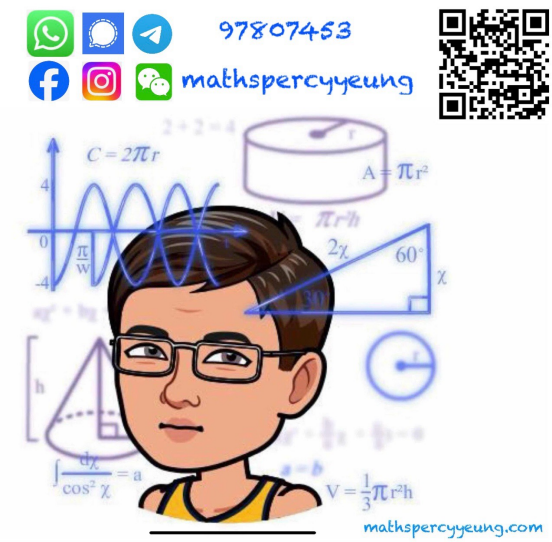
2022 – 2023
S5 First Term Uniform Test

MATHEMATICS Compulsory Part

PAPER 1

Question–Answer Book

7th November, 2022
9:45 am – 10:45 am (1 hour)
This paper must be answered in English



Sections	Marks
A (1 – 3)	
A (4 – 7)	
A Total	**/31**
B Total	**/19**
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 $\dfrac{\left(a^2b^{-1}\right)^4}{a^{-4}b^7}$ and express your answer with positive indices. (3 marks)

2. (a) Factorize $x^2-13x+30$.
   (b) Hence, or otherwise factorize $x^2-13x+30-2xy+6y$.

(3 marks)

3. Make y the subject of the formula $x=\dfrac{2y-5}{y-1}$. (3 marks)

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4. Consider the compound inequality

$$\frac{x+4}{3} < 2x-2 \quad \text{or} \quad 2x-1 \geq 2(3-x) \quad \ldots\ldots\ldots\ldots\ldots(*).$$

(a) Solve (*) and represent the solutions graphically.

(b) Write down the least integer satisfying (*).

(5 marks)

Section A(2) (17 marks)

5. The following table shows the distribution of the ages of a group of 20 students in a summer camp.

Age	15	16	17	18
Number of students	4	8	6	x

(a) Find x. (1 mark)

(b) Find the range and the inter-quartile range of the ages of the group of students. (3 marks)

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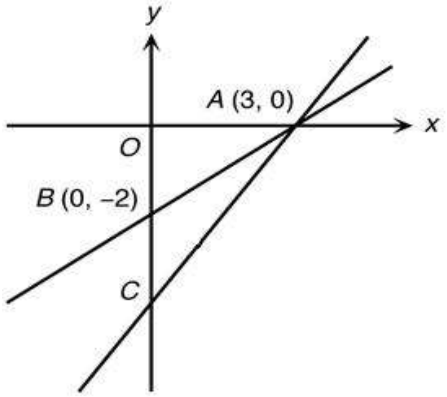
6. In the figure, the vertices of $\triangle ABC$ are $A(3, 0)$, $B(0, -2)$ and C respectively. C is a point on the y-axis.



If the slope of CA is twice that of BA, find

(a) the equations of BA and CA, (4 marks)

(b) the coordinates of C, (1 mark)

(c) the area of $\triangle ABC$. (2 marks)

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7. The cost ($\$C$) of producing a stapler is partly constant and partly varies inversely as the number of staplers (n) produced. When 250 staplers are produced, the cost of each stapler is \$18. When 1000 staplers are produced, the cost of each stapler is \$13.5.

(a) Express C in terms of n. (3 marks)

(b) How many staplers should be produced if the cost of each stapler is \$16? (1 mark)

(c) If 750 staplers are produced and each stapler is sold at \$25, what is the percentage profit? (Give your answer correct to 3 significant figures.) (2 marks)

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Section B (19 marks)

8. A restaurant is going to arrange x standard tables and y VIP tables for a banquet subject to the following conditions.

   I. Each standard table and each VIP table occupy 18 sq. units and 24 sq. units respectively. The total area of the restaurant is 1440 sq. units.

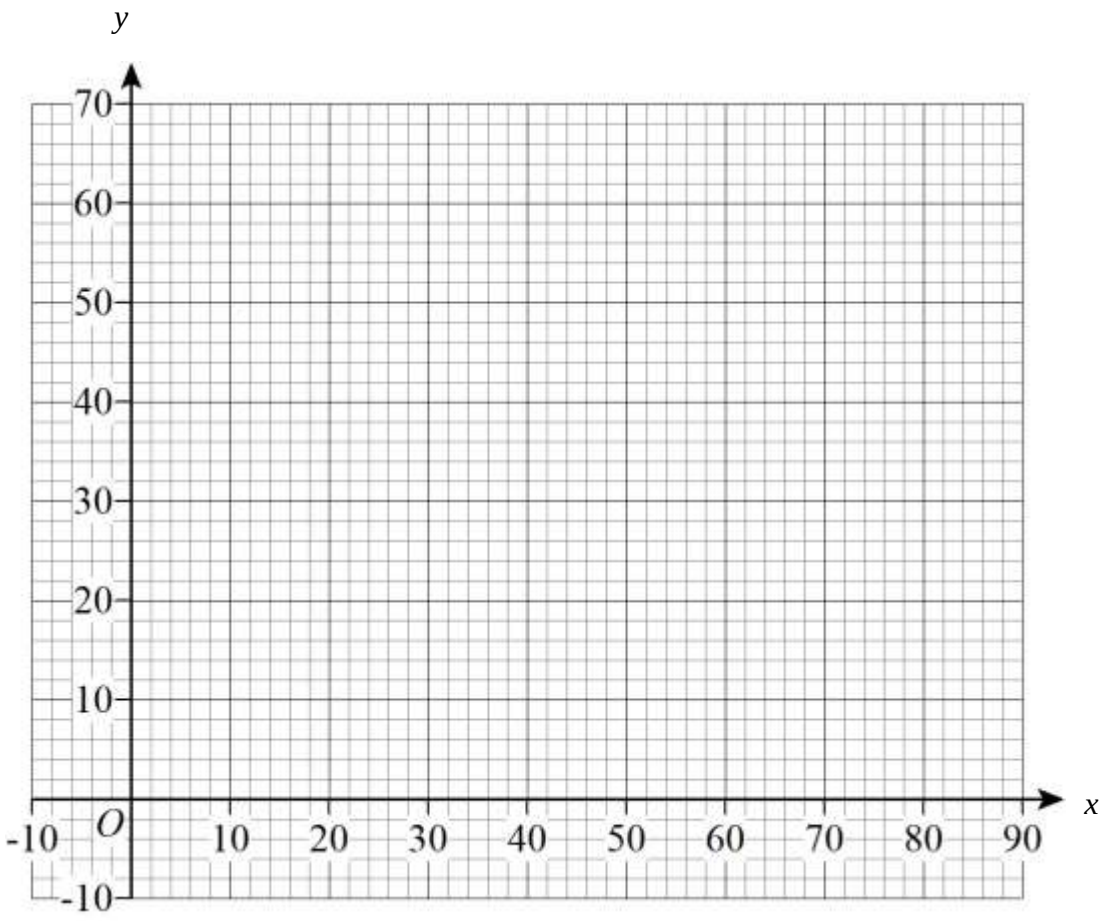
   II. At least 30 tables in total should be provided.

   III. There are 56 standard tables and 24 VIP tables available.

   (a) Write down all the constraints on x and y. (2 marks)

   (b) Indicate the solutions that satisfy the constraints in (a) on the coordinate plane. (3 marks)

   (c) The profits of serving a standard table and a VIP table are \$600 and \$2000 respectively. If all the tables can be served, how many standard tables and VIP tables should be arranged in order to maximize the profit? (4 marks)



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9. The number (N) of bananas on a tree after t weeks is given by $N = P(1.32)^t$, where P is a constant. Initially, the number of bananas on the tree is 20.

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

   (b) Peter claims that if the value of t is doubled, the value of N will be multiplied by $(1.32)^2$. Do you agree? Explain your answer. (3 marks)

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10. The following table shows two scales, namely Scale *A* and Scale *B*, to represent the magnitude of an explosion.

Scale	Formula
A	$M = \log_a E$
B	$N = \log_8\left(\frac{E}{32}\right)$

It is given that *M* and *N* are the magnitudes of an explosion on Scale *A* and Scale *B* respectively, while *E* is the energy released by the explosion. Suppose the magnitudes of an explosion on Scale *A* and Scale *B* are 3 and $\frac{1}{3}$ respectively.

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

(b) Another explosion is occurred and its energy released is 256 units. What is the magnitude of this explosion on Scale *A*? (2 marks)

END OF PAPER

Answers written in the margins will not be marked