

2021-2022 S6
1st TERM UT
MATH CP
PAPER 1

2021 – 2022
S6 First Term Uniform Test

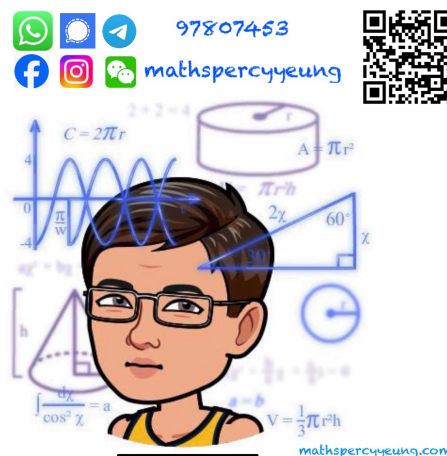
MATHEMATICS Compulsory Part PAPER 1

Question–Answer Book

8th November, 2021
8:15 am – 9:45 am (1 hour 30 minutes)
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 – 9)	
A Total	/41
B Total	/29
TOTAL	/70

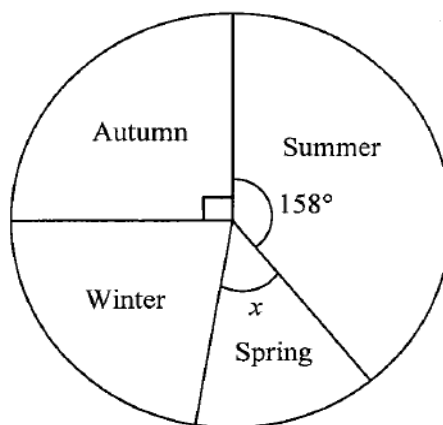
3. Factorize

(a) $16a^2 - 49$,

(b) $16a^2 - 49 - 4ab - 7b$.

(3 marks)

4. The pie chart below shows the distribution of the seasons of birth of the students in a school. If a student is randomly selected from the school, then the probability that the selected student was born in spring is $\frac{1}{9}$.



Distribution of the seasons of birth of the students in the school

(a) Find x .

(b) In the school, there are 180 students born in winter. Find the number of students in the school.

(4 marks)

Answers written in the margins will not be marked

5. (a) Solve the inequalities $\frac{10-x}{4} < 7+2x$ and $3x-21 \leq 0$.
(b) How many integers satisfy both inequalities in (a)?

(4 marks)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

- 6.** The coordinates of the points A and B are $(4, -2)$ and $(-6, 8)$ respectively. A' is the image of reflection of A with respect to the y -axis. B is rotated clockwise about the origin through 90° to B' .
- (a)** Write down the coordinates of A' and B' .
- (b)** Find the coordinates of the mid-point of $A'B'$.

(4 marks)

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(b) The school subsidizes \$2 000 for the publishing fee and 1000 copies are printed for sale at a price of \$10 each. If only 700 copies are sold, will the Mathematics club suffer a loss?

[illegible]

Answers written in the margins will not be marked

8. $A(4, 4)$ and $B(8, 2)$ are two points on the circle C . G is the centre of C . The straight line $L: 9x + 2y = 8$ passes through G .
- (a) Find the coordinates of G . (5 marks)
- (b) E and F are two points on C such that $EF = AB$ and $EF \parallel AB$. Find the equation of EF . (3 marks)

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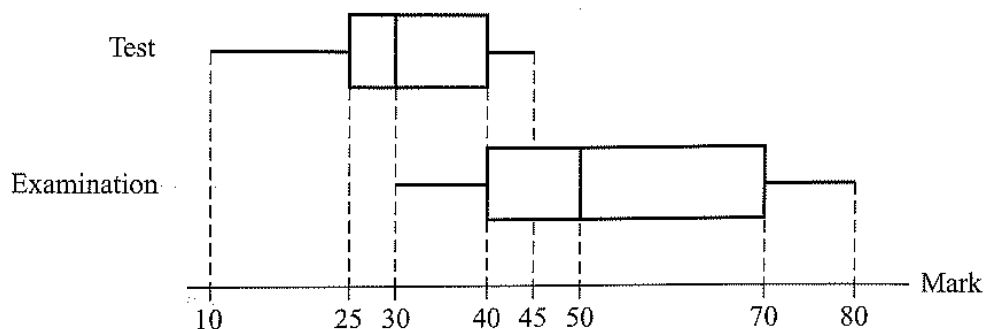
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9. The box-and-whisker diagrams below show the distributions of the test marks and the examination marks of a class of 41 students.



The full marks for the test and the examination are 50 and 100 respectively. The passing marks for the test and the examination are 25 and 50 respectively.

- (a)** Do more students pass the test than the examination? Explain your answer. (2 marks)
- (b)** Tony gets 30 marks in the test and 55 marks in the examination. Does Tony perform relatively better in the test? Explain your answer (2 marks)
- (c)** Mary gets 50 marks in the examination. She claims that there must be at least 20 students with marks less than her. Do you agree? Explain your answer. (2 marks)

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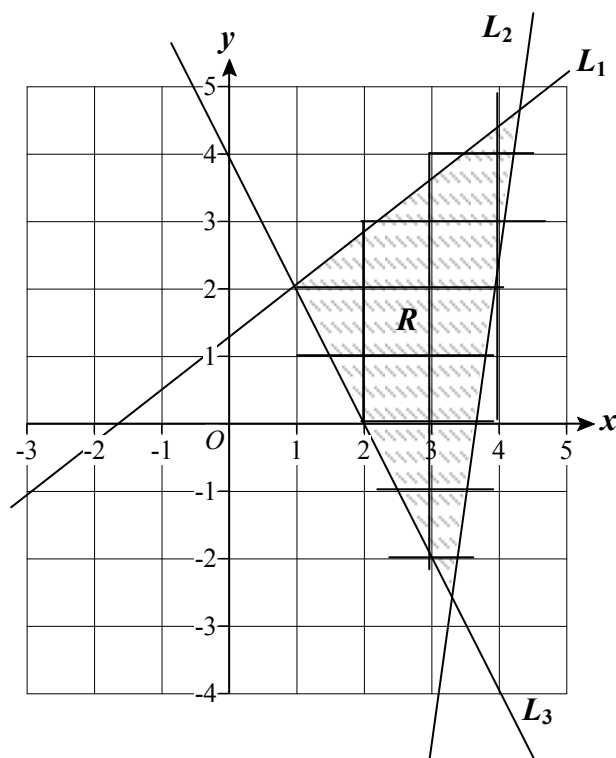
10. The user name of a website is a permutation of 10 distinct characters which are chosen from the 26 capital letters and 10 numeral digits 0, 1, 2, ..., 9.

- (a)** How many different 10-character user names can be formed? (2 marks)
- (b)** If the last 3 characters of the user name must be numeral digits, how many different user names can be formed? (2 marks)

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11. In the figure, the equations of L_1 and L_2 are $4x - 5y + 6 = 0$ and $9x - y - 32 = 0$ respectively. R is the region (including the boundary) bounded by L_1 , L_2 and L_3 .



- (a) If R represents the solutions of a system of inequalities, find the system of inequalities. (3 marks)
- (b) Let x and y be integers such that (x, y) lies in R . Someone claims that the maximum value of the function $F = 2x - y + 2$ is 10. Do you agree? Explain your answer. (2 marks)

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Handwriting practice area with 30 horizontal dotted lines.

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12. There are two types of seats in a newly set-up theater, luxury seat and normal seat. In order to use the space in a better way, all the luxury seats are arranged in the even numbers' rows and all the normal seats are arranged in the odd numbers' row. The first row has 18 seats. For the n th row, when n is an odd number, the $(n + 2)$ th row is formed by adding 3 seats to the n th row. The second row has 8 seats. For the n th row, when n is an even number, the $(n + 2)$ th row is formed by adding 2 seats to the n th row. It is given that the last row in the theater is arranged by luxury seats.
- (a) Find, in terms of n , the total number of seats in this new theatre. (2 marks)
- (b) Someone claims that the total number of seats in this theatre can be from 1050 to 1100. Do you agree? Explain your answer. (3marks)

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- 14.** Consider the function $f(x) = x^3 - 2x^2 - 3x + 4$.
- (a)** If the graph of $y = g(x)$ is obtained by reflecting the graph of $y = f(x)$ with respect to the y -axis, find $g(x)$. (1 mark)
- (b)** If the graph of $y = h(x)$ is obtained by translating the graph of $y = g(x)$ to the left by 1 unit, find $h(x)$. (1 mark)
- (c)** John claims that the graph of $y = h(x)$ can be obtained by the following transformations.
Translating the graph of $y = f(x)$ to the left by 1 unit and then reflecting the resulting graph with respect to the y -axis.
Do you agree? Explain your answer.

(3 marks)

END OF PAPER