2021-2022 S5 1st TERM UT-MATH-CP 1

2021-2022 S5 1st TERM UT MATH CP PAPER 1

> 2021 – 2022 S5 First Term Uniform Test

MATHEMATICS Compulsory Part

PAPER 1

Question–Answer Book

8th November, 2021 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.
- This paper consists of THREE sections, A(1), A(2) and B.
- 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 – 2)	
A (3 – 7)	
A Total	/33
B Total	/17
TOTAL	/50

Simplify $\frac{x^{-9}}{(-2x)}$	$(\frac{y^{10}}{(4y)^5})^5$ and express your answer with positive indices.	(3 marks
Factorize		
(a) $6x^2 + 7xy$	$-3y^{2}$,	
(b) $6x^2 + 7xy$	$-3y^2-6x-9y.$	
		(3 marks
Consider the co	ompound inequality	
Consider the co	pompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots (*).$	
Consider the co (a) Solve (*).	pompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2}$ or $3x + 18 \le 0$ (*).	
Consider the co(a) Solve (*).(b) Write dow	Sompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots (*).$ In the greatest integer satisfying (*).	
Consider the co (a) Solve (*). (b) Write dow	pompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots (*).$ In the greatest integer satisfying (*).	(4 marks)
 Consider the co (a) Solve (*). (b) Write dow 	ompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots (*).$ on the greatest integer satisfying (*).	(4 marks)
Consider the co (a) Solve (*). (b) Write dow	The proposed inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots \dots (*).$ If the greatest integer satisfying (*).	(4 marks)
(a) Solve (*). (b) Write dow	pompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots \dots (*).$ In the greatest integer satisfying (*).	(4 marks)
(a) Solve (*). (b) Write dow	ompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots \dots (*).$ In the greatest integer satisfying (*).	(4 marks)
(a) Solve (*). (b) Write dow	ompound inequality $\frac{3x}{7} - \frac{1}{3} > \frac{x}{2} \text{ or } 3x + 18 \le 0 \qquad \dots \dots (*).$ In the greatest integer satisfying (*).	(4 marks)

- 4. The scores of 10 students in a quiz are 45, 75, 60, 65, 55, 50, 50, 55, *k* and 85. Given that the mean score is 61.
 - (a) Find the value of *k*.
 - (b) Find the range and the inter-quartile range of the scores.

(5 marks) Section A(2) (18 marks) In Figure 1, the straight line L_1 : 3x + by - 24 = 0 cuts the 5. L2 y-axis at A(0, -6) and the straight line L_2 cuts the x-axis at C(5, 0). L_1 and L_2 intersects at B(4, k). С 0 (a) Find the values of *b* and *k*. (2 marks) B(4,k) (b) L_3 is a straight line passing through B and $L_1: 3x + by - 24 = 0$ perpendicular to L_2 . Find the equation of L_3 . Figure 1 (3 marks)

- 6. A teacher organizes a China trip for his students through a travel agency. The charge (C) for each person partly varies as the number of days (D) of the trip and partly varies inversely as the square root of the number of people (N) joining the trip. When a total of 25 students and teachers join the trip for 5 days, the charge for each person is \$2900. When a total of 64 students and teachers join the trip for 3 days, the charge for each person is \$1750.
 - (a) When a total of 100 students and teachers join the trip for 4 days, how much should each person pay?(4 marks)
 - (b) Now, 42 students and 7 teachers join the trip for 5 days. The travel agency takes 85% of the money as the operation cost and the remaining will be shared among 3 tour guides equally. The basic salary of a tour guide in a 5-day trip is \$2500. The travel agency claims that each tour guide can earn more than \$9500 in this tour. Do you agree? Explain your answer.

·····		
······		
·····		
······		
······		
· · · · · · · · · · · · · · · · · · ·		

- 7. A hemispherical container of radius 15 cm is held vertically on a horizontal surface. The container is fully filled with water.
 - Find the volume of the water in the container in terms of π . (2 marks) (a)
 - A solid metal frustum is made by cutting off the lower part of an inverted right circular (b) cone of base radius 15 cm. The radius of the lower base of the frustum is 12 cm. It is now held vertically in the hemispherical container in (a) as shown in Figure 2. Find the volume of the water remaining in the container in terms of π . (5 marks)



Section B (17 marks)

- 8. A steel company is going to decide the allocation work of two machines A and B which produce two semi-finished products next week. The two products are bands and coils. Machine A can produce 250 kg of bands per hour and machine B can produce 150 kg of coils per hour. Based on current booking orders, the production of bands and coils should not exceed 7 500 kg and 4 500 kg respectively. The total production time for the two machines is at most 44 hours next week. Besides the store room in the company can hold not more than 9 000 kg of the two products at the same time. Let *x* hours be the time allocated for producing bands and *y* hours be the time allocated for producing coils.
 - (a) Write down all the constraints on *x* and *y*.

(2 marks)

- (b) Using the graph paper on Page 7, represent the feasible solutions on a rectangular coordinate plane. (3 marks)
- (c) If the profit of each kilogram of bands and coils are \$250 and \$300 respectively, find the number of kilograms of bands and that of coils should be produced in order to have a maximum profit. Also find the maximum profit. (4 marks)

Answers written in the margins will not be marked



10	Figure 3 shows the linear relation between log v	log y
10.	and $\log r$ The slope and the v-intercept are	
	3 and 5 respectively. Express the relation between x	5
	and y in the form $y = Ax^k$, where A and k are	
	constants. (4 marks)	
	/	$O \longrightarrow \log_3 x$
	/	Figure 3
	END OF PAPER	