20-21 F.5
2nd TERM UT
MATH CP
PAPER 1

2020 – 2021
Form 5 Second Term Examination

MATHEMATICS Compulsory Part

PAPER 1

Question-Answer Book

19th April, 2021.
8:15 am – 9:30 am (1 hour 15 minutes)

This paper must be answered in English.

INSTRUCTIONS

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

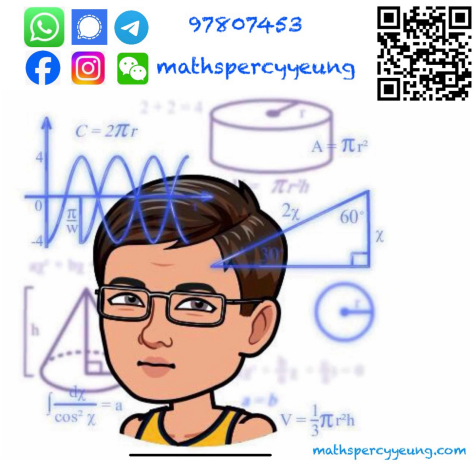
2. This paper consists of THREE sections, A(1), A(2) and B.

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.



Section	Marks
A (1 – 3)	
A (4 – 6)	
A Total	**/30**
B Total	**/30**
TOTAL	**/60**

Section A(1) (9 marks)

1. Simplify $\dfrac{(a^{-7}b^{8})^{9}}{b^{-6}}$ and express your answer with positive indices. (3 marks)

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

3. Factorize

(a) $m^2 - 49n^2$,

(b) $m^2 - 49n^2 - 4m - 28n$. (3 marks)

Answers written in the margins will not be marked.

Section A(2) (21 marks)

4. In a workshop, 4 identical solid metal right circular cone of base radius R cm are melted and recast into 54 smaller identical solid right circular cone of base radius r cm and height 8 cm. It is given that the base area of a larger circular cone is 9 times that of a smaller one.

(a) Find

(i) $r : R$,

(ii) the height of a larger circular cone.

(5 marks)

(b) Susan claims that a smaller circular cone and a larger circular cone are similar. Do you agree? Explain your answer.

(2 marks)

Answers written in the margins will not be marked.

5. The polynomial $f(x) = 10x^3 - 17x^2 + mx + n$ is divisible by $x - 2$. When $f(x)$ is divided by $x - 1$ and $x + 1$, the remainders are the same.

(a) Find the values of *m* and *n*. (4 marks)

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

Answers written in the margins will not be marked.

6. The monthly income ($\$I$) of a salesman is partly constant and partly varies directly as the square root of his monthly sales ($\$S$). His monthly income is \$7 400 when his monthly sales is \$40 000, and his monthly income is \$8 600 when his monthly sales is \$90 000.

(a) Express I in terms of S. (4 marks)

(b) Find his monthly income if his monthly sales is \$640 000. (1 mark)

(c) Find the percentage change in his monthly income when his monthly sales is four times that in (b).

(3 marks)

Answers written in the margins will not be marked.

Section B (30 marks)

7. How many 5-digit numbers can be formed from the digits 1, 2, 3, 4, 5, 6, 7, 8

(a) if there are no restrictions? (2 marks)

(b) without repetition? (2 marks)

8. In a dozen of products, 7 are good and the rest are defective. A quality inspector selects 4 products at random for inspection. Find the probabilities that

(a) all of them are good, (2 marks)

(b) exactly 3 of them are defective, (2 marks)

(c) at least one of them is defective. (2 marks)

Answers written in the margins will not be marked.

9. The mean mark of an aptitude test for Primary six students is 75.

(a) Mary got 70 marks and her standard score is −1. Find the standard deviation of the test marks. (2 marks)

(b) The Secondary one admission requirement of a certain secondary school is a standard score of at least 1.8 in the aptitude test. If Tom wants to study in this school, at least how many marks should he get in the aptitude test?

(2 marks)

Answers written in the margins will not be marked.

10. The coordinates of the points P, Q and R are (3, 7), (2, 8) and (–4, 8) respectively. Let C be the circle which passes through P, Q and R.

(a) Find the equations of C. (4 marks)

(b) Denote the origin by O and the centre of C by G. A and B are points on C such that O is the mid-point of A and B.

(i) Describe the geometric relationship between the line segments OG and AB.

(ii) Find the equation of the straight line AB.

(iii) Find the length of AB.

(5 marks)

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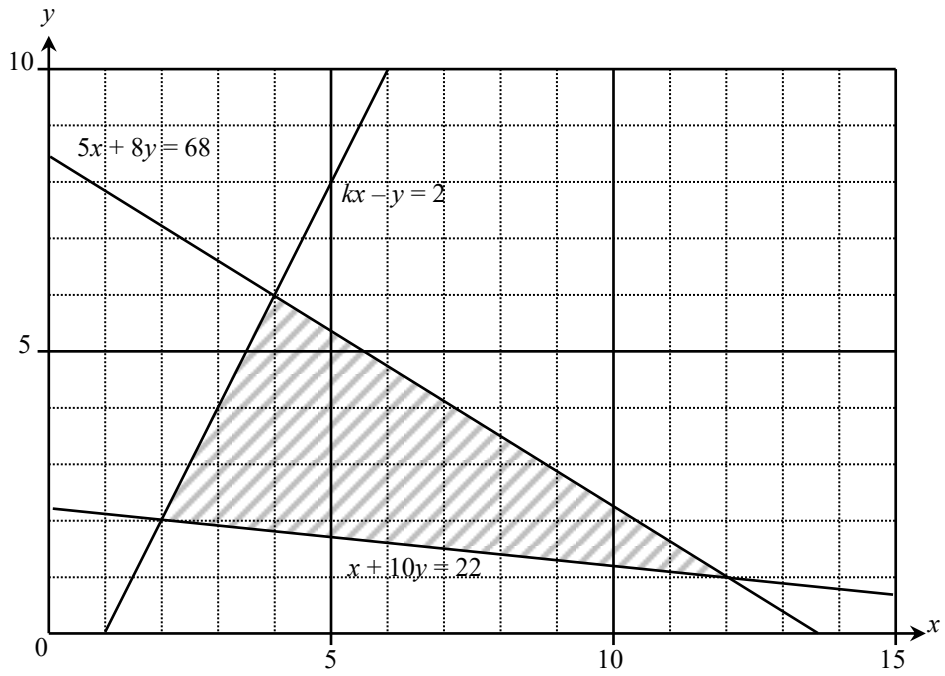
11. In the figure, the shaded region (including the boundary) represents the solution of a system of inequalities. It is given that the shaded region is bounded by the straight lines $5x + 8y = 68$, $x + 10y = 22$ and $kx - y = 2$, where k is a constant.



(a) Find the value of k. Hence write down the system of inequalities. (4 marks)

(b) Suppose that (x, y) is a point lying in the shaded region, where x and y are integers.

(i) How many number of these points are there?

(ii) Find the maximum and minimum values of $P = 5x - ky$.

(3 marks)

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END OF PAPER