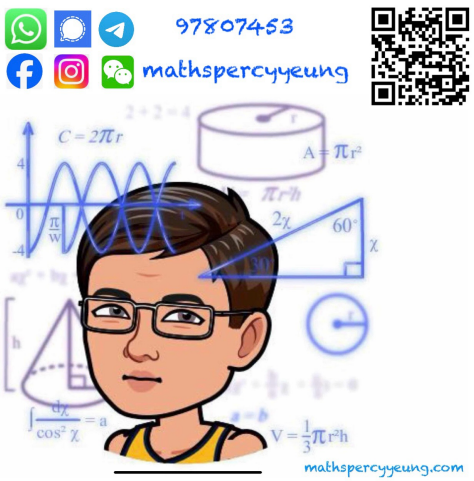
18-19 F.5
1st TERM UT
MATH CP

2018 – 2019
Form 5 First Term Uniform Test

MATHEMATICS Compulsory Part

Question–Answer Book

5th November, 2018
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. Answer ALL questions in Section A. You are advised to use an HB pencil to mark all the answers on the Answer Sheet, so that wrong marks can be completely erased with a clean rubber. You must mark the answers clearly; otherwise you will lose marks if the answers cannot be captured. You should mark only ONE answer for each question. If you mark more than one answer, you will receive NO MARKS for that question.

3. Attempt ALL questions in Sections B and C. Write your answers in the spaces provided in this Question – Answer Book.

4. Unless otherwise specified, all working must be clearly shown and numerical answers should be either exact or correct to 3 significant figures.

5. The diagrams in this paper are not necessarily drawn to scale.

Section	Marks
A Total	**/24**
B (13 – 15)	
B (16 – 19)	
B Total	**/29**
C Total	**/15**
TOTAL	**/68**

Section A (24 marks)

Choose the best answer for each question.

1. The solution of $x+\frac{x-1}{4}>6$ or $3<2x-9$ is

   A. $x>4$.

   B. $x>5$.

   C. $x>6$.

   D. $x>7$.

2. The solutions of $x^2+7x+10\geq 0$ are

   A. $x\geq -5$.

   B. $x\geq -2$.

   C. $-5\leq x\leq -2$.

   D. $x\leq -5$ or $x\geq -2$.

3. Find the values of the real numbers a and b if $\frac{1-3i}{a-bi}=-1-i$.

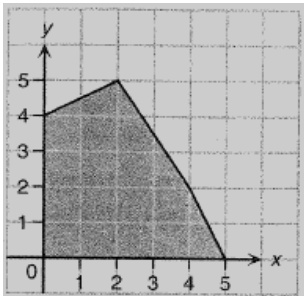
   A. $a=1, b=-2$

   B. $a=1, b=2$

   C. $a=2, b=-1$

   D. $a=2, b=1$

4. Find the maximum value of $P=3x+3y+4$ if (x, y) is a point lying in the shaded region (including the boundary).



   A. 16

   B. 19

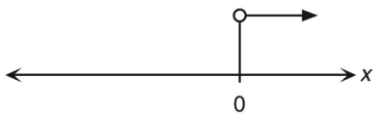
   C. 22

   D. 25

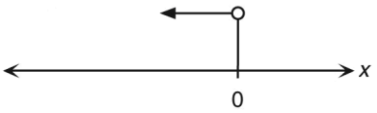
5. Which of the following represents the solutions of

   $2(x-5)\geq 5x-1$ and $5x-1<3x-1$?

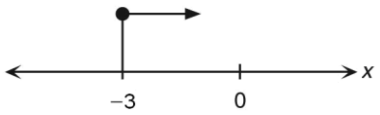
   A.



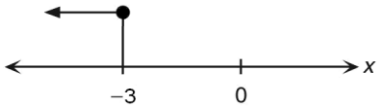
   B.



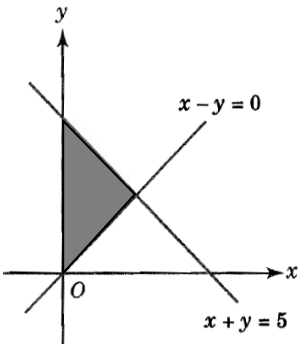
   C.



   D.



6. In the figure, (x, y) is a point in the shaded region (including the boundary), which of the following must be true?



   I. $x-y\leq 0$

   II. $x+y\geq 5$

   III. $x\geq 0$

   A. I only

   B. III only

   C. I and III only

   D. II and III only

7. $\dfrac{a^{\frac{3}{2}}(\sqrt[6]{a})^5}{\sqrt[3]{a^{-2}}} =$

A. a^6.

B. a^3.

C. $a^{\frac{5}{6}}$

D. $a^{\frac{5}{3}}$

8. If $6^{x+1} = 7^x$, then $x =$

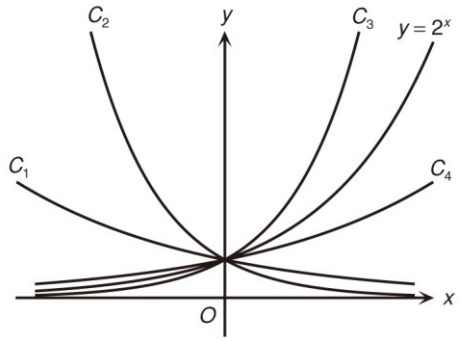
A. $\dfrac{\log 6}{\log 6 - \log 7}$.

B. $\dfrac{\log 6}{\log 7 - \log 6}$.

C. $\dfrac{\log 7}{\log 6 - \log 7}$.

D. $\dfrac{\log 7}{\log 7 - \log 6}$.

9. The figure shows the graph of $y = 2^x$ and four curves C_1, C_2, C_3 and C_4. Which of the curves can be the graph of $y = 3^x$?



A. C_1

B. C_2

C. C_3

D. C_4

10. If the simultaneous equations $\begin{cases} y = mx - 3 \\ y = 2x^2 - 3x + 5 \end{cases}$ have only one solution, find the value of m.

A. 7 or -1

B. -7 or 1

C. 5 or -11

D. -5 or 11

11. If α and β are the roots of the equation $\left(\dfrac{1}{2x+1}\right)^2 - 13\left(\dfrac{1}{2x+1}\right) + 2 = 0$, find the value of $\dfrac{1}{2\alpha+1} + \dfrac{1}{2\beta+1}$.

A. 13

B. $\dfrac{1}{13}$

C. $-\dfrac{1}{13}$

D. -13

12. Which of the following equations can be reduced to a quadratic equation?

I. $\dfrac{1}{x+1} + \dfrac{2}{x-5} = 3$

II. $\sqrt{x^2+1} - 2 = x$

III. $\log(x+1) + \log x + \log(x-1) = 2$

A. I only

B. I and II only

C. II and III only

D. I, II and III

Section B(1) (13 marks)

13. Simplify $\dfrac{\left(a^{-3}b\right)^{-5}}{b^{-2}}$ and express your answer with positive indices. (3 marks)

14. Make b the subject of the formula $\dfrac{1-a}{5+b}=3a$. (3 marks)

15. Factorize
    (a) $6x^2-x-2$,
    (b) $6x^2-x-2-15mx+10m$

(3 marks)

16. (a) Solve the compound inequality $x-3<\frac{3x+1}{4}\leq\frac{x}{2}+1$.

(b) If x is a non-negative integer satisfying the compound inequality $x-3<\frac{3x+1}{4}\leq\frac{x}{2}+1$, What are the possible values of x ?

(4 marks)

Section B(2) (16 marks)

17. Suppose y varies jointly as the square root of a and inversely as the cube of b.
It is given that $y=18$ when $a=81$ and $b=2$.

(a) Express y in terms of a and b. (3 marks)

(b) Find the value of y when $a=4$ and $b=5$. (2 marks)

18. The simultaneous equations $\begin{cases} y = x^2 + kx - 2 \\ 3x - y - 11 = 0 \end{cases}$ have only one real solution. Find the values of k.

(5 marks)

19. Let \$ C be the running cost of a mathematics course in a tuition centre and n be the number of students enrolled. It is given that C is the sum of two parts, one part is a constant and the other part varies as the square of n. When 10 students enrolled, the cost is \$4900. When 20 students enrolled, the cost is \$6100.

(a) Find the running cost of the course if there are 50 students enrolled. (4 marks)

(b) The tuition fee for each student of the course is \$ 536. Find the range of the number of students such that the profit is made for running the course. (2 marks)

Section C (15 marks)

20. (a) Using the graph paper on P.9, draw the following straight lines.
$x + 2y = 12$, $3x + y = 12$ and $3x + 2y = 18$. (3 marks)

(b) The vitamin content and the selling price per kilogram of food X and food Y are shown in the table.

	Vitamin A	Vitamin B	Vitamin C	Selling Price
Food X (1kg)	2 units	3 units	3 units	\$10
Food Y (1kg)	4 units	1 unit	2 units	\$15

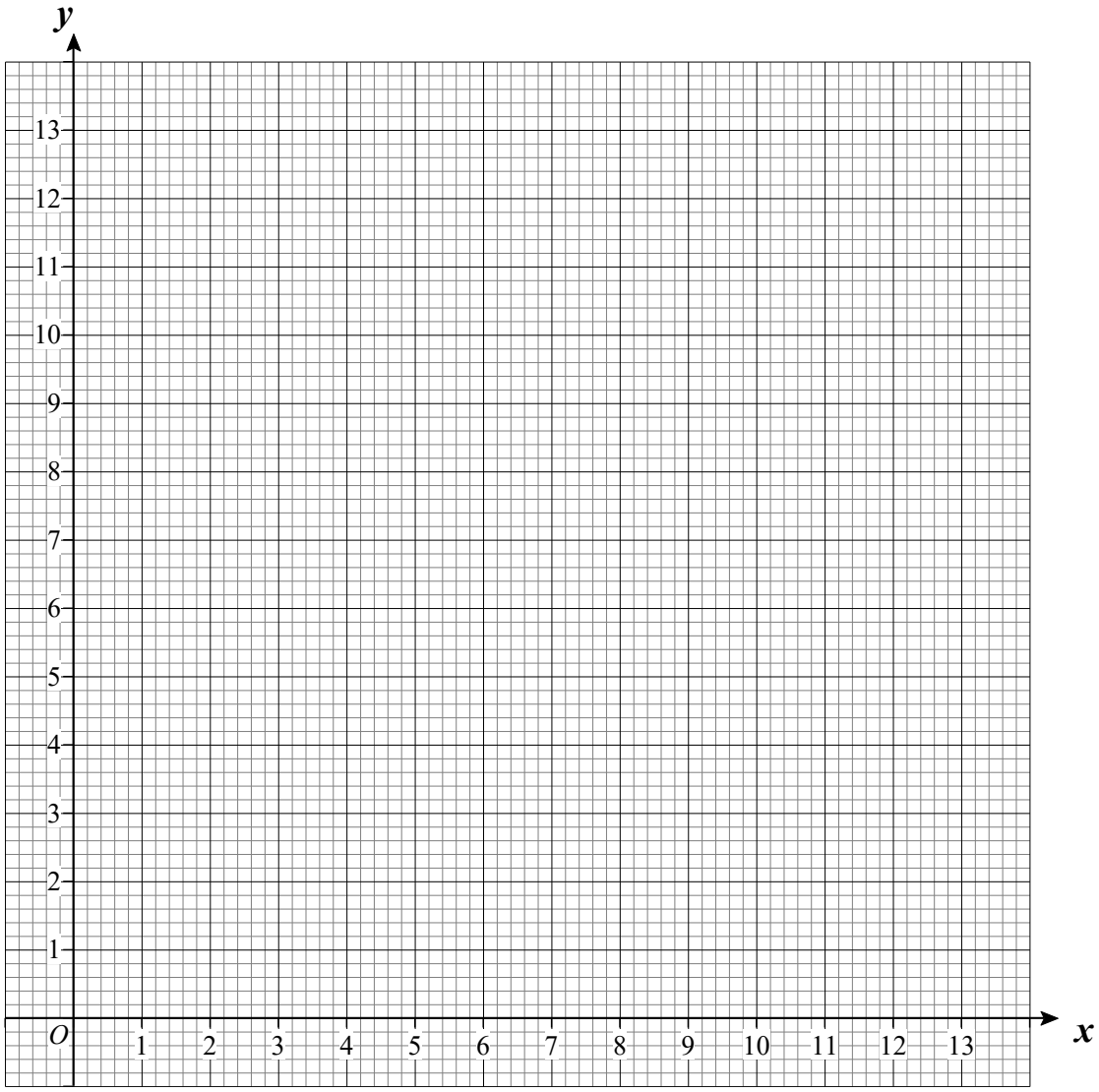
Two kinds of food X and Y are mixed so that the vitamin content of the mixture is at least 24 units of vitamin A, 12 units of vitamin B and 18 units of vitamin C.

Let x kg of food X and y kg of food Y be mixed.
(i) Using the information above, write down the constraints in terms of x and y.

(ii) On the graph paper, shade the region that satisfies the constraints in b(i).

(4 marks)

(c) Express the cost $\$C$ of the mixture in terms of x and y.
Hence find the minimum cost of the mixture. (4 marks)


y
x
O
1
2
3
4
5
6
7
8
9
10
11
12
13

21. Scale A and Scale B are defined to measure the magnitudes of typhoons. The formulas are shown below:

Scale	A	B
Formula	$M = \log_9 E$	$N = \log_{27} 2E$

where M and N represent the magnitudes of a typhoon on Scale A and Scale B respectively. E represents the relative energy released by the typhoon.

(a) Express N in terms of M. (3 marks)

(b) If the magnitude of the typhoon is 5.7 on Scale A, find the magnitude of the typhoon on Scale B. (1 mark)

END OF PAPER