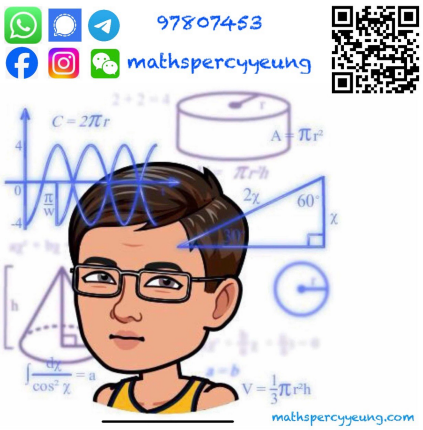
2022-2023 S4
1st TERM UT
MATH CP

2022 – 2023
S4 First Term Uniform Test

MATHEMATICS Compulsory Part

Question–Answer Book

7th November, 2022
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 should 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.

Sections	Marks
A Total	**/24**
B (13 – 15)	
B (16 – 21)	
B Total	**/36**
C Total	**/9**
TOTAL	**/69**

Section A (24 marks)

Choose the best answer for each question.

1. $(2a^3b^{-5})^{-2} =$

   A. $\frac{b^{10}}{4a^6}$.

   B. $\frac{a}{4b^7}$.

   C. $4a^6b^{10}$.

   D. $4ab^7$.

2. If $5y^2 - 50y + m \equiv n(y-5)^2 - 48$, where m and n are constants, then $m =$

   A. -48 .

   B. 5 .

   C. 77 .

   D. 125 .

3. Which of the following numbers is NOT a rational number?

   A. $\frac{4}{5}$

   B. 4.5

   C. $4.\dot{5}$

   D. $\sin 45°$

4. If α and β are the roots of the quadratic equation $x^2 - 7x = 3$, then $\frac{1}{\alpha\beta} =$

   A. -3 .

   B. $-\frac{1}{3}$.

   C. $\frac{1}{7}$.

   D. $\frac{1}{3}$.

5. Which of the following quadratic equations does not have a real root?

   A. $x^2 - 9 = 0$

   B. $5x^2 + x = 1$

   C. $x^2 = 8x - 16$

   D. $8x = 11x^2 + 15$

6. Which of the following equations can be formed with the double root $-\frac{3}{2}$?

   A. $4x^2 - 9 = 0$

   B. $4x^2 + 9 = 0$

   C. $4x^2 + 12x + 9 = 0$

   D. $4x^2 - 12x + 9 = 0$

7. The area of a rectangular garden is 63 m^2. The length of the garden is 2 m longer than its width. Find the perimeter of the garden.

   A. 32 m

   B. 34 m

   C. 36 m

   D. 38 m

8. If $f(x) = x^3 - 2kx^2$, then $f(-2) + f(3) =$

   A. $-10k - 19$.

   B. $-26k + 3$.

   C. $-26k + 19$.

   D. $26k + 19$.

9. If $f(x-2) = x^2 + 4x - 1$, find $f(x)$.

   A. $f(x) = x^2 - 5$

   B. $f(x) = x^2 + 8x + 11$

   C. $f(x) = x^2 + 4x - 13$

   D. $f(x) = x^2 + 4x + 11$

10. The equation of straight line which passes through $(0,0)$ and $(-8,2)$ is

A. $x-4y=0$.

B. $x+4y=0$.

C. $x-4y+16=0$.

D. $x+4y-16=0$.

11. The straight line L passes through the point $(4,9)$ and is parallel to the straight line $8x-6y+9=0$. The equation of L is

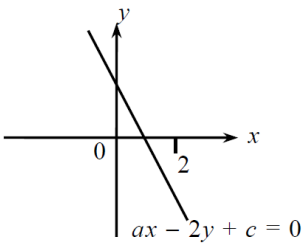
A. $3x-4y+10=0$.

B. $3x+4y+2=0$.

C. $4x+3y+5=0$.

D. $4x-3y+11=0$.

12. The figure shows the graph of the straight line $ax-2y+c=0$. Which of the following are true?



I. $a<0$

II. $c>0$

III. $c>-2a$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

Section B(1) (18 marks)

13. Simplify $\dfrac{(a^{-3}b^{8})^{-1}}{a^{2}b^{-5}}$ and express your answer with positive indices. (3 marks)

14. Factorize

(a) $s^2+5s-14$,

(b) $s^2+5s-14+st^2-2t^2$. (3 marks)

15. Simplify the expression $\frac{-2}{2m-1} - \frac{4m}{1-2m}$. (3 marks)

16. Convert $0.\dot{9}\dot{4}$ into a fraction. Show your steps clearly. (2 marks)

17. Simplify the following surds.

(a) $\sqrt{2}-\sqrt{3}+\sqrt{50}+\frac{4}{\sqrt{3}}$

(b) $\sqrt{12a^2b^3}\times 5\sqrt{ab^6}$ (4 marks)

18. Find the range of values of k such that the quadratic equation $5x^2+3x-5k=0$ has two distinct real roots. (3 marks)

Section B(2) (18 marks)

19. It is given that $f(x)=\sqrt{7x+4}$ and $h(x)=\dfrac{1}{2x-1}$.

(a) Find the domain of $f(x)$. (1 mark)

(b) Find the values of $f(3)$ and $h(-5)$. (3 marks)

(c) If $f(2a)=\dfrac{1}{h(a)}+1$, find a. (Leave your answers in surd form.) (4 marks)

20. Let $g(x) = 4x^2 + 12x + c$, where c is a constant. The equation $g(x) = 0$ has two equal real roots.

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

(b) Solve the equation $g(x) = 9$. (2 marks)

21. The straight line L_1 with slope $\frac{5}{4}$ passes through $(3, -3)$.

(a) Find the equation of L_1. (2 marks)

(b) If $E(7, b)$ lies on L_1, find the value of b. (2 marks)

(c) L_2 is a straight line passing through E and $F(0, 6)$, find the equation of L_2. (2 marks)

Section C (9 marks)

22. It is given that α and β are the two roots of the equation $x^2 + 2x - 5 = 0$, where $\alpha > \beta$.

(a) Find the values of $\alpha + \beta$ and $\alpha\beta$. (2 marks)

(b) Find the values of each of the following expressions without solving the equation.

(i) $\alpha^2\beta + \alpha\beta^2$

(ii) $\alpha^2 + \beta^2$

(iii) $(\alpha - \beta)^2$

(5 marks)

(c) Form a quadratic equation in x with the roots α and $-\beta$. (2 marks)

END OF PAPER