**2021-2022 S4
1st TERM UT
MATH CP**

2021 – 2022
S4 First Term Uniform Test

## MATHEMATICS Compulsory Part

Question–Answer Book

9th 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.

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.

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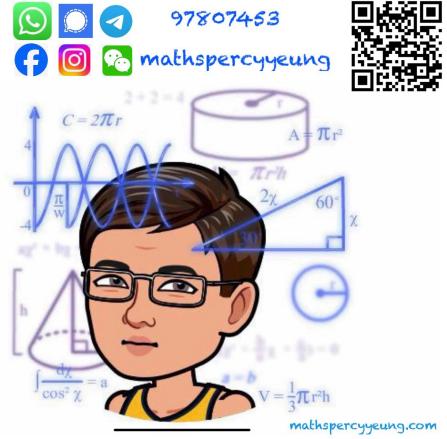
Sections	Marks
A Total	**/24**
B (13 – 15)	
B (16 – 21)	
B Total	**/34**
C Total	**/8**
TOTAL	**/66**

Section A   (24 marks)
Choose the best answer for each question.

1. Which of the following is an identity/are identities?

    I. $(2x-3)^2 = 4x^2 + 9$
    II. $(3x-2)(3x+2) = 9x^2 - 4$
    III. $(x-2)(x+4) = x^2 + 2x + 8$

    A.   I only
    B.   II only
    C.   II and III only
    D.   I, II and III

2. If $P(x+5)+Q(2-x) \equiv 2(3x+2)-x$
    where P and Q are constants, then

    A. $P = 2$ and $Q = -4$.
    B. $P = 2$ and $Q = -3$.
    C. $P = 4$ and $Q = -3$.
    D. $P = 6$ and $Q = -\dfrac{3}{2}$.

3. Which of the following are rational numbers?

    I. $\sqrt{\dfrac{441}{169}}$
    II. $0.98\dot{7}$
    III. $\dfrac{\sqrt{48}}{\tan 60°}$
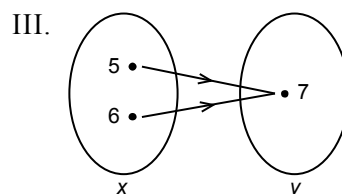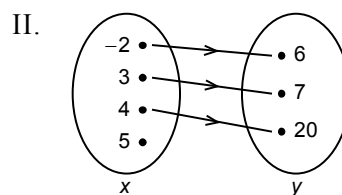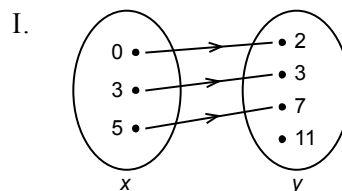
    A.   I and II only
    B.   I and III only
    C.   II and III only
    D.   I, II and III

4. If n is a positive integer, which of the following numbers must be odd?

    I. 2^{2n+1}
    II. $3(2^n)$
    III. $(2n+1)^2$

    A.   II only
    B.   III only
    C.   II and III only
    D.   I, II and III

5. Which of the following represent(s) that y is **NOT** a function of x?

    I.

    II.

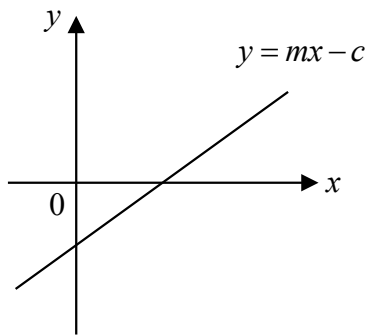
    III.

    A.   II only
    B.   III only
    C.   I and III only
    D.   II and III only

6. If $f(2x) = 4x^4 - 6x$, then $f(a) =$
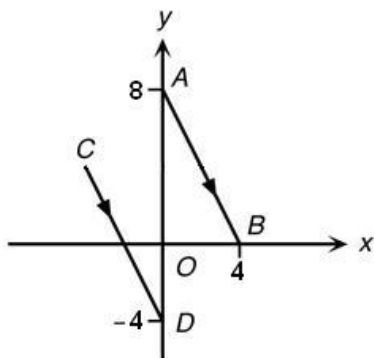
    A. $2a^4 - 3a$.
    B. $a^4 - 6a$.
    C. $\dfrac{a^4}{2} - 3a$.
    D. $\dfrac{a^4}{4} - 3a$.

7. If both x and y are real numbers, which of the following is the domain of the function $y = \sqrt{3x - 12}$?

    A. $x \geq 0$.

    B. $x > 4$.

    C. $x \geq 4$.

    D. x is any real number except 4.

8. In the figure, the equation of the straight line is $y = mx - c$. Which one of the following is true?

    A. $m > 0$ and $c > 0$

    B. $m > 0$ and $c < 0$

    C. $m < 0$ and $c < 0$

    D. $m < 0$ and $c > 0$

9. In the figure, CD is parallel to AB. Find the equation of CD.

    A. $2x + y + 4 = 0$

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

    C. $4x + y + 2 = 0$

    D. $4x + y - 2 = 0$

10. Solve $x(2x + 3) = x(3x - 4)$.

    A. $x = 0$

    B. $x = -\dfrac{3}{2}$ or $x = \dfrac{4}{3}$

    C. $x = 0$ or $x = 7$

    D. $x = 0$ or $x = -\dfrac{3}{2}$ or $x = \dfrac{4}{3}$

11. The sum of a number and its square is 56. Find the number.

    A.   7

    B.   8

    C. -8 or 7

    D. -7 or 8

12. If $\begin{cases} a^2 - a - 3 = 0 \\ b^2 - b - 3 = 0 \end{cases}$, $a \neq b$, then $a^2 + b =$

    A.   1.

    B.   2.

    C.   3.

    D.   4.

Section B(1) (26 marks)

13. Simplify $\dfrac{(m^3n)^2}{m^6n^{-7}}$ and express your answer with positive indices. (3 marks)

14. Factorize

    (a) $6a+10b$,

    (b) $3a^2-ab-10b^2$,

    (c) $6a+10b+3a^2-ab-10b^2$.

                                               (4 marks)

15. Make y the subject of the formula $\dfrac{2x+y}{x+2y} = \dfrac{3}{4}$. (3 marks)

16. Convert $0.1\dot{8}$ into a fraction. Show your steps clearly. (2 marks)

17. It is given that $f(x) = \dfrac{kx+3}{2x+1-k}$, where k is a constant. If $f(1)=5$, find

    (a) the value of k,

    (b) $f(1-x)$.

(4 marks)

18. In the figure, two straight lines L_1: $y = 2x + k$ and L_2 intersect at $A(2, a)$. L_1 is perpendicular to L_2 and has x-intercept -1.

  (a) Find the values of k and a.

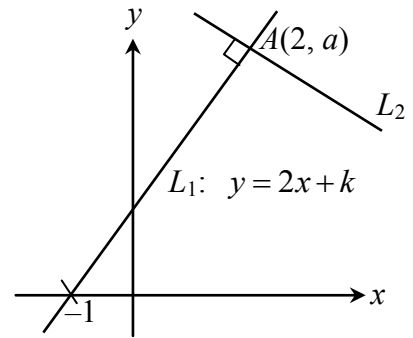 **(b)** Find the equation of L_2.

(6 marks)

Figure 1

19. Consider the equation $3x^2 + 3x - 5 + k = 0$.

  (a) Find the range of values of k if the equation has two distinct real roots.

  (b) Find the greatest value of k given that k is an integer.

(4 marks)

Section B(2) (8 marks)

20. Simplify $\dfrac{(3+\sqrt{2})(2\sqrt{2}-2)}{\sqrt{2}}$.

(4 marks)

21. **(a)** The following shows the steps of the method of completing the square. Fill in the blanks.
$$x^2 + 4x = x^2 + 4x + (\underline{\hspace{1cm}})^2 - (\underline{\hspace{1cm}})^2$$
$$= (x + \underline{\hspace{1cm}})^2 - \underline{\hspace{1cm}}$$

(b) Hence, or otherwise, solve the equation $x^2 + 4x - 8 = 0$.(Express your answer in surd form)

(4 marks)

Section C (8 marks)

22. It is given that α and β are the roots of the quadratic equation $2x^2 + 3x - k = 0$, where k is a real number.

    (a) Find, in terms of k,

        (i) $\alpha + \beta$,

        (ii) $\alpha\beta$,

        (iii) $\alpha^2 + \beta^2$.

                                                                             (4 marks)

    (b) If $k = 1$, form a quadratic equation in x with the roots $-\dfrac{\beta}{\alpha}$ and $-\dfrac{\alpha}{\beta}$.   (4 marks)

END OF PAPER