20-21 F.4
1st TERM UT
MATH CP

2020 − 2021
Form 4 First Term Uniform Test

MATHEMATICS   Compulsory Part

Question–Answer Book

5th November, 2020
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.

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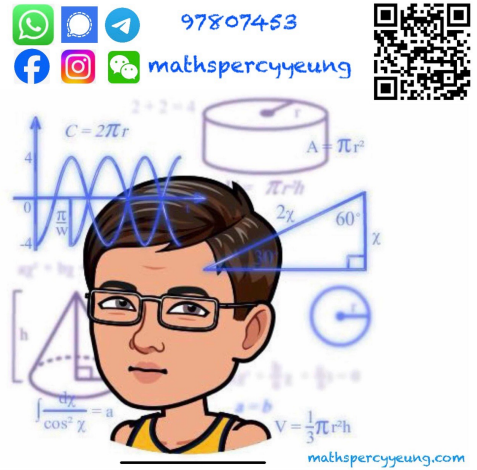
Section	Marks
A Total	**/24**
B (13 – 15)	
B (16 – 19)	
B Total	**/28**
C Total	**/14**
TOTAL	**/66**

Section A (24 marks)

Choose the best answer for each question.

1. $\dfrac{8^{2n+1}}{4^{3n+1}} =$

   A. 1.

   B. 2.

   C. 2^n.

   D. 2^{-n}.

2. If $\dfrac{y-1}{c} = \dfrac{y+1}{d}$, then $y =$

   A. $\dfrac{c-d}{c+d}$.

   B. $\dfrac{d-c}{c+d}$.

   C. $\dfrac{c+d}{c-d}$.

   D. $\dfrac{c+d}{d-c}$.

3. $ha - ka + hb - kb - hc + kc =$

   A. $(h+k)(a-b+c)$.

   B. $(h+k)(a+b-c)$.

   C. $(h-k)(a-b+c)$.

   D. $(h-k)(a+b-c)$.

4. Which of the following numbers is rational?

   A. $\dfrac{\sqrt{8}}{2}$

   B. π^2

   C. $(\sqrt{2}+1)(\sqrt{2}-1)$

   D. $\sin 60°$

5. Simplify $\sqrt{75} + 3\sqrt{108} - 5\sqrt{147}$.

   A. $-12\sqrt{3}$

   B. $-4\sqrt{3}$

   C. $4\sqrt{3}$

   D. $12\sqrt{3}$

6. Solve $2x(x+1) = 27 - x$.

   A. $x = \dfrac{9}{2}$ or -3

   B. $x = -\dfrac{9}{2}$ or 3

   C. $x = \dfrac{9}{2}$ or 3

   D. $x = -\dfrac{9}{2}$ or -3

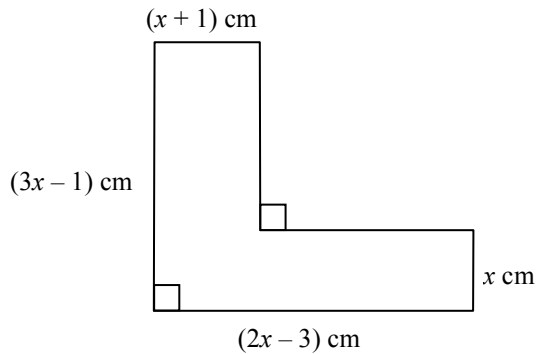7. If the quadratic equation $3x^2 + 4k = 4x$ has no real roots, find the range of the values of k.

   A. $k < \dfrac{4}{3}$

   B. $k < \dfrac{1}{3}$

   C. $k > \dfrac{1}{3}$

   D. $k > \dfrac{4}{3}$

8. If the product of the roots of the equation $3x^2 + 5x + k = 0$ is twice the sum of the roots, find the value of k.

   A. 10

   B. $\dfrac{5}{2}$

   C. $-\dfrac{5}{2}$

   D. -10

9. The area of the 'L' shape figure shown below is 239 cm². If the figure is formed by two rectangles, find the value of x.

$(x + 1)$ cm

$(3x − 1)$ cm

x cm

$(2x − 3)$ cm

A. $\dfrac{15}{2}$

B. 8

C. 9

D. 13

10. What is the domain of the function $y = \dfrac{3}{\sqrt{5-x}}$?

A. All real numbers except 5.

B. All real numbers less than or equal to 5.

C. All real numbers less than 5.

D. All real numbers greater than 5.

11. If $f(x) = (x+1)(x+b)$ and $f(2) = f(5)$, then $f(10) =$

A. 22.

B. 16.

C. 10.

D. −8.

12. Which of the following represent that y is a function of x?

I.

II.

III.
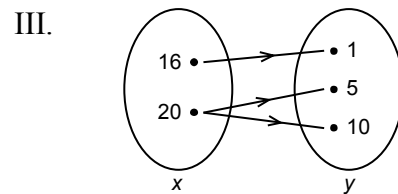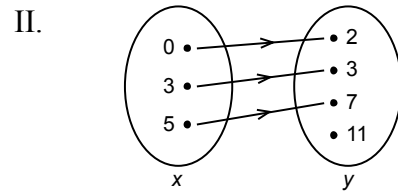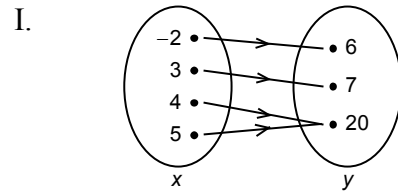
A. I and II only

B. I and III only

C. II and III only

D. I, II and III

Section B(1) (14 marks)

13. Simplify $\dfrac{m^8 n^{-7}}{(m^3 n^{-3})^2}$ and express your answer with positive indices. (3 marks)

14. Make b the subject of the formula $\dfrac{a + 2b}{3b + 4c} = 5$. (3 marks)

15. Factorize

    (a) $4x^2 - 4xy + y^2$,

    (b) $4x^2 - 4xy + y^2 - 9$.

    (3 marks)

16. Solve the following quadratic equations.
    (a) $2x^2 + 3x - 2 = 0$
    (b) $(2x+1)(x-3) = x+1$, leave your answers in surd form.

(5 marks)

Section B(2) (14 marks)

17. Simplify $\dfrac{\left(\sqrt{8} - 2\sqrt{3}\right)^2}{\sqrt{2}}$.

(4 marks)

18. It is given that $f(2x) = 12x^2 + 12x + 2$.
    (a) Find $f(x)$.
    (b) Hence solve the equation $f(x) = -1$.

    (5 marks)

19. Let k be a constant. It is given that the quadratic equation $x^2 + 2x + 3 = k(x^2 + 2)$ has equal real roots.
    (a) Find the possible values of k.
    (b) If k is an integer, solve the given equation.

    (5 marks)

Section C (14 marks)

20. It is given that α and β are the roots of the quadratic equation $3x^2 + kx + k = 2x$, where k is a real constant.

  (a) Express $\alpha + \beta$ and $\alpha\beta$ in terms of k. (2 marks)

  (b) Given that $\dfrac{1}{\alpha} + \dfrac{1}{\beta} = -\dfrac{3}{2}$.

    (i) Find the value of k.

    (ii) Without finding the values of α and β, form a quadratic equation in y with the

      roots $\dfrac{3\alpha}{\beta}$ and $\dfrac{3\beta}{\alpha}$.

  (7 marks)

21. A ladder with length 10 m leans against a wall. The bottom of the ladder is 6 m from the wall. If the bottom of the ladder is pulled away from the wall further for x m ($x \neq 0$) so that the top slides down by the same distance, find x. (5 marks)