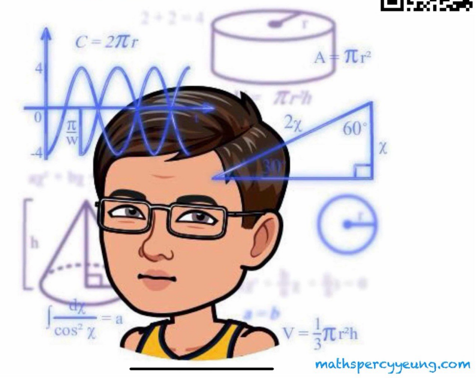


19-20 F.4
1st TERM UT
MATH CP

2019 – 2020
Form 4 First Term Uniform Test

MATHEMATICS Compulsory Part

Question–Answer Book

7th November, 2019
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 – 20)	
B Total	**/36**
C Total	**/8**
TOTAL	**/68**

Section A (24 marks)

Choose the best answer for each question.

1. $\left(\frac{1}{5}\right)^{998}(-5)^{999}=$

A. -5.
B. -0.2.
C. 0.2.
D. 5.

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

I. $4x^2-9=(2x-3)^2$
II. $4x^2-9=(2x+3)(2x-3)$
III. $4x^2-9=0$

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

3. Which of the following numbers is a rational number?

A. $\frac{\pi}{2\pi}$
B. $\sqrt{4}\times\sqrt{8}$
C. $\sqrt{0.9}$
D. $2+\sqrt{2}$

4. Which of the following is not a function of x for all positive values of x?

A. $y=5-x$
B. $y=x^2+9x-12$
C. $y=x^3+\frac{1}{x}$
D. $y^2=4x$

5. Which of the following is the domain of the function $f(x)=-\frac{1}{\sqrt{x}}$?

A. All real numbers except 0
B. All negative real numbers
C. All positive real numbers
D. All non-negative real numbers

6. $ac-bc-ad+bd=$

A. $(a-b)(c-d)$.
B. $(a-b)(d-c)$.
C. $(a+b)(c-d)$.
D. $(a+b)(d-c)$.

7. Simplify $\sqrt{75}-\sqrt{192}+4$.

A. 1
B. $\sqrt{3}$
C. $4-3\sqrt{13}$
D. $4-3\sqrt{3}$

8. If $f(x)=\frac{2-x}{1+x}$, then $f(1)-f(-2)=$

A. $-\frac{9}{2}$.
B. $\frac{3}{2}$.
C. $\frac{9}{2}$.
D. $\frac{11}{2}$.

9. If $g(x+1) = 2x^2 + 4x + 2$, then $g(x) =$

A. x^2.
B. $2x^2$.
C. $2x^2 + 4x + 2$.
D. $2x^2 + 8x + 8$.

10. Solve the equation $(x+c)(x-c+1) = x+c$ where c is a constant.

A. $x = c$
B. $x = c - 1$
C. $x = -c$ or $x = c$
D. $x = -c$ or $x = c - 1$

11. Let k be a constant. If the quadratic equation $3x^2 - 12x - 2k = 0$ has two unequal real roots, then the range of values of k is

A. $k \geq -24$.
B. $k > -24$.
C. $k \geq -6$.
D. $k > -6$.

12. If one root of the quadratic equation $6x^2 + kx - 4 = 0$ is 2, then the other root is

A. -2.
B. $-\frac{1}{3}$.
C. $\frac{1}{3}$.
D. 4.

Section B(1) (18 marks)

13. Simplify $\dfrac{(m^5 n^3)^{-4}}{n^8}$ and express your answer with positive indices. (3 marks)

14. Consider the formula $\frac{y}{5} = \frac{3x-2}{6}$.

(a) Make x the subject of the above formula.

(b) If the value of y is increased by 5, write down the change in the value of x.

(4 marks)

15. Factorize

(a) $4a - 10b$,

(b) $2a^2 - 3ab - 5b^2$,

(c) $4a - 10b - 2a^2 + 3ab + 5b^2$.

(4 marks)

16. Solve the equation $2(4x^2+1)=-11x$. (Leave your answers in surd form if necessary.)

(3 marks)

17. (a) Rationalize the denominator of $\dfrac{3}{\sqrt{2}}$.

(b) Hence, simplify $3\sqrt{2}-\dfrac{3}{\sqrt{2}}-\dfrac{\sqrt{2}}{3}$.

(4 marks)

Section B(2) (18 marks)

18. Given that $f(x) = ax^2 + bx + 3$, where a and b are constants.

(a) If $f(-1) = 1$ and $f(3) = 33$, find the values of a and b. (4 marks)

(b) If $g\left(\frac{x}{2}\right) = f(x)$,

(i) find the algebraic representation of $g(x)$,

(ii) hence, find the value of $g(5)$. (3 marks)

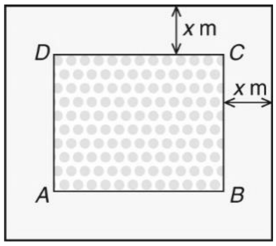
19. The figure shows a rectangular garden $ABCD$, where $AB = 10$ m and $BC = 8$ m. The garden is surrounded by a path of width x m. It is given that $S(x)$ is a function for the area (in m^2) of the path.

(a) Find the algebraic representation of $S(x)$. (2 marks)

(b) Find the domain of $S(x)$. (1 mark)

(c) (i) If the width of the path is 2 m, find the area of the path.

(ii) If the area of the path is 144 m^2, find the width of the path. (3 marks)



20. If the quadratic equation $x^2 + 2x + 3 = k(x^2 + 2)$ has equal real roots where k is a constant,

(a) find the possible values of k, (3 marks)

(b) solve the equation by taking the integral value of k. (2 marks)

Section C (8 marks)

21. It is given that α and β are the roots of the quadratic equation $x^2 - 4x - 2 = 0$.

(a) Find ,

(i) $\alpha + \beta$,

(ii) $\alpha\beta$,

(iii) $\left(\dfrac{1}{\alpha+2}\right)\left(\dfrac{1}{\beta+2}\right)$,

(iv) $\dfrac{1}{\alpha+2} + \dfrac{1}{\beta+2}$. (6 marks)

(b) Form a quadratic equation in x with the roots $\dfrac{1}{\alpha+2}$ and $\dfrac{1}{\beta+2}$. (2 marks)

END OF PAPER