FUKIEN SECONDARY SCHOOL

S2 First Term Uniform Test (2020-2021)

Mathematics

(1 hour)

Date: 22nd October 2020 Name:_____

Time: 8:30 a.m. - 9:30 a.m. Class: _____ No.: _____

**Instructions to students:**

1. This paper consists of THREE parts, Conventional Questions, Multiple-choice Questions and Bonus Question. There are Section A and Section B in Conventional Questions. Section A carries 52 marks, Section B carries 13 marks, Multiple-choice Questions carry 14 marks and Bonus Question carries 5 marks.

2. The maximum score of this paper is 79.

3. Attempt **ALL** questions in Conventional Questions and Multiple-choice Questions. Write your answers in the spaces provided in this Question / Answer Book.

4. Unless otherwise specified, show your workings clearly.

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

**Section A (52 marks)**

1. Expand
   (a) $(2 - u)^2$,
   (b) $(4x + 5)(4x - 5)$.

(2 marks)

2. Express the following rates with the units given in brackets.
   (a) The cost of 16 kg of flour is $432. (*$/kg*)
   (b) The volume of 5 bottles of milk is 1.6 L. (*mL/bottle*)
   (c) The time required to travel a distance of 240km is 2 hours 30 minutes. (*km/h)*

(6 marks)

3. Factorize the following expressions.
   (a) $8m^2p^2 + 16m^3p$
   (b) $3a(x - 2y) - b^2(x - 2y)$
   (c) $2px - 5p - 2qx + 5q$
   (d) $14ab^2 + c + 7b^2c + 2a$

(10 marks)

4. Find the unknown constants $A$ and $B$ such that $3x(x - A) + 5x \equiv Bx^2 - 4x$. (4 marks)

5. Simplify the following ratios.

(a) $\frac{15}{11} : \frac{12}{11} : \frac{9}{11}$

(b) 27 min : 1.5 h : 540 s

(4 marks)

6. If $\frac{x}{14} = \frac{z}{8}$ and $\frac{y}{27} = \frac{z}{12}$, where $x$, $y$ and $z$ are non-zero numbers, find $x : y : z$.

(4 marks)

7. Find the value of $x$ if $18 : x = 10 : \frac{x+1}{2}$. (3 marks)

8. In the astronomy club, the ratio of the number of boys to that of girls is 7 : 5. After six more boys joining the club, the ratio becomes 2 : 1. Find the number of girls in the club.

(4 marks)

9. If $4m + n = 5n - 2m$, where $m$ and $n$ are non-zero numbers, find
   (a) $m : n$,
   (b) $(3m - n) : (9m + 2n)$.

(5 marks)

10. (a) Expand $(x - y)(x + 2y)$.
    (b) Using the result of (a), factorize $x^2 + xy - 2y^2 + 4x - 4y$.

(6 marks)

11. Determine whether the equation $4 - (m + 1)^2 = (1 - m)(m + 3)$ is an identity. (4 marks)

**Section B (13 marks)**

12. A student claims that the difference between the squares of two consecutive positive integers must be an odd number. Do you agree? Explain your answer. (5 marks)

13. The price rate of tea of brand *X* is \$40/kg and the price of 400 g tea of brand *Y* is \$80.
    (a) Find the price rate of tea of brand *Y* in \$/kg.
    (b) Peter spends \$1 800 on buying the two brands of tea. It is known that the weight of tea of brand *X* bought is 15 kg more than that of brand *Y*.
        (i) How much does he spend on buying tea of brand *X*?
        (ii) He mixes the tea of two brands bought. Find the price rate of the mixture in \$/kg.

(8 marks)

**Multiple-choice Questions (14 marks)**

Each question carries 2 marks. Write down the correct answers in the boxes.

| 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|
| | | | | | | |

14. If $K$, $M$ and $N$ are non-zero constants such that $3x^2 + 7Nx + K \equiv (3x + M)(x + N)$, find the value of $\frac{M}{N}$.

    A. 2
    B. 4
    C. 6
    D. 7

15. Factorize $6xz - 8yz + 16y^2 - 12xy$.

    A. $2(z + 2y)(3x - 4y)$
    B. $2(z + 2y)(3x + 4y)$
    C. $2(z - 2y)(3x - 4y)$
    D. $2(z - 2y)(3x + 4y)$

16. Which of the following are not identities?

    I. $3(x + 6) = 3x + 6$
    II. $(4x)(4x) = 16x^2$
    III. $5(u - v) = 5(v - u)$

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

17. Which of the following is/are the factor(s) of $q(2p + 1) - 3(2p^2 + p)$?

    I. $2p + 1$
    II. $q - 3$
    III. $q - 3p$

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

18. The scale of a map is 1 : 500. If the actual length of a rectangular garden is 24 m, find the length of the garden on the map.
    A. 4.8 cm
    B. 12 cm
    C. 1.2 m
    D. 4.8 m

19. If $P : Q = 3 : 2$ and $P + Q = 600$, find $P$.
    A. 120
    B. 240
    C. 360
    D. 480

20. John drives at a speed of 50 km/h for $x$ hours and then at a speed of 60 km/h for $y$ hours. If the average speed of the whole journey is 56 km/h, find $x : y$.
    A. 2 : 3
    B. 3 : 2
    C. 3 : 4
    D. 4 : 3

**Bonus (5 marks)**

21. (a) Prove that the equation $(1 + 4x)^2 + 500 = 2x(8x + 9) – 10x + 501$ is an identity. (2 marks)

(b) Hence, determine whether $201^2 + 500$ is a multiple of 409. Explain your answer. (3 marks)

End of Paper