FUKIEN SECONDARY SCHOOL

S5 First Term Uniform Test (2020-2021)

Mathematics Compulsory Part

(1 hour 15 minutes)

Date: 21st October 2020 Name:_____

Time: 8:30 a.m. - 9:45 a.m. Class: _____ No.: _____

Instructions to students:

1. This paper consists of THREE parts, Section A, Section B and Multiple-choice Questions. Section A carries 30 marks, Section B carries 16 marks, Multiple Choice Questions carry 10 marks.

2. The maximum score of this paper is 56.

3. Attempt ALL questions.
   Write your answers in the spaces provided in this Question / Answer Book.

4. Unless otherwise specified, show your workings clearly.

5. Unless otherwise specified, numerical answers should either be exact or correct to 3 significant figures.

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

Section A (30 marks)

1. Make x the subject of the formula $\frac{x-3y}{x-1}=4z$. (3 marks)

2. Simplify $\frac{\left(x^{-2}y^{0}\right)^{2}}{x^{3}y^{-3}}$ and express your answer with positive indices. (3 marks)

3. Factorize
   (a) $-4x^{2}+6x-2$,
   (b) $-4x^{2}+6x-2+2xy-y$. (3 marks)

4. It is given that z varies directly as the cube of x and inversely as the square of y. When $x=1$ and $y=4$, $z=6$.
   (a) Express z in terms of x and y.
   (b) Find the value of y when $x=3$ and $z=4$. (4 marks)

5. If the 1st term and 3rd term of an arithmetic sequence are 2 and 32 respectively.
   (a) Find the general term $T(n)$ of the sequence.
   (b) Determine whether 137 is a term of the sequence. Explain your answer. (4 marks)

6. Consider a geometric sequence 128, 192, 288, … . Find
   (a) the general term $T(n)$ of the sequence,
   (b) the smallest term which is greater than 2500. Explain your answer. (3 marks)

7. It is given that $f(x)$ is a sum of two parts. One part is a constant and the other part varies inversely as the cube root of x. $f(1)=5$ and $f(27)=1$. Find $f(-8)$.
(4 marks)

8. The 1st term and 6th term of a geometric sequence are 1944 and 8 respectively. Find
   (a) the common ratio of the sequence and the value of the 10th term,
   (b) the sum of the first 5 terms of the sequence,
   (c) the sum of the 6th term to the 50th term of the sequence. (6 marks)

Section B (16 marks)

9. S is the sum of two parts. One part varies as t and the other part varies as the square of t. The table below shows certain pairs of the values of S and t.

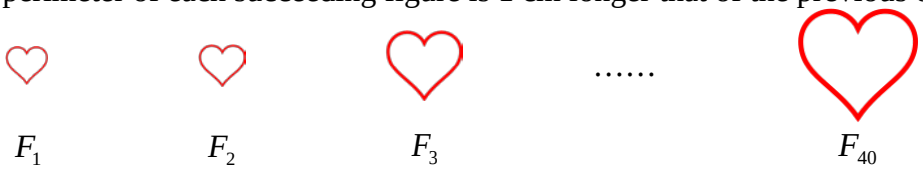
S	0	3	2	−3	−12
t	0	1	2	3	4

(a) Express S in terms of t. (4 marks)

(b) By using the method of completing the square, find the value of t when the value of S is the greatest. (2 marks)

(c) Find the value(s) of t when $S = -4$. (2 marks)

10. F_1, F_2, F_3,..., F_{40} as shown below are 40 similar figures. The perimeter of F_1 is 7 cm. The perimeter of each succeeding figure is 1 cm longer that of the previous one.



F_1 F_2 F_3 ..... F_{40}

(a) (i) Find the perimeter of F_{40}.

(ii) Find the sum of the perimeters of the 40 figures.

(4 marks)

(b) It is known that the area of F_1 is 3 cm^2.

(i) Find the area of F_2.

(ii) Determine with justification whether the area of F_1, F_2, F_3,..., F_{40} form an arithmetic sequence.

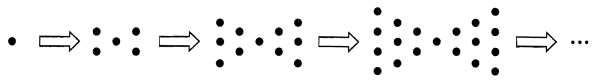
(4 marks)

Multiple-choice Questions (10 marks)

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

11	12	13	14	15

11. In the figure, the 1st pattern consists of 1 dot. For any positive integer n, the $(n+1)$ th pattern is formed by adding $(2n+2)$ dots to the n th pattern. Find the number of dots in the 7 th pattern.



A. 41
B. 55
C. 71
D. 161

12. Which of the following may represent the nth term of the sequence 0, $\frac{-1}{4}$, $\frac{2}{5}$, $\frac{-3}{6}$, $\frac{4}{7}$, … ?

A. $(-1)^n \frac{n-1}{n+1}$
B. $(-1)^n \frac{n-1}{n+2}$
C. $(-1)^{n+1} \frac{n}{n+3}$
D. $(-1)^{n+1} \frac{n-1}{n+2}$

13. The first negative term in the arithmetic sequence 2006, 1998, 1990, is

A. -8.
B. -6.
C. -4.
D. -2.

14. If the sum of the first n term of a sequence $4n^2+n$, which of the following is/are true?

I. 39 is a term of the sequence.
II. The first term of the sequence is 5.
III. The sequence is a geometric sequence.

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

15. If w varies directly as the square root of u and inversely as the square of v, which of the following must be constant?

A. u^4vw^2
B. uv^4w^2
C. $\frac{vw^2}{u^4}$
D. $\frac{v^4w^2}{u}$

END OF PAPER