FUKIEN SECONDARY SCHOOL

S2 First Term Examination (2020-2021)

Mathematics

(1 hour 30 minutes)

Date: 7th January 2021

Name:_____

Time: 8:30 a.m. - 10:00 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 58 marks, Section B carries 22 marks, Multiple-choice Questions carry 20 marks and Bonus Question carries 5 marks.

2. The maximum score of this paper is 100.

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 (58 marks)

1. Make x the subject of the formula $y+2=\frac{x-4}{2}$.

(3 marks)

2. Simplify $\frac{24xy^2}{3^2x^3y}$ and express your answer with positive indices.

(3 marks)

3. In Figure 1, trapezia $ABCD$ and $EFGH$ are similar figures.

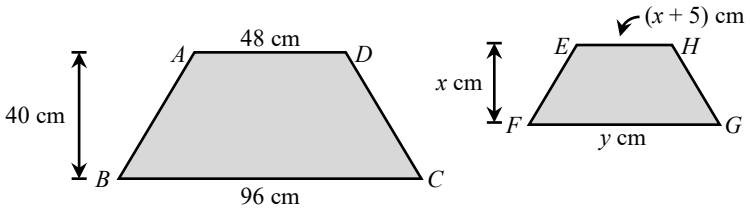

Figure 1

Find x and y.

(4 marks)

4. Factorize

(a) $x^2 - y^2$,

(b) $x^2 + 2xy + y^2$,

(c) $2x^2 + 8x + 6$.

(4 marks)

5. It is given that $a:b = 1:3$ and $a:c = 3:4$, find

(a) $a:b:c$.

(b) the value of $\dfrac{5b}{2a-3c}$.

(3 marks)

6. The scale of the model of a mountain is 1 : 8000. If the actual height of the mountain is 500 m, find the height (in cm) of the mountain in the model.

(3 marks)

7. Solve the simultaneous equation $\begin{cases} x+y=7 \\ 2x-y=2 \end{cases}$.

(4 marks)

8. It is given that $3\left(x^2+4B\right) \equiv A\left(x^2-4\right)$. Find the values of A and B.

(4 marks)

9. Simplify the following expressions.

(a) $\dfrac{4x}{15y^2} \div \dfrac{2}{3xy}$

(b) $\dfrac{7x+3y}{3x-5y} + \dfrac{13y+x}{5y-3x}$

(5 marks)

10. It is given that $\dfrac{1}{f} = \dfrac{1}{u} + \dfrac{1}{v}$.

(a) Make v the subject of the formula.

(b) If $u = 20$ and $f = 16$, find the value of v.

(5 marks)

11. (a) Factorize $3a^2 - ab - 2b^2$.

(b) Hence, factorize $3a^2 - ab - 2b^2 + 2a - 2b$.

(4 marks)

12. Simplify the following expressions.

(a) $\dfrac{x^2 + 6x + 9}{x^2 + 8x + 15}$

(b) $\dfrac{7}{3x + 6} - \dfrac{2}{x + 2}$

(6 marks)

13. It is given that $M(0,m)$ is a point on the graph of $2x-5y-20=0$.
    (a) Find the value of m.
    (b) Determine whether the graph passes through the point $(5,-2)$.

(5 marks)

14. The cost \$$C$ of coating a tank with silver is given by the formula $C=\frac{h(9t+4w)}{10}$, where t cm is the thickness of the tank, h cm is the height of the tank and w kg are the weight of the tank.
    (a) Make w the subject of the formula.
    (b) The cost of coating the prism with silver is \$29.6. If $t=6$ and $h=4$. Find the weight of the tank.

(5 marks)

Section B (22 marks)

15. Factorize the following expressions.

(a) $27x^3+125y^3$

(b) $27x^3+125y^3+3x+5y$

(5 marks)

16. (a) Figure 2 shows the graph of $x+2y=-3$. Solve the simultaneous equations $\begin{cases}2x=y+4\\x+2y=-3\end{cases}$ by adding a suitable straight line on the rectangular coordinate plane.

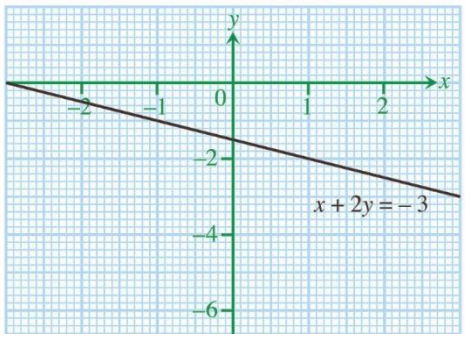

Figure 2

(b) It is given that a and b are two numbers. The sum of a and 3 is equal to the product of b and -2. The sum of 4 and b is equal to the product of a and 2. Find these two numbers.

(6 marks)

17. It is given that the sum of the cubes of all integers from 1 to n is $\frac{n^2(n+1)^2}{4}$,

i.e. $1^3 + 2^3 + 3^3 + \cdots + n^3 = \frac{n^2(n+1)^2}{4}$.

(a) Find the value of $1^3 + 2^3 + 3^3 + \cdots + 50^3$.

(b) Hence find the value of $51^3 + 52^3 + 53^3 + \cdots + 100^3$.

(4 marks)

18. Patrick has y candies originally. He gives $\frac{2}{5}$ of the candies to Susan, then he gives $\frac{1}{3}$ of the rest to Tommy.

(a) (i) Express the number of candies of Susan and Tommy in terms of y.

(ii) Find the ratio of the numbers of candies of Patrick, Susan and Tommy.

(b) If Susan gets 24 candies, find the number of candies of Tommy.

(7 marks)

Multiple-choice Questions (20 marks)

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

19	20	21	22	23	24	25	26	27	28

19. The running speed of a leopard is $16\frac{2}{3}$ m/s. Express the speed in km/h.

A. 30 km/h
B. 40 km/h
C. 50 km/h
D. 60 km/h

20. Determine whether each of the following is factorization or expansion.

(i)	$(2x+3)(x-1)(x+4)$ $=2x^2+9x^2+x-12$
(ii)	$2x^2+9x^2+x-12$ $=(2x+3)(x-1)(x+4)$

	(i)	(ii)
A.	Factorization	Factorization
B.	Factorization	Expansion
C.	Expansion	Factorization
D.	Expansion	Expansion

21. Determine whether a rate or a ratio should be used to relate the quantities in each of the following statements.

(i)	The price of 100g of beef is \$20.
(ii)	The weights of Simon and Peter are 60kg and 130kg respectively.

	(i)	(ii)
A.	Rate	Rate
B.	Rate	Ratio
C.	Ratio	Rate
D.	Ratio	Ratio

22. $\frac{5}{x+5}+\frac{3}{x+3}-\frac{6}{(x+3)(x+5)}=$

A. $\frac{3}{x+3}$
B. $\frac{8}{x+3}$
C. $\frac{3}{x+5}$
D. $\frac{8}{x+5}$

23. Suppose we can exchange 1 Euro for 12 HK dollars and 1 pound for 15 HK dollars. How much pounds can we exchange for 100 Euro? (Give your answer correct to the nearest integer if necessary.)
    A. 33 pounds
    B. 80 pounds
    C. 125 pounds
    D. 333 pounds

24. Which of the following is an identity?
    A. $4x+10=0$
    B. $4x+10=5x$
    C. $4x+25=(x+5)^2$
    D. $3x-5=\dfrac{12x-20}{4}$

25. The price of a packet of potato chips is 4 times that of a can of soft drink. Tony spends \$147 to buy 5 packets of potato chips and 8 cans of soft drinks. The prices of a packet of potato chips and a can of soft drink are \$$x$ and \$$y$ respectively. Find x.
    A. 20
    B. 21
    C. 22
    D. 23

26. $-2x^2-2x+12=$
    A. $(x+3)(x-2)$
    B. $-2(x+3)(x-2)$
    C. $2(x+3)(x-2)$
    D. $-(3-x)(4+2x)$

27. If the fee of 4 music lessons is \$720 and each lesson lasts for 1.5 hours, find the fee of the music lessons in \$/hour.
    A. \$120/hour
    B. \$180/hour
    C. \$270/hour
    D. \$480/hour

28. Given that $x+y+2=0$, find the values of p and q.

x	p	1	q	4
y	0	−3	−4	−6

    A. $p=0$, $q=2$
    B. $p=0$, $q=3$
    C. $p=-2$, $q=2$
    D. $p=-2$, $q=3$

Bonus Question (5 marks)

29. Factorize $x^9 + x^6 + x^3 - 3$.

(5 marks)

End of Paper