FUKIEN SECONDARY SCHOOL

S1 Final Examination (2020-2021)

Mathematics

(1 hour 30 minutes)

Date: 9th June 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 Questions. There are Section A and Section B in Conventional Questions. Section A carries 50 marks. Section B carries 30 marks. Multiple-choice Questions carries 20 marks. Bonus Question carries 6 marks.

2. The maximum score of this paper is 100.

3. Attempt ALL questions in Conventional Questions and Mulitple-choice 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 be either exact or correct to 3 significant figures.

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

Conventional Questions

Section A (50 marks)

1. (a) Round off 2 578.174 5 to 3 significant figures.
   (b) Round down 2 578.174 5 to 1 decimal place.
   (c) Round up 2 578.174 5 to the nearest integer. (3 marks)

2. Simplify the following expressions.
   (a) $(10x - 7y - 4) - (5x + 9y + 3)$ (b) $\dfrac{6x^{13}y^{8}}{18x^{9}y^{12}}$
   (c) $-uv^{6} \times 3(u^{3}v)^{2}$ (d) $(5k + 1)^{2}$ (8 marks)

3. (a) Expand and simplify $(8x - 3)(1 - 4x)$ and arrange the terms in descending powers of x.
   (b) If $x = -2$, find the value of the polynomial obtained in (a). (3 marks)

4. Solve the following equations.

(a) $15 - 3(p - 3) = 5p$ (b) $\frac{3a}{5} + \frac{2a - 7}{3} = 4$ (5 marks)

5. The marked price of a game console is \$1600. When it is sold at the marked price, the profit percent will be 25%.

(a) Find the cost price.

(b) If it is sold at 10% discount, find the profit percent. (5 marks)

6. The following stem-and-leaf diagram shows the distribution of the bus fares of 20 bus routes.

Bus fares of 20 bus routes

Stem ($1)	Leaf ($0.1)
10	*x* 5 9
11	1 4 4
12	0 4 *x* 9
13	2 2 3 5 8 *y*
14	0 3
15	6 8

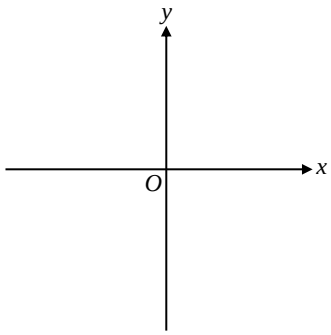
(a) Write down all possible values of x and y.

(b) Find the greatest possible difference between the highest and lowest bus fares.

(c) What percentage of the bus routes have a bus fare higher than $12.5? (6 marks)

7. On a rectangular coordinate plane, there are five points $A(-5, 6)$, $B(-5, 1)$, $C(-1, -4)$, $D(7, -4)$ and $E(2, 6)$. Find the area of the pentagon $ABCDE$.

(4 marks)



8. In Figure 1, B and C are points lying on FG. AC and BD intersect at point E.

   It is given that $\angle FBD = 131°$ and $\angle ACG = 117°$. Find $\angle AED$. (3 marks)

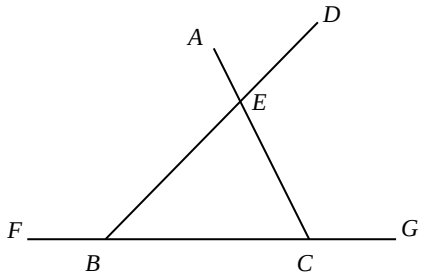


Figure 1

9. In Figure 2, AD // BC and $AD = BC$.

   (a) Prove that $\triangle ABC \cong \triangle CDA$.

   (b) Hence, prove that AB // CD.

(4 marks)

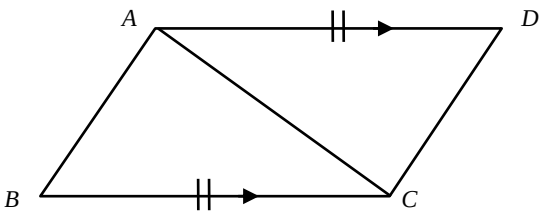


Figure 2

10. In Figure 3, find the area of the shaded region. (4 marks)

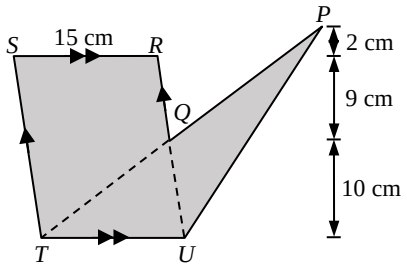
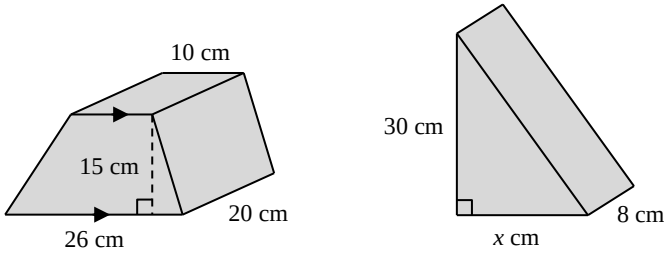


Figure 3

11. Figure 4 shows two metal right prisms *A* and *B*. If one prism *A* is melted and recast to make three prism *B*s, find *x*. (5 marks)



Prism *A* Prism *B*

Figure 4

Section B (30 marks)

12. Janice wants to buy a dress and a belt of marked prices $400 and $150 respectively. Three boutiques sell these items at different discounts as shown in the table below.

Boutique	Discount
A	20% off for all items
B	$50 discount for every $200 of purchase
C	40% off for purchase over $600 (before discount)

In which boutique should Janice choose in order to pay less? Explain your answer. (6 marks)

13. In Figure 5, *BCD*, *AFD* and *CFE* are straight lines. It is given that *AB* // *ED*, $\angle ABD = \angle CFD = 90°$ and *AB* = *CD*.

(a) Prove that $\triangle ABD \cong \triangle CDE$. (4 marks)

(b) A line segment is drawn to join *A* and *E*. It is given that *BC* = 6, *AB* = 3. Find the area of the quadrilateral *ABDE*. (3 marks)

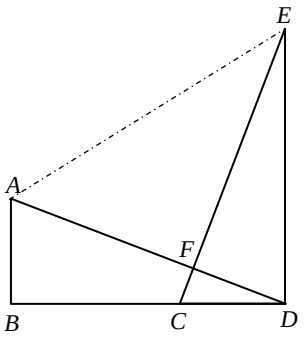


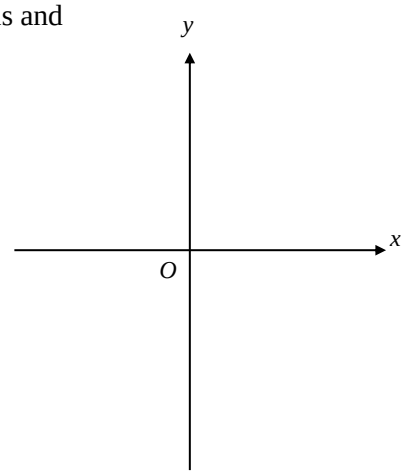
Figure 5

14. On a rectangular coordinate plane, L is a straight line parallel to the x-axis and passes through $(0, -2)$. $M(-4, 2)$ is reflected about L to M_1.
$N(3, -5)$ is translated 7 units upwards to N_1.

(a) Find the coordinates of M_1 and N_1. (3 marks)

(b) Find MM_1 and MN_1. (3 marks)

(c) Find the area of the quadrilateral MM_1NN_1. (2 marks)



15. Figure 6 shows a container in a shape of right prism. Initially, the container is filled with 12 000 cm^3 of water.

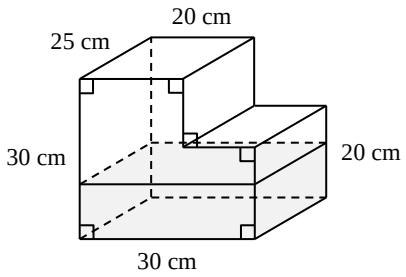


Figure 6

(a) Find the depth of water in the container. (2 marks)

(b) Five identical metal balls each of volume 900 cm^3 are put in the container such that they are totally immersed in water and no water overflows.

(i) Find the depth of water in the container now.

(ii) Find the total wet surface area. (7 marks)

Multiple-choice Questions (20 marks)

Each question carries 2 marks. Put ✓ in the correct boxes.

	16	17	18	19	20	21	22	23	24	25
A										
B										
C										
D										

16. It is given that the units digit of a 5-digit number A is 0. Which of the following must be true?

    I. A is divisible by 2.
    II. A is divisible by 4.
    III. A is divisible by 5.

    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 the H.C.F. of 105, 250 and 525?

    A. 5
    B. 15
    C. 25
    D. 35

18. The initial balance in Ivan's credit card is –$200. He uses his credit card to buy 40 Christmas cards with equal price. After buying the Christmas cards, the balance becomes –$800. Find the price of a Christmas card.

    A. $5
    B. $10
    C. $15
    D. $20

19. It is given that the nth term of a sequence is $2n - 1$. Which of the following are true?

    I. The 7th term is 13.
    II. All terms in the sequence are odd number.
    III. All terms in the sequence are positive.

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

20. If $1.204 < k < 1.205$, then k =

A. 1.2 , *correct to 1 decimal place*.

B. 1.2 , *correct to 1 significant figure.*

C. 1.21 , *correct to 2 decimal places*.

D. 1.21 , *correct to 2 significant figures.*

21. Which of the following is a polynomial?

A. $\frac{2}{2x+1}$

B. $-8 + 2x^2 + 4x$

C. $9 + 3^x$

D. $\frac{x^2}{y} - \frac{11}{2}$

22. Flora's daily working hours have increased from 10 hours to 12 hours but her hourly wage has decreased by 20%. Find the percentage change in her daily income.

A. $-3\frac{1}{3}\%$

B. −4%

C. 0%

D. +4%

23. In Figure 7, *AB* and *CE* intersect at point *G* while *BF* and *CD* intersect at point *H*. Which of the following are true?

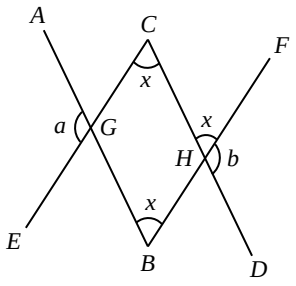


Figure 7

I. *AB* // *CD*

II. *CE* // *FB*

III. $a = b$

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

24. In Figure 8, if *ABCDEF* is congruent to *QRSTUP*, then $\angle PUT$ =

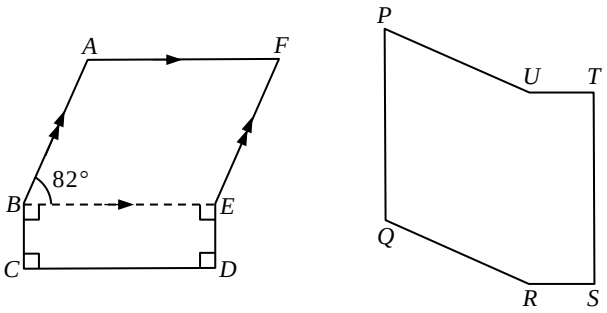
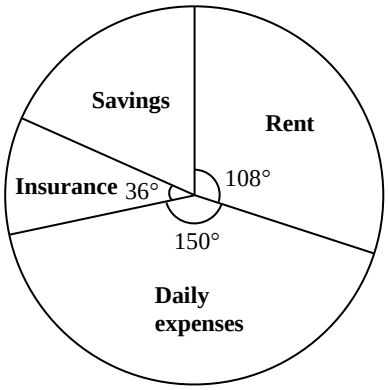


Figure 8

A. 82°.
B. 98°.
C. 172°.
D. 188°.

25. The following pie chart shows the distribution of the monthly expenses of Elaine.

Distribution of the monthly expenses of Elaine



If the rent is $7200, how much is the savings?

A. $3600
B. $4000
C. $4400
D. $4800

Bonus Question (6 marks)

26. In Figure 9, T_k are points on the rectangular coordinate plane in the order of turning corners of a path starting from point A. The path extends indefinitely.

(a) It is known that the sequence of points which lie on Quadrant I is : T_1 , T_5 , T_9 , T_{13} , …
Write down the sequence of points which lie on Quadrant IV.

(b) Let U_k be the sequence of points which lie on Quadrant I.
i.e. $U_1 = T_1$, $U_2 = T_5$, $U_3 = T_9$, $U_4 = T_{13}$, …
Express U_k in terms of $T_{(\ )}$ and k.
Hence, find the coordinates of U_{506} and T_{2020} .

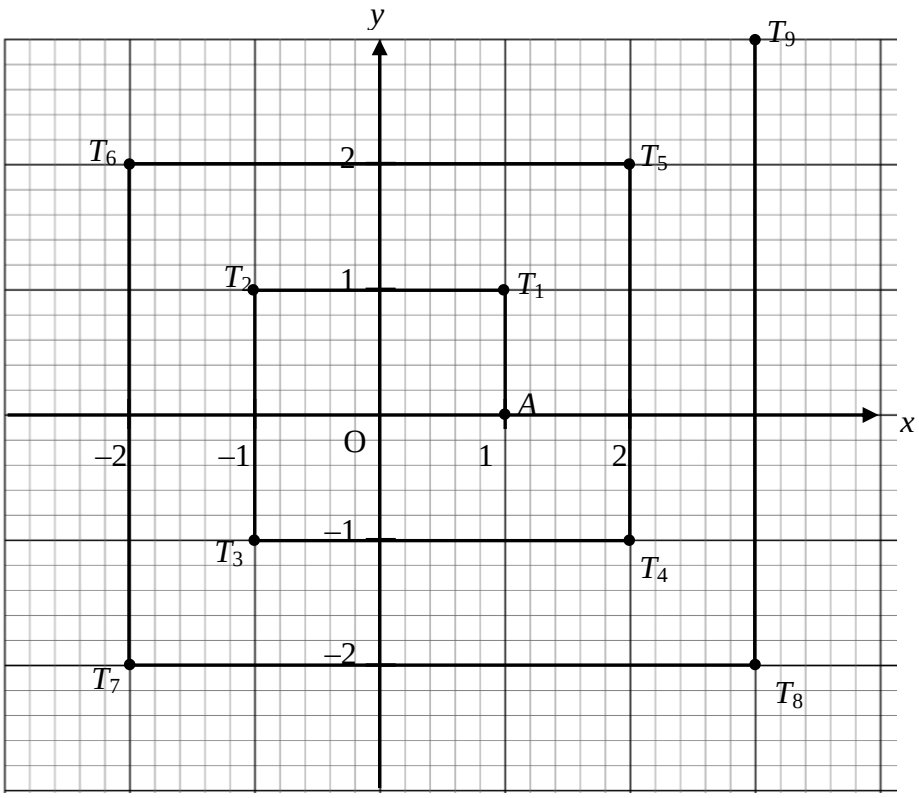


Figure 9

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