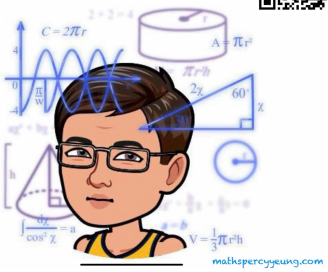


FINAL EXAMINATION 2022 – 2023
FORM ONE MATHEMATICS (PAPER I)
(Question-Answer Sheet)

Jun., 2023

1. Total no. of pages: 15 pages
2. Time allowed: 1 hour 15 minutes
3. Total marks of this paper: 100 marks
4. Weighting: 10% from Regular Test; 10% from Formative Assessment; 10% from project, 70% from the Exam
   The score of Paper I counts for 65% of the subject.

Class (No.): 1_____( )

Index No.: _____

Instructions:

1. Attempt **ALL** questions.
2. Write your **index no. class and class no.** on the top of the answer sheet.
3. Write down your solutions on the **SPACE** provided. Clear working steps are required; otherwise, marks will be deducted.
4. The diagrams in this paper are **NOT** necessarily drawn to scale.
5. Correct your answer to 3 significant figures if necessary.
6. Using calculator is allowed.

Section A (40 marks)

1. The difference between two numbers is 7. If the sum of the smaller number multiplied by 3 and the half of the larger number is 70, find the smaller number. (4 marks)

2. (a) Expand $(2a-1)^2$. (2 marks)

(b) Simplify $(\frac{1}{2}a^2+\frac{1}{3}a-2)-(5-2a^2+\frac{1}{2}a)$. (3 marks)

3. (a) Round down 2.3456 to 2 decimal places.
   (b) Round up 2.3456 to 2 significant figures.
   (c) Round off 2.3456 to the nearest hundredth. (3 marks)

4. The selling price of a smart watch is \$2800. If it was sold with 30% off, find the marked price.

(2 marks)

5. (a) $A(-2, 3)$ is translated rightwards by 7 units and upwards by 6 units to B. Write down the coordinates of B.

   (b) $C(5, a)$ is reflected with respect to the x-axis and translated downwards by 3 units to D. If D lies on the x-axis, find the value of a.

(4 marks)

6. Simplify $\left(\frac{x^2}{-y^5}\right)^2 (y^2)^3$ and express your answer with positive indices. (4 marks)

7. Solve $\frac{6y+4}{6} = \frac{2y+1}{3}$. (4 marks)

8. It is given that the air temperature is decreased by 6°C for every 1000 m in altitude. Suppose the air temperature at an altitude of 3000 m is 7°C.

   (a) If a plane is at an altitude of 12 000 m, what is the air temperature outside the plane?

   (b) If a plane detects that the air temperature outside is –23°C, what is the altitude of the plane?

(6 marks)

9. Consider the formula $A = \frac{mx^2 - 3x}{x + n}$, where m and n are constants. It is given that when $m = -5$ and $x = 1$, then $A = 8$.

(a) Find n. *(4 marks)*

(b) Using the result of (a), find A when $x = -6$.

10. Complete the following table. **(4 marks)**

	Coordinates before transformation	Type of transformation	Coordinates after transformation
(i)	$A(-2, 5)$	Translate to the right by 4 units and then reflect about the x-axis	$A'(\_\_\_, \_\_\_)$
(ii)	$B(3, -2)$	Reflect about the y-axis and then rotate anti-clockwise about the origin through 90°	$B'(\_\_\_, \_\_\_)$
(iii)	$C(\_\_\_, \_\_\_)$	Rotate clockwise about the origin through 180° and then reflect about the y-axis	$C'(-5, 4)$
(iv)	$D(\_\_\_, \_\_\_)$	Reflect about the y-axis and then translate to the left by 2 units.	$D'(-6, -3)$

Section B (34 marks)

11. Figure 1 shows a right prism of volume 540 cm^3.

(a) Find h. (4 marks)

(b) Find the total surface area of the prism. (3 marks)

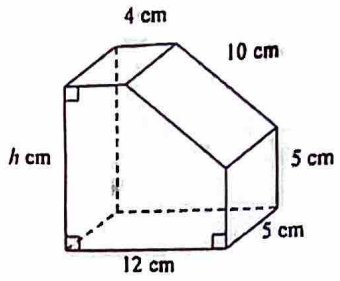
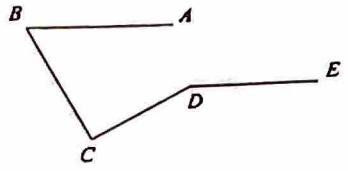


Figure 1

12. In the figure, $BA \parallel DE$. If $\angle BCD = 87°$ and $\angle CDE = 151°$, find $\angle ABC$. (5 marks)



13. In a school, there are 800 students. 40% of the students are boys. If the number of boys is increased by 10% while the number of girls is decreased by 15%, find the percentage change in the number of students in the class. (7 marks)

14. 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 6 8
14	0 3
15	6 8

(a) Write down all possible values of x. (2 marks)

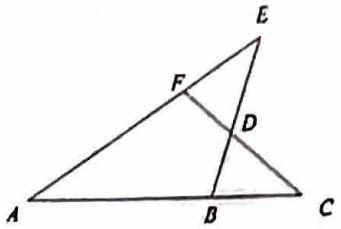
(b) Find the greatest possible difference between the highest and lowest bus fares. (2 marks)

(c) What percentage of the bus routes have a bus fare higher than $12.5? (3 marks)

15. In the figure, B and F are points lying on AC and AE respectively such that $\angle AFC = \angle ABE$. BE and CF intersect at point D. It is given that $AB = AF$.

(a) Prove that $\triangle ABE \cong \triangle AFC$. **(4 marks)**

(b) If $\angle AEB = 38°$ and $\angle EAC = 35°$, find $\angle FDB$. **(4 marks)**



Section C (26 marks)

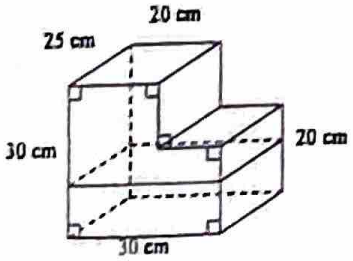
16. It is given that the general term of a sequence is $a_n = (n + 1)(n + 2)$.

(a) Find a_6. (1 mark)

(b) Suppose k is a positive integer. Express the kth and $(k + 1)$th term of the sequence in terms of k. (3 marks)

(c) If the difference between two consecutive terms in the sequence is 70, using the result in (b), find the smaller term. (3 marks)

17. The figure shows a container in a shape of right prism. Initially, the container is filled with 12 000 cm^3 of water.



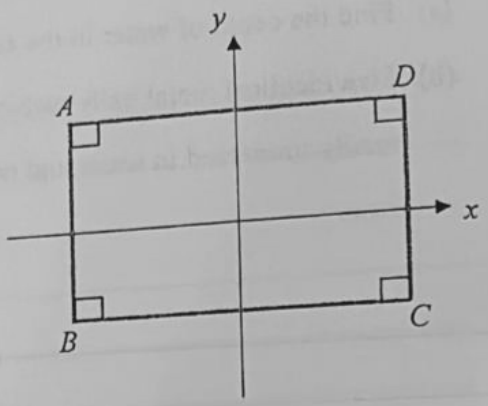
(a) Find the depth of water in the container. (2 marks)

(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. Find the depth of water in the container now. (4 marks)

18. The vertices of rectangle $ABCD$ in the figure are $A(a-3, 4)$, $B(-5, b+1)$, $C\left(\frac{c}{3}, -4\right)$ and $D\left(6, \frac{2d-1}{2}\right)$. It is given that AB is perpendicular to the x-axis.

(a) Find a, b, c and d. (4 marks)

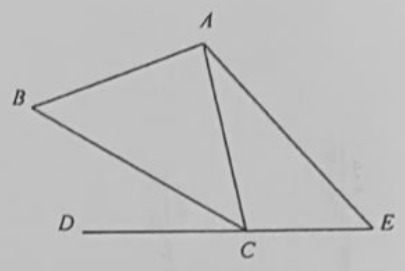
(b) Find the area of the rectangle $ABCD$. (3 marks)



19. In the figure, C is a point lying on DE. It is given that $\angle ABC = 56°$, $\angle AEC = 53°$ and reflex $\angle BAE = 252°$.

(a) Suppose $\angle BAC = x$. Express $\angle CAE$ in terms of x. (2 marks)

(b) Hence, Find $\angle BCD$ (4 marks)



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