SFX F2 2023-24 First Term Exam paper 1

FIRST TERM EXAMINATION 2023-2024
FORM TWO MATHEMATICS (PAPER I)
(Question-Answer Book)

Jan., 2024

1.	Total number of pages:	13
2.	Time allowed:	1 hour 15 minutes
3.	Total mark of this paper:	100 marks
4.	Weighting:	10% from regular test; 10% from formative assessment; 80% from exam The score of Paper I counts for 65% of the subject total.

Index No.: _____ Class (No.): 2_____( )

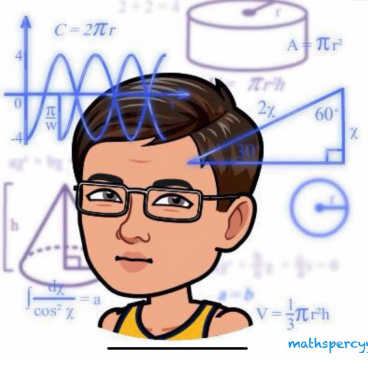
Instructions:

1. Attempt **ALL** questions.
2. Write your **index no., class and class no.** in the spaces provided on Page 1.
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. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.

Section A (43 marks)

1. Simplify the following ratios.

(a) $\frac{3}{8}:\frac{4}{5}$ (b) 380 g : 9.5 kg (3 marks)



2. Determine whether $\frac{2-3x}{6} - \frac{x}{3} = \frac{2-5x}{6}$ is an identity. (3 marks)

3. Factorize

(a) $2x^3 + x^2y$,

(b) $2x^3 + x^2y - 2xy^2 - y^3$. (5 marks)

4. Factorize

(a) $16m^2 - 8mn + n^2$,

(b) $16m^2 - 8mn + n^2 - 9k^2$. (4 marks)

5. Let a, b and c be non-zero numbers. If $a : b = 2 : 5$ and $b : c = 4 : 3$, find the value of $(a + c) : (b + c)$. (5 marks)

6. Simplify each of the following expressions.

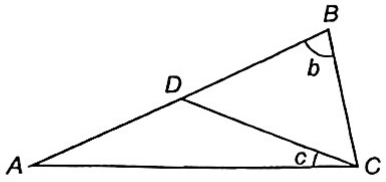
(a) $\frac{2}{h-2}+\frac{-h}{2-h}$

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

7. Make h the subject of the formula $\frac{hk+l}{h-l}=3$. (4 marks)

8. The volume of a bottle of water is measured as 350 mL, correct to the nearest 5 mL.
   (a) Find the maximum absolute error of the measured volume.
   (b) Find the percentage error of the volume of the bottle of water. (4 marks)

9. In the figure, D is the mid-point of AB. $CD : AB = 1 : 2$. Find $b + c$. (5 marks)



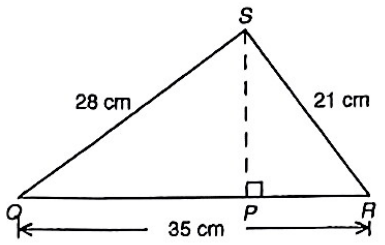
10. In the figure, P is a point on QR such that $SP \perp QR$.

(a) Show that $\triangle QRS$ is a right-angled triangle.

(b) Find the area of $\triangle QRS$.

(c) Hence, find the length of SP.

(5 marks)



Section B (39 marks)

11. Factorize

(a) $2a^2 - 5ab - 12b^2$,

(b) $2a^2 - 5ab - 12b^2 - 12a - 18b$. (5 marks)

12. The perimeter of a rectangular metal plate is 48 cm. The ratio of its length to its width is 5 : 3.

(a) Find the length and the width of the plate.

(b) If the painting cost of the plate is \$5/cm^2, find the amount required to paint both sides of the plate. (6 marks)

13. If $(x^2 + Ax + 1) + (x - B) \equiv Cx^2 + 2$, where A, B and C are constants, find the values of A, B and C. (4 marks)

14. A shop owner bought a batch of ballpoint pens. It is given that the profit $\$P$ he will make can be calculated by the following formula: $P = 20n - 600$, where n is the number of ballpoint pens sold.

(a) If 35 pieces of ballpoint pens are sold, find the profit.
(b) If the shop owner makes a profit of \$1000, find the number of ballpoint pens sold.

(4 marks)

15. Consider the formula $x + 6y + 10 = \frac{3}{4}(3x + 5y)$.

(a) Make x the subject of the above formula.
(b) If the value of y is increased by 20, write down the change in the value of x.

(6 marks)

16. Simplify each of the following expressions.

(a) $3\sqrt{2}(\sqrt{18}+2\sqrt{6})$

(b) $2\sqrt{1\frac{7}{18}}-\frac{3}{\sqrt{72}}$ (5 marks)

17. A pack of rice is termed *mini* if its weight measured as 800 g correct to the nearest g.

(a) Find the least possible weight of a *mini* pack of rice.

(b) Is it possible that the total weight of 23 *mini* packs of rice is measured as 18.3 kg correct to the nearest 0.1 kg? Explain your answer. (5 marks)

18. If the sum of the interior angles of a convex n-sided polygon is 5 times the sum of the exterior angles of the polygon, find the value of n. (4 marks)

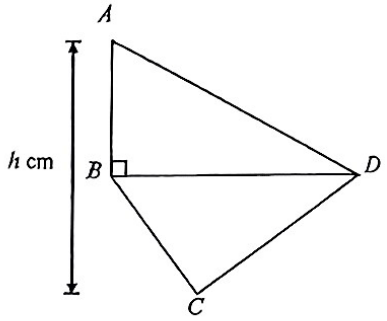
Section C (18 marks)

19. In the figure, $ABCD$ is a quadrilateral where $AB = 24$ cm, $BC = 27$ cm, $CD = 36$ cm and $AD = 51$ cm. Let h cm be the vertical distance between A and C.

(a) Prove that $\triangle BCD$ is a right-angled triangle.

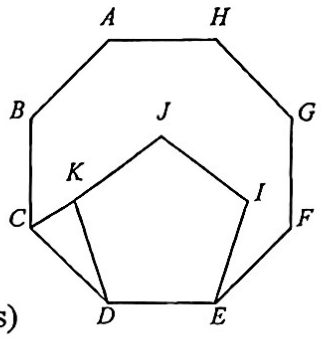
(b) Hence, find the value of h.

(8 marks)



20. In the figure, *ABCDEFGH* is a regular octagon and *DEIJK* is a regular pentagon.

(a) Find $\angle CDK$.
(b) Find $\angle DKC$.
(c) Hence determine whether *CKJ* is a straight line.



(10 marks)