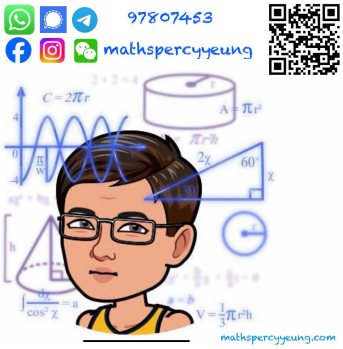
2022-2023 Second Term Form Test

F. 3 Mathematics



Time allowed : 45 minutes

Full mark : 45

This question-answer book consists of 9 printed pages.

Instructions to candidates:

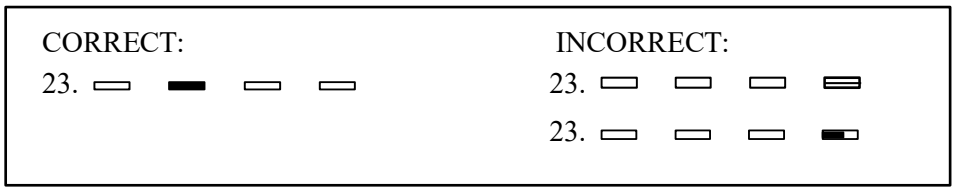
1. This paper must be answered in English with a blue / black ball pen, unless otherwise specified.

2. Write your name, class and class number in the space provided on this cover.

3. This paper consists of TWO sections, A and B.
   Section A carries 20 marks and Section B carries 25 marks.

4. Answer ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Book. Do not write in the margins. Answers written in the margins will not be marked.

5. Mark the answers for Section A on page 4 with an HB pencil as follows:



   Wrong marks should be completely erased with a clean rubber.
   Choose the best answer for each question. All questions carry equal marks in Section A.

6. All diagrams / graphs / charts as part of the answers must be clearly drawn with an HB pencil.

7. Graph paper and supplementary answer sheets will be supplied on request. Write your name, class and class number on each sheet, and fasten them INSIDE this book.

8. Unless otherwise specified, all working must be clearly shown in Section B.

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

10. Unless otherwise specified, numerical answers must be exact.

11. Calculator pad printed with the "HKEA Approved" / "HKEAA Approved" label is allowed.
    Remove the calculator cover / jacket.

Section A (20 marks)

1. The base of a right pyramid is a square. If the height and slant height of the pyramid are 15 cm and 25cm respectively, find the volume of the pyramid.

   A. 1800 cm^3

   B. 3200 cm^3

   C. 3600 cm^3

   D. 4000 cm^3

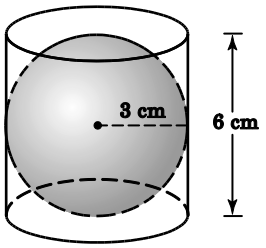
2. The figure shows a solid sphere of radius 3 cm fitting perfectly in a cylindrical container of radius 3 cm and height 6 cm. Find the volume of space left in the container.

   A. 54π cm^3

   B. 36π cm^3

   C. 28π cm^3

   D. 18π cm^3



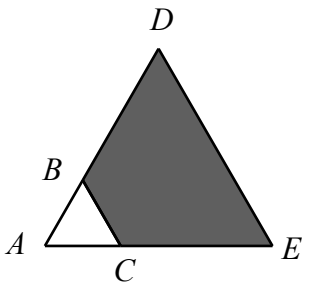
3. The figure shows two equilateral triangles, $\triangle ABC$ and $\triangle ADE$. The ratio of their sides is 1 : 3. Find the ratio of the area of $\triangle ABC$ to that of quadrilateral $BCED$.

   A. 1 : 6

   B. 1 : 7

   C. 1 : 8

   D. 1 : 9



4. In the figure, the slopes of straight lines L_1, L_2 and L_3 are m_1, m_2 and m_3 respectively. Which of the following must be correct?

   I. $m_1 < 0$

   II. $m_2 < 0$

   III. $m_3 > 0$

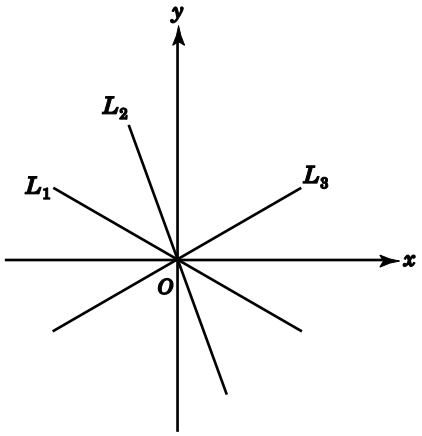
   IV. $m_2 > m_1$

   A. I and II only

   B. II and III only

   C. I, II and III only

   D. I, II, III and IV



Answers written in the margins will not be marked.

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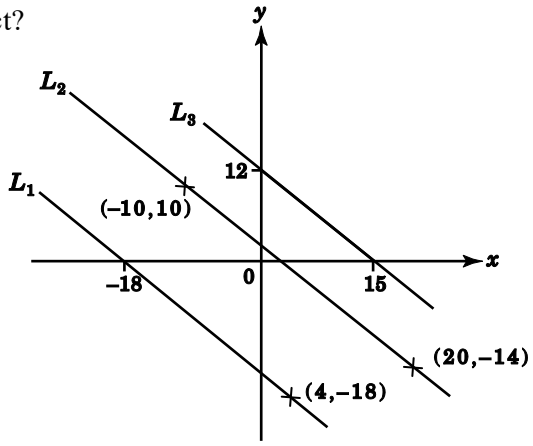
5. Refer to the figure, which of the following is/are correct?



I. $L_1 // L_2$

II. $L_2 // L_3$

III. $L_1 // L_3$

A. I only

B. II only

C. III only

D. I, II and III

6. Which of the following points are endpoints of the line segment perpendicular to the line segment with endpoints $(a , 0)$ and $(0 , b)$?

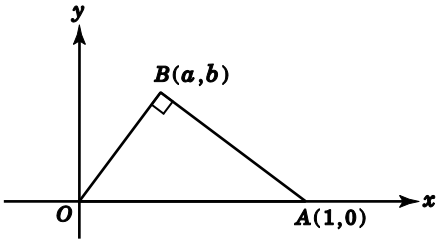
A. $(-b , 0), (0 , a)$

B. $(-a , 0), (0 , b)$

C. $(a , 0), (0 , -b)$

D. $(b , 0), (0 , a)$

7. In the figure, O is the origin. $\triangle OAB$ is a right-angled triangle with $\angle ABO = 90°$. Express b in terms of a.



A. $b = a$

B. $b = \sqrt{2}a$

C. $b = \sqrt{a + a^2}$

D. $b = \sqrt{a - a^2}$

8. $(\sin 30° + \cos 60°)^2 \tan 60° =$

A. $\sqrt{3}$.

B. 1.

C. $\dfrac{\sqrt{3}+3}{2}$.

D. 3.

9. If x and y are acute angles and $x + y = 90°$, which of the following must be true?

   I. $\sin x = \cos (90° - y)$

   II. $\sin (90° - x) = \cos (90° - y)$

   III. $\tan x \tan y = 1$

   A. I and II only

   B. I and III only

   C. II and III only

   D. I, II and III

10. If $\tan\theta\tan 4\theta = 1$, find θ.

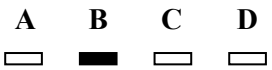
   A. 9°

   B. 18°

   C. 36°

   D. 45°

Use a pencil to mark your answer as follows:



	A	B	C	D
1.	▭	▭	▭	▭
2.	▭	▭	▭	▭
3.	▭	▭	▭	▭
4.	▭	▭	▭	▭
5.	▭	▭	▭	▭

	A	B	C	D
6.	▭	▭	▭	▭
7.	▭	▭	▭	▭
8.	▭	▭	▭	▭
9.	▭	▭	▭	▭
10.	▭	▭	▭	▭

Answers written in the margins will not be marked.

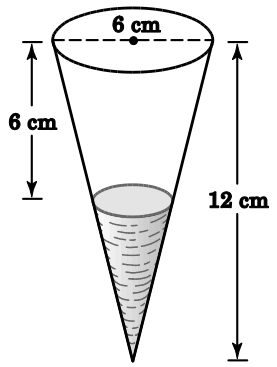
Section B (25 marks)

1. A right conical paper cup of diameter 6 cm and height 12 cm is filled up with water. If water leaks from a tiny hole at the bottom of the paper cup, until the water level drops by 6 cm.

   (a) Find the radius of the water surface. (2 marks)

   (b) Find the volume of the water leaking in terms of π. (3 marks)

   (c) Find the wet surface area of the paper cup when the water level drops by 6 cm. (Correct the answer to 3 significant figures) (2 marks)



Answers written in the margins will not be marked.

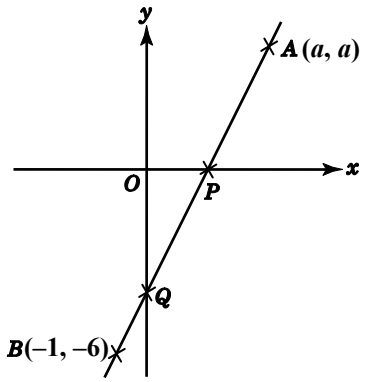
2. In the figure, the straight line passing through $A\ (a\ ,\ a)$ and $B\ (-1\ ,\ -6)$ cuts the x-axis and the y-axis at points P and Q respectively. It is given $BQ : QA = 1 : 4$.

(a) Find the value of a. (2 marks)

(b) Find the coordinates of P and Q. (2 marks)

(c) Find $AP : PQ : QB$. (2 marks)

(d) If a straight line L passing through P is perpendicular to AB, does L pass through $W\ (4\ ,\ -1)$? (2 marks)



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3. Simply the following expressions without using calculators.

(a) $\dfrac{\sin 60° \cos 60°}{\cos^2 45°}$ (2 marks)

(b) $\sin 20° \cos 70° + \sin 70° \cos 20°$ (2 marks)

Answers written in the margins will not be marked.

4. (a) Simplify $\dfrac{\sin\theta\sin(90°-\theta)}{-\tan\theta}$. (3 marks)

(b) Hence, prove that $(\sin\theta-1)(\sin\theta+1)\equiv\dfrac{\sin\theta\sin(90°-\theta)}{-\tan\theta}$. (3 marks)

Answers written in the margins will not be marked.

End of Paper