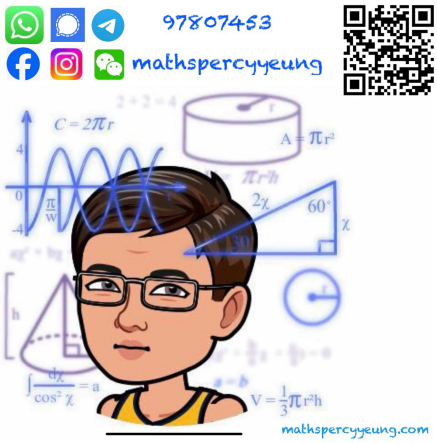
2023-2024 S3
2nd TERM UT1
MATH



2023 – 2024
S3 Second Term Uniform Test 1

MATHEMATICS

Question–Answer Book

9th April, 2024
8:15 am – 9:15 am (1 hour)

This paper must be answered in English

INSTRUCTIONS

1. Write your name, class and class number in the spaces provided on this cover.

2. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question – Answer Book.

3. Unless otherwise specified, all working must be clearly shown and numerical answers should be either exact or correct to 3 significant figures.

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

Sections	Marks
A (1 – 2)	
A (3 – 10)	
A Total	**/50**
B Total	**/20**
TOTAL	**/70**

Section A (50 marks)

1. Solve the equation $\begin{cases} x-10y=11 \\ 5x+y=4 \end{cases}$. (3 marks)

2. In Figure 1, ΔABD and ΔBCD are right-angled triangles. Find CD. (3 marks)
(Leave the answer in surd form if necessary.)

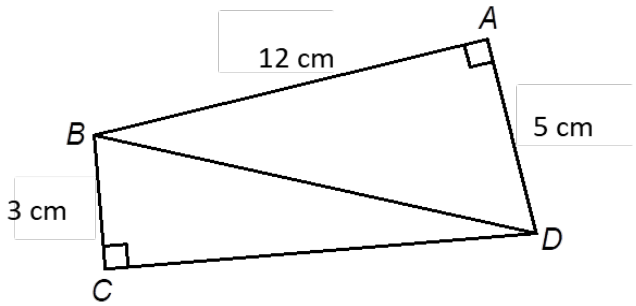


Figure 1

3. In Figure 2, $\angle PRQ = 44°$ and $\angle QPR = 78°$. PS is the altitude of ΔPQR on QR. T is a point on PR such that QT is the angle bisector of $\angle PQR$. PS and QT intersect at U.

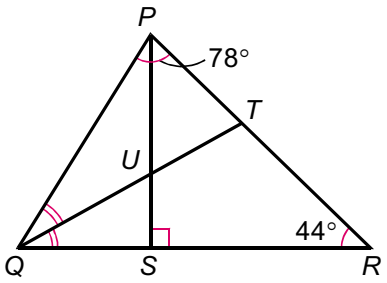


Figure 2

(a) Find $\angle QTR$.

(b) Find $\angle TUS$.

(5 marks)

4. In Figure 3, $BCDE$ is a parallelogram. Diagonals BD and EC intersect at O. ABC is a straight line. Find x and y.

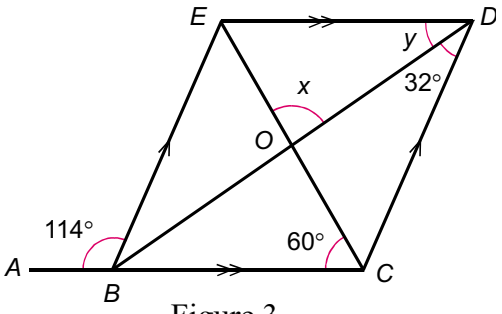


Figure 3

(5 marks)

5. In Figure 4, *DGF* and *EHF* are straight lines. *HG* is the perpendicular bisector of *DF*.

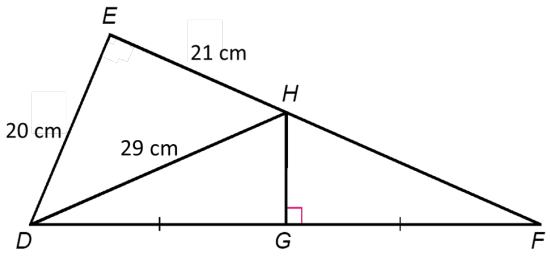


Figure 4

(a) Prove that ΔDEH is a right-angled triangle.

(b) Prove that $\Delta DHG \cong \Delta FHG$

(c) Find the area of ΔDEF.

(7 marks)

6. In Figure 5, *AD//BG//CH. ABC, AEGH* and *CFED* are straight lines. Find *BF* and *FG*.

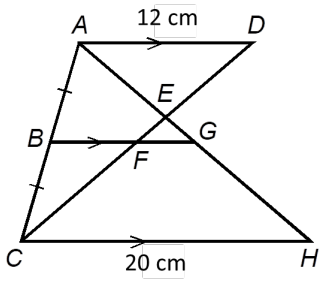


Figure 5

(6 marks)

7. In Figure 6, *VABCD* is a right pyramid, where *ABCD* is the square base with sides of 8 cm each. The length of slant edge is 10 cm. *E* is a point on *CD* such that $VE \perp CD$.

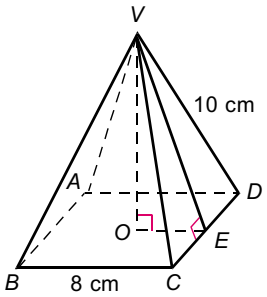


Figure 6

(a) Find the length of *VE* in surd form.
(b) Find the total surface area of the pyramid.

(4 marks)

8. In Figure 7, a small circular cone is cut away from an inverted right circular cone. The height of the remaining frustum is 4 cm, and the radii of the upper base and lower base are 6 cm and 4 cm respectively.

(a) Find the height of the original inverted right circular cone.

(b) Hence, find the volume of the frustum. (Express your answer in terms of π.)

(6 marks)

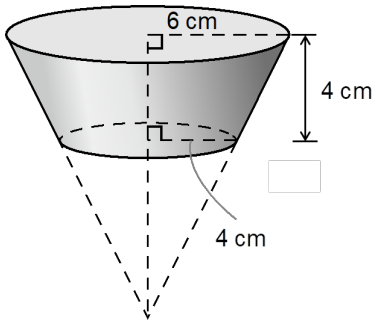


Figure 7

9. Figure 8 shows two points A (8, 6) and B (–4, 0). AB cuts the y-axis at P.

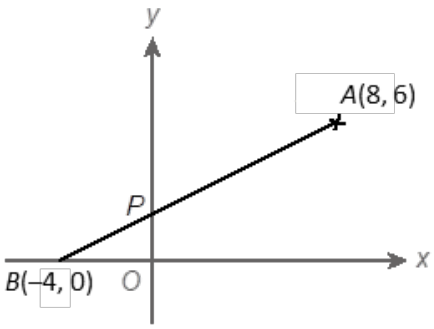


Figure 8

(a) Find $AP : PB$.

(b) Find the coordinates of P.

(c) Find the perimeter of ΔBOP.

(6 marks)

10. The coordinates of A and B are (–3, 6) and (1, –2) respectively. A is rotated clockwise about the origin O through 180° to A'.

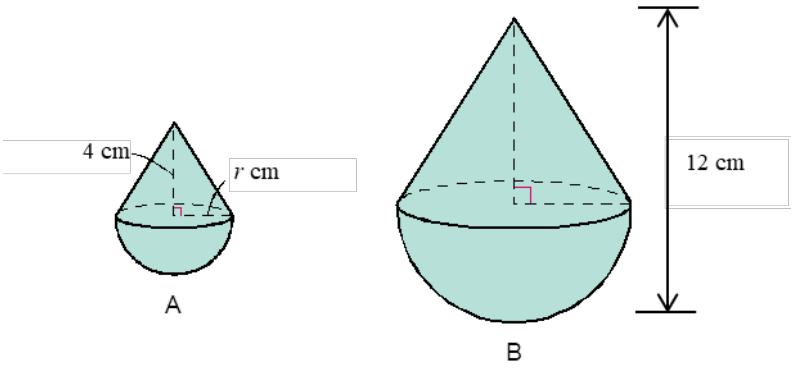
(a) Write down the coordinates of A'.

(b) Determine whether the three points A, B and A' are collinear.

(5 marks)

Section B (20 marks)

11. The following shows two similar solids A and B. Each of the solids is composed of a right circular cone and a hemisphere. It is given that the volumes of the right circular cone and the hemisphere in each solid are the same. The base radius and the height of the smaller right circular cone are r cm and 4 cm respectively.



(a) Find the value of r. (3 marks)

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

(c) Given that the height of solid B is 12 cm, find the total surface area of solid B. (4 marks)

12. Two points $A(2-6a,\ a)$ and $B(8,\ b-1)$ are given.

(a) $M(-4, 7)$ is the mid-point of line segment AB, find the values of a and b. (3 marks)

(b) C is a point on the y-axis such that CM is the altitude of ΔABC. Find the coordinates of C. (4 marks)

(c) Find the area of ΔABC. (3 marks)

END OF PAPER