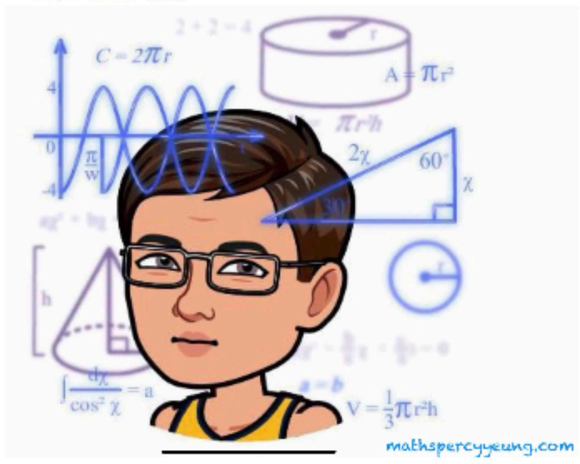


Form 1
160 students

Final Examination 2021-2022

MATHEMATICS
Paper I
Time Allowed: 1 hour 30 minutes

Class: _____ Class No.: _____ Division: _____ Name: _____

Please read the following <u>instructions</u> very carefully.

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

2. This paper carries 100 marks. Attempt ALL questions in this paper. Write your answers in the spaces provided in this Question-Answer Paper.

3. ***ALL*** working must be clearly shown.

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

For Markers' Use Only	
Question No.	**Marks**
1	(6)
2	(7)
3	(7)
4	(7)
5	(5)
6	(5)
7	(6)

For Markers' Use Only	
Question No.	**Marks**
8	(8)
9	(7)
10	(8)
11	(8)
12	(6)
13	(9)
14	(11)
Total	(100)

1. (a) Simplify $(-4x+9)-2(6-7x)$. (2 marks)

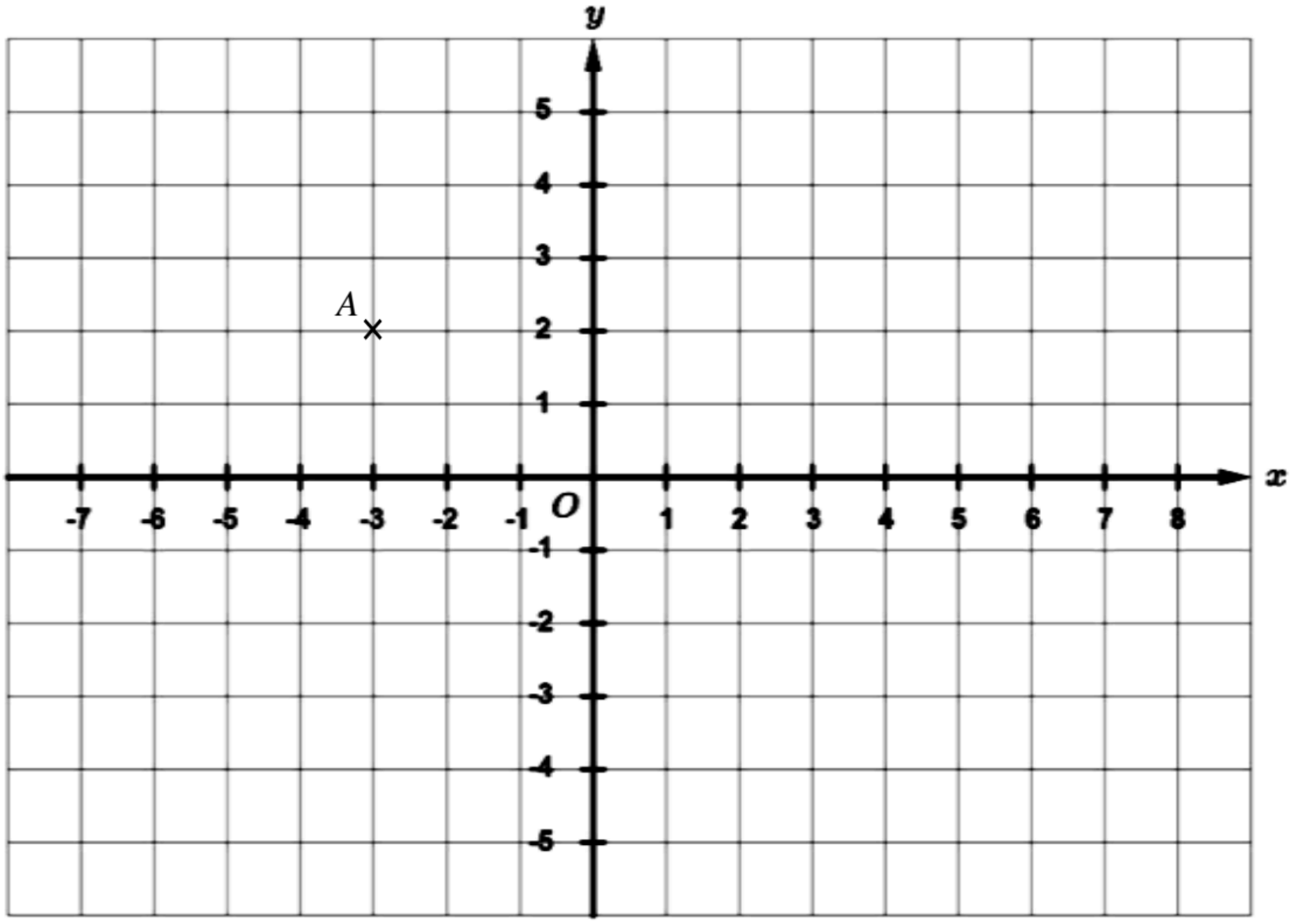
   (b) Hence, expand $[(-4x+9)-2(6-7x)](x-5)$ and arrange the terms in descending powers of x. (4 marks)

2. Simplify the following, where all indices are positive integers.

   (a) $\dfrac{27xy^7}{(3x^4y)^2}$ (4 marks)

   (b) $3^{3m+4} \div 3^{2m-8}$ (3 marks)

3. In the figure, A is a point on a rectangular coordinate plane.

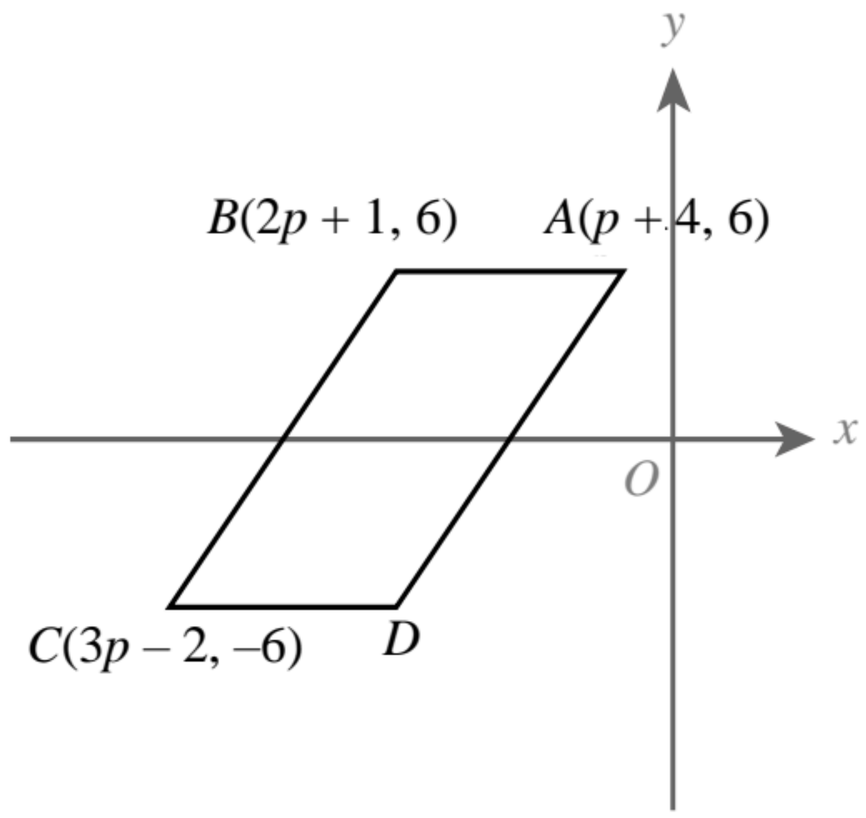


(a) A is translated downwards by 7 units and rightwards by 4 units to obtain the image B. Draw B in the figure and write down the coordinates of B. (2 marks)

(b) A is rotated clockwise about the origin through 90° to obtain the image C. Draw C in the figure and write down the coordinates of C. (2 marks)

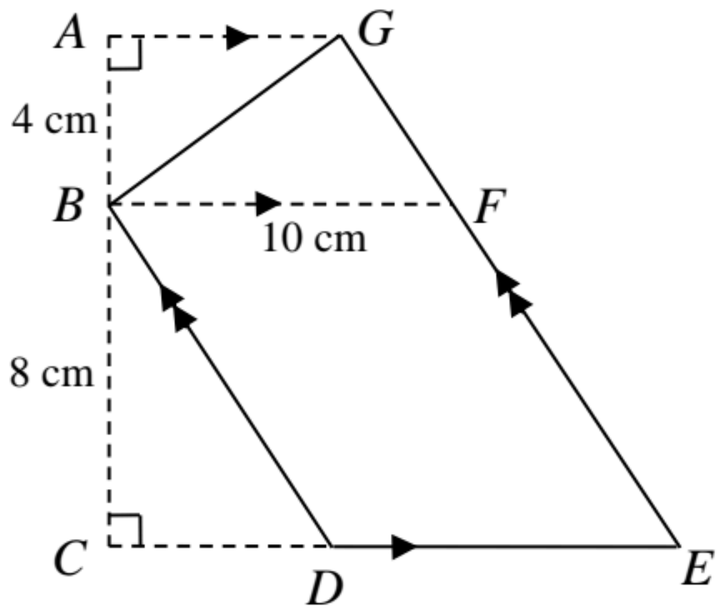
(c) Find the area of ΔABC. (3 marks)

4. In the figure, $ABCD$ is a parallelogram and $AB = 9$.
   (a) Find the value of p. (2 marks)
   (b) Find the coordinates of D. (3 marks)
   (c) Someone claims that D is the image of B when B is reflected with respect to the x-axis. Do you agree? Explain your answer. (2 marks)

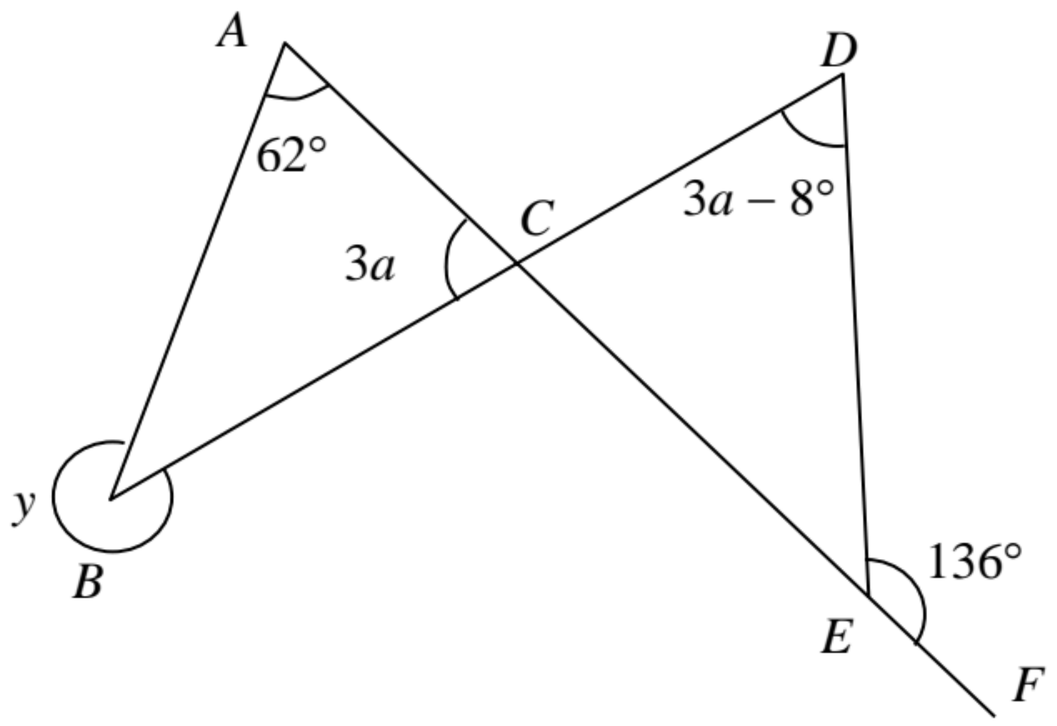


5. (a) If $P(2, -4)$ is translated downwards by 1 unit, and then reflected with respect to the x-axis to obtain P', find the coordinates of P'. (2 marks)
   (b) Mandy claims that if P is reflected with respect to the x-axis, and then translated downwards by 1 unit, the image obtained is the same as P'. Do you agree? Explain your answer. (3 marks)

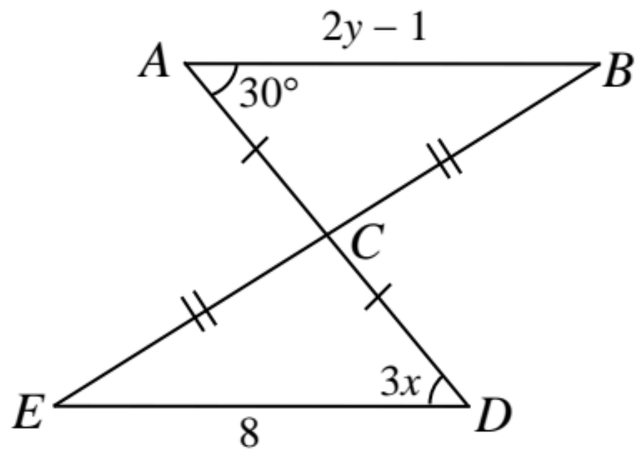
6. In the figure, EFG is a straight line. AG // BF // CE and BD // GE.
   (a) Find the area of trapezium $BDEG$. (2 marks)
   (b) If $CD = x$ cm and $AG = 6$ cm, find the value of x. (3 marks)



7. In the figure, *ACEF* and *BCD* are straight lines. Find *a* and *y*. (6 marks)



8. In the figure, ACD and BCE are straight lines. $AC = DC$ and $BC = EC$.



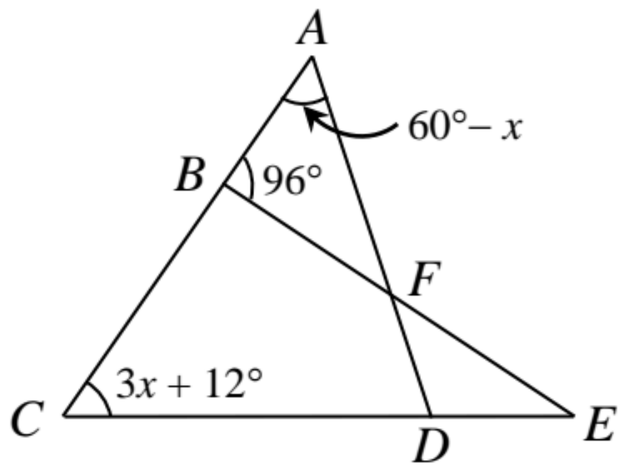
(a) Prove that $\Delta ABC \cong \Delta DEC$. (4 marks)

(b) Find x and y. (4 marks)

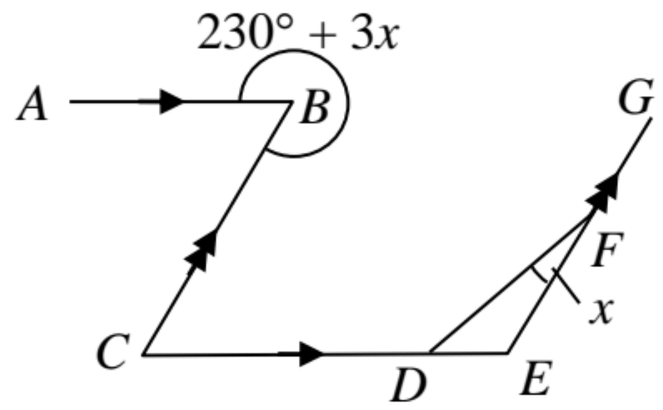
9. In the figure, ABC, AFD, BFE and CDE are straight lines and $AD = CD$.

(a) Find x. (3 marks)

(b) Is ΔBCE an isosceles triangle? Explain your answer. (4 marks)



10. In the figure, *CDE* and *EFG* are straight lines, *AB* // *CE* and *BC* // *GE*.



(a) Express $\angle BCE$ and $\angle FED$ in terms of x. (4 marks)

(b) It is given that $\angle CDF = 154°$.

(i) By using the result in (a), find the value of x. (3 marks)

(ii) According to the lengths of the sides of ΔDEF, what type of triangle is ΔDEF ? (1 mark)

11. ABC is a triangle where $AB = 12m - 3$ and $AC = 6m + 23$. The perimeter of ΔABC is 84.

(a) Find the length of BC in terms of m. (3 marks)

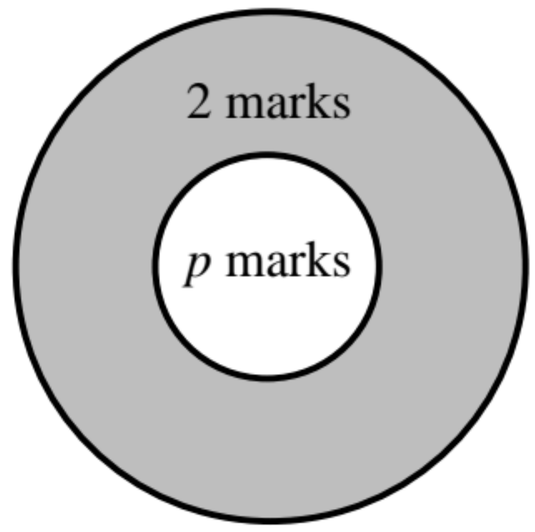
(b) It is given that $\angle B$ is a right angle.

(i) Show that the area of ΔABC is $-108m^2 + 411m - 96$. (3 marks)

(ii) Is the area of ΔABC larger than 300 when $m = 2$? Explain your answer. (2 marks)

12. The figure shows a dartboard with two regions. 2 marks are scored for hitting the grey region, p marks are scored for hitting the white region and no marks are scored for missing the dartboard. Jeffrey throws 11 darts. 1 of them misses the dartboard, 3 of them hit the white region and the rest hit the grey region.

[Express all the answers below in terms of p.]



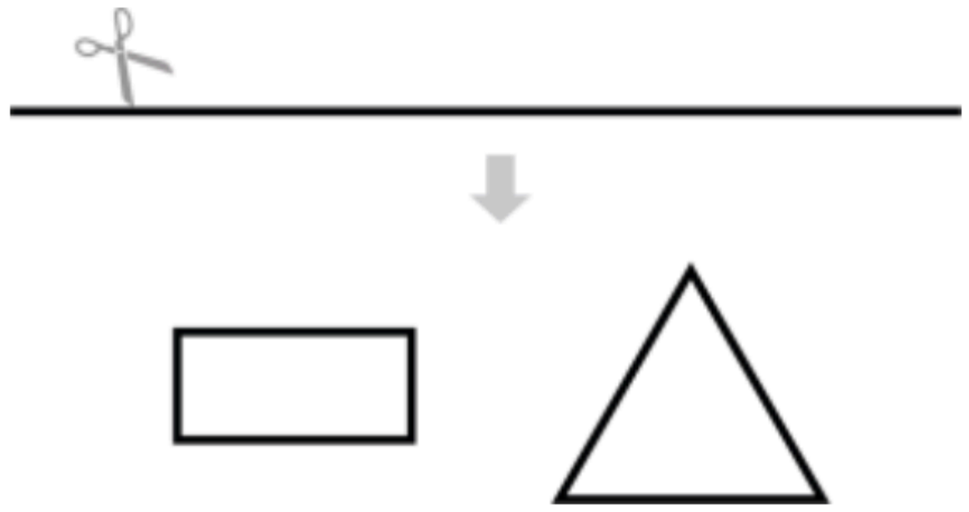
(a) Find the marks Jeffrey scores. (2 marks)

(b) Phoebe hits the white region with 2 darts fewer than Jeffrey, but she hits the grey region with 3 darts more than him.

(i) How many marks does Phoebe score? (2 marks)

(ii) If Jeffrey scores a bonus of $(3p + 2)$ marks, how many marks do Jeffrey and Phoebe score in total? (2 marks)

13. In the figure, a wire of 90 cm long is cut into two portions. They are bent into a rectangle and a triangle, where all the sides of the triangle are equal. The length of the rectangle is 2 times the width. The width of the rectangle is 9 cm shorter than the length of each side of the triangle.



(a) Find the width of the rectangle. (6 marks)

(b) Is the perimeter of the rectangle greater than that of the triangle? Explain your answer. (3 marks)

14. Figure I shows container A (without a lid) which is a right prism. The uniform cross section of container A is formed by two parts. The upper part is a square of side 10 cm and the lower part is a trapezium. Container A is fully filled with water.

(a) (i) Find the area of the uniform cross section of container A. (2 marks)

(ii) Find the volume of water in container A. (2 marks)

(iii) Find the total area of wet surface of container A. (2 marks)

(b) Figure II shows container B which is a triangular right prism. Water in container A is poured into container B and the water level reaches h cm from the base of container B.

(i) Find the value of h. (2 marks)

(ii) Mary claims that the total area of wet surface of container B now is the same as that of container A in (a)(iii). Do you agree? Explain your answer. (3 marks)

Container A:

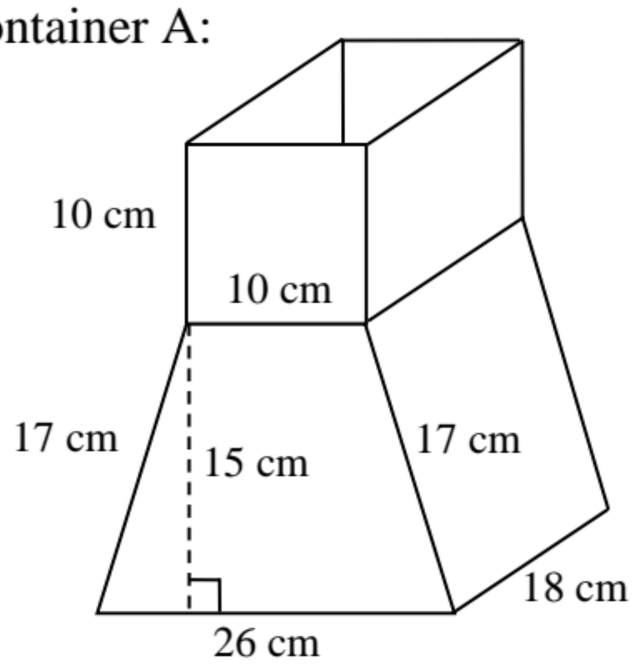


Figure I

Container B:

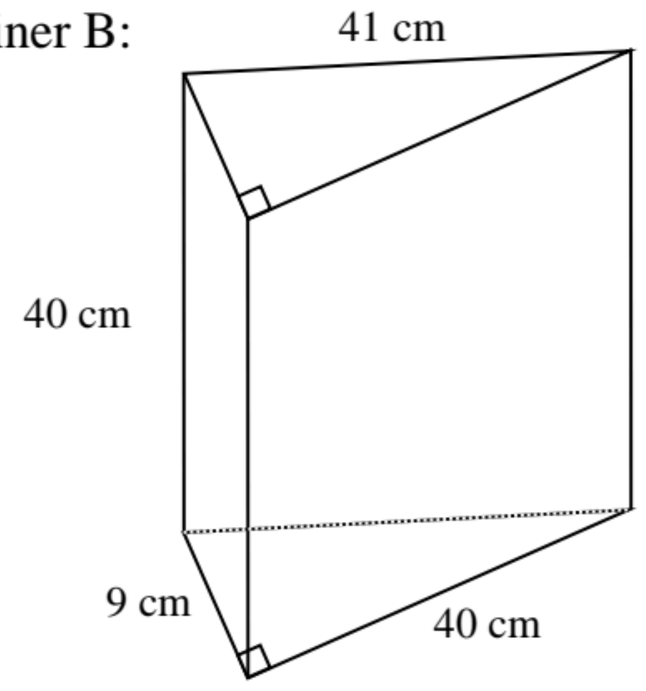


Figure II

*** End of Paper ***