

TB(2B) Ch. 11 Areas & Volumes (II) Conventional Questions

1. [12-13 Mock Exam, 4]

In **Figure 1**, ABC is a semi-circle with centre O and diameter 6 cm and $\angle CAB = 60^\circ$. Find the area of the shaded region.

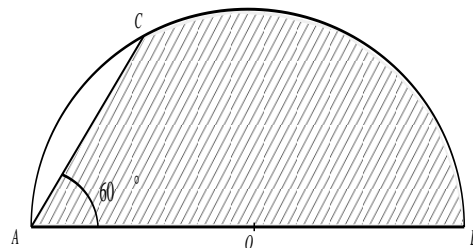


Figure 1

2. [12-13 Final Exam #11]

- (a) **Figure 4a** shows a bottle made up of two cylinders of radii 1 cm and 3 cm. **Figure 4b** shows its cross-section with height h cm. It contains water to a height of 20 cm. The height of the smaller cylinder is x cm. Find the volume of water in terms of π . (2 marks)
- (b) When the bottle is put upside down as shown in **Figure 4c**, the height of water becomes 28 cm. Find the value of x . (2 marks)
- (c) If the outer surface of the bottle (closed) is completely painted with an area of 180π cm², find the value of h . (2 marks)

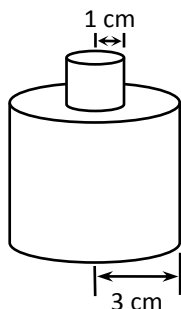


Figure 4a

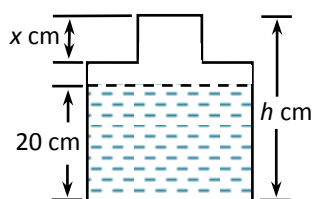


Figure 4b

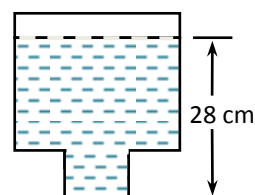


Figure 4c

3. [13-14 Final Exam #11]

Four identical metal cylinders of base radii 2 cm and height h cm are melted and recast into a new cylinder of the same height.

- (a) Find the volume of the new cylinder in terms of π and h . (1 mark)
- (b) Peter claims that the total surface area of the new cylinder is larger than that of the original four metal cylinders. Do you agree? Explain your answer. (3 marks)

4. [13-14 Final Exam #12]

In **Figure 4**, sector AOB with radius 1 cm and sector COD with radius 2 cm have a common centre O . AOD and OBC are straight lines. If the perimeter of sector AOB is equal to that of sector COD , find θ . (3 marks)

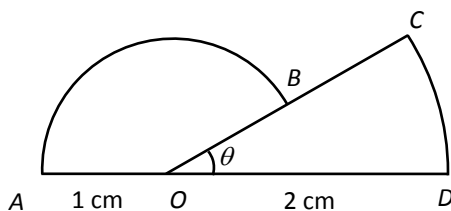


Figure 4

5. [13-14 Final Exam #13]

In **Figure 5(a)**, rectangle $ABCD$ with dimensions a cm \times b cm is inscribed in a circle with diameter d cm. In **Figure 5(b)**, four semi-circles are then constructed with their diameters to be each of the four sides of the rectangle. Show that the total area of the shaded regions is ab cm². (4 marks)

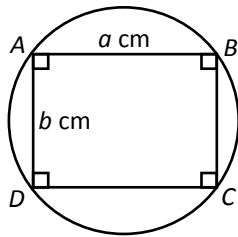


Figure 5(a)

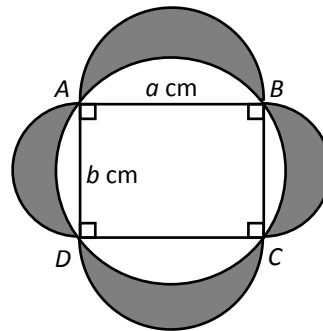


Figure 5(b)

6. [14-15 Final Exam #14]

In **Figure 5**, the sector OAD is cut from the sector OBC . It is given that $\angle BOC = 120^\circ$, $OD = 2r$ cm, $DC = r$ cm and the perimeter of shaded region $ABCD$ is $(6 + 10\pi)$ cm. Find the area of the shaded region $ABCD$. (3 marks)
(Give the answer in terms of π .)

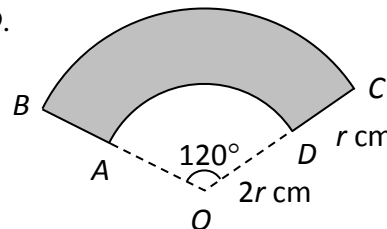


Figure 5

7. [15-16 Final Exam #8]

It is given that a cylindrical tank of base diameter 8 cm and height 20 cm contains some water.

- (a) Find the curved surface area of the tank. (2 marks)
- (b) If the volume of water in the tank is 240π cm³, find the height of the water level. (2 marks)
- (c) Write down the percentage increase of the capacity of the tank if the base diameter and the height are both increased by 10%. (1 mark)

8. [15-16 Final Exam #15]

Figure 7 shows a metallic prism. It has a cross-section of a sector with radius r and height h . The angle subtended by the arc of the sector is 60° . There is a cylinder with same radius and of height k . It is given that the total surface areas of the prism and the cylinder are the same. Janice claims that k is less than half of h . Do you agree? Explain your answer. (3 marks)

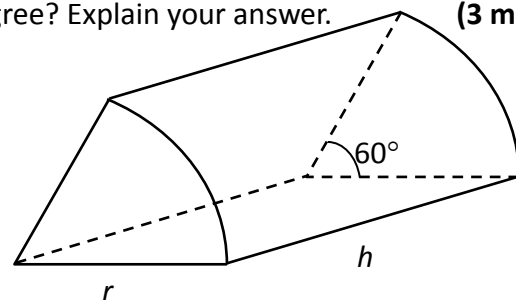


Figure 7

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