

2003 Sample Paper

Question 1

Q1. (a) The area of a square is 49 cm^2 . Find the length of the perimeter in millimeters.

(b) A solid cone has vertical height 6 cm . The radius of its base is 2.5 cm .

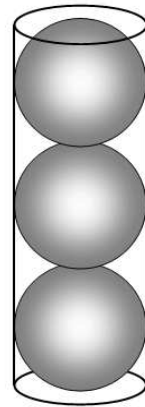
(i) Find the slant height.

(ii) Find the total surface area in cm^2 , correct to two decimal places.

(c) (i) Find, in terms of π , the volume of a sphere of radius 6cm .

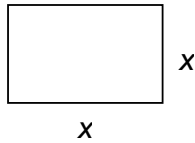
(ii) Three such spheres, placed one on top of the other, fit exactly into a cylindrical tube. Find the internal volume of the tube.

(iii) What fraction of the internal volume of the tube is not occupied by the spheres?



Solution

Q1. (a) The area of a square is 49 cm^2 . Find the length of the perimeter in millimeters.



$$\text{Area } l \times b$$

$$49 = x^2$$

$$x = 7 \text{ cm}$$

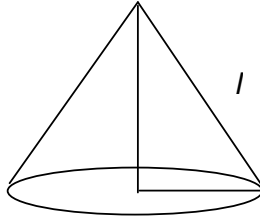
$$x = 70 \text{ mm}$$

$$\text{Perimeter} = 2(l+b)$$

$$\text{Perimeter} = 2(70 + 70) = 280 \text{ mm}$$

(b) A solid cone has vertical height 6cm. The radius of its base is 2.5cm.

- (i) Find the slant height.
- (ii) Find the total surface area in cm^2 , correct to two decimal places.



(i) $h^2 + r^2 = l^2$

$$6^2 + (2.5)^2 = l^2$$

$$36 + 6.25 = l^2$$

$$l^2 = 42.25$$

$$l = 6.5cm$$

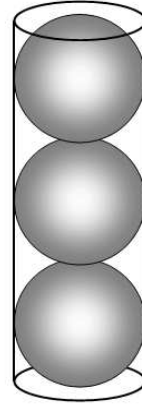
(ii) $A = \pi rl + \pi r^2$

$$A = (3.14)(2.5)(6.5) + (3.14)(2.5)^2$$

$$A = 51.025 + 19.625$$

$$A = 70.65cm^2$$

- (c) (i) Find, in terms of π , the volume of sphere of radius 6cm.
- (ii) Three such spheres, placed one on top of the other, fit exactly into a cylindrical tube. Find the internal volume of the tube.
- (iii) What fraction of the internal volume of the tube is not occupied by the spheres?



(i) $V = \frac{4}{3}\pi r^3$

$$= \frac{4}{3}\pi(6)^3$$

$$= \frac{4}{3}\pi(216)$$

$$= 288\pi$$

- (ii) Cylinder $r = 6$ and $h = 36$

$$V = \pi r^2 h$$

$$= \pi(6)^2(36)$$

$$= 1296\pi \text{ cm}^3$$

- (iii) Empty space = Total – 3 spheres

$$1296\pi - 864\pi = 432\pi$$

$$\text{Fraction of empty space} = \frac{432\pi}{1296\pi} = \frac{1}{3}$$