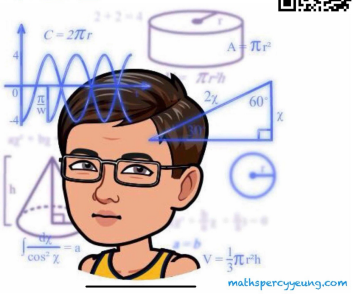
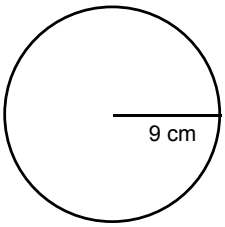


Chapter 12 Areas and Volumes

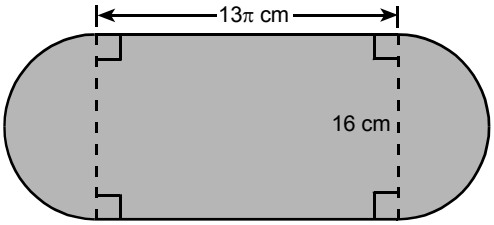
Multiple Choice Questions

1. The figure shows a circle with radius 9 cm. Find its circumference.



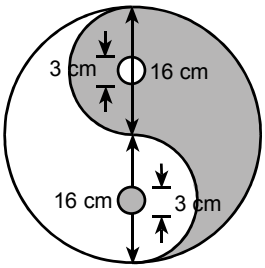
A. 9π cm B. 18π cm C. 57π cm D. 81π cm

2. The figure is formed by a rectangle and two semi-circles at two ends. Find its perimeter.



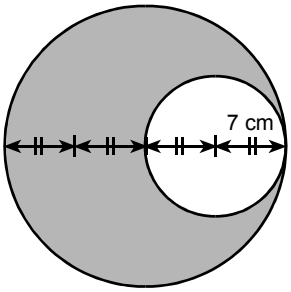
A. 21π cm B. 34π cm C. 42π cm D. 45π cm

3. The figure is formed by circles and semi-circles. Find the perimeter of the shaded region.



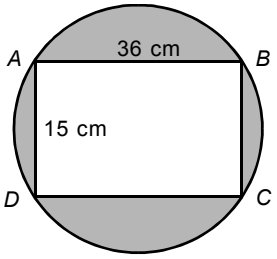
A. 16π cm B. 38π cm C. 48π cm D. 64π cm

4. The figure is formed by circles. Find the perimeter of the shaded region. (Take $\pi = 3.14$ and correct your answer to the nearest cm.)



A. 21 cm B. 42 cm C. 66 cm D. 132 cm

5. In the figure, $ABCD$ is a rectangle. Find the circumference of the circle.



A. 19.5π cm B. 39π cm C. 54π cm D. 18π cm

6. Which of the following is/are correct?

I. π = Area of a circle ÷ (Radius)^2

II. $\pi = \frac{22}{7}$

III. π = Circumference ÷ (2 × Radius)

A. II only B. I and II C. I and III D. I, II and III

7. Find the area of a circle with a diameter of 7 cm.

A. 3.5π cm^2 B. 12.25π cm^2 C. 14π cm^2 D. 49π cm^2

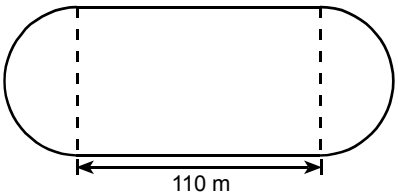
8. A, B and C are three different circles. The radius of A is 15 cm and the diameter of B is 16 cm. If the sum of the areas of A and B is equal to the area of C, find the radius of C.

A. 17 cm B. 23 cm C. 31 cm D. 34 cm

9. Find the area of a circle with a diameter of $\frac{y}{2}$.

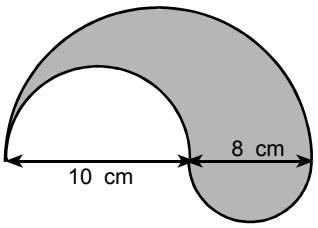
A. $\frac{1}{2}\pi y^2$ B. $\frac{1}{4}\pi y^2$ C. $\frac{1}{8}\pi y^2$ D. $\frac{1}{16}\pi y^2$

10. A playground is formed by a rectangular field and two identical semi-circular fields at two ends as shown in the figure. If the perimeter of the playground is 440 m, find the area of the playground.



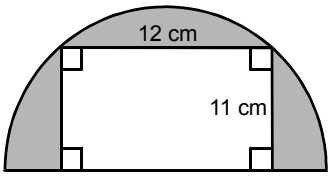
A. $\frac{24206}{\pi}$ m^2 B. $\frac{31362}{\pi}$ m^2 C. $\frac{31419}{\pi}$ m^2 D. $\frac{36300}{\pi}$ m^2

11. Find the shaded area of the following figure which is formed by semi-circles.



A. 20π cm^2 B. 36π cm^2 C. 48π cm^2 D. 72π cm^2

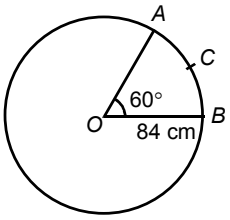
12. Find the shaded area of the following figure which is formed by a semi-circle and a rectangle.



A. $(78.5\pi - 132)\,\text{cm}^2$ B. $(157\pi - 132)\,\text{cm}^2$

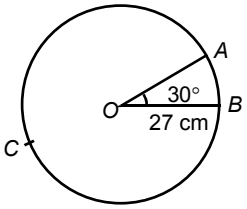
C. $157\pi\,\text{cm}^2$ D. It cannot be found.

13. In the figure, find the length of $\overset{\frown}{ACB}$.



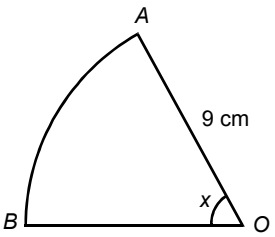
A. 24π cm B. 28π cm C. 88π cm D. $1\,176\pi$ cm

14. In the figure, find the area of sector $OACB$.



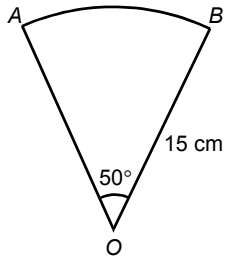
A. 4.5π cm^2 B. 60.75π cm^2 C. 300π cm^2 D. 668.25π cm^2

15. In the figure, the area of sector AOB is $\frac{27}{2}\pi$ cm^2, find the angle subtended by the arc AB.



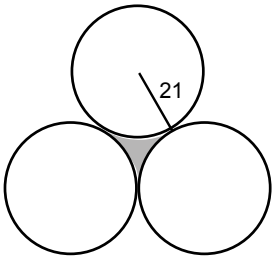
A. 30° B. 60° C. 90° D. 270°

16. In the figure, find the perimeter of the sector. (Take $\pi = 3.14$ and correct your answer to 3 significant figures.)



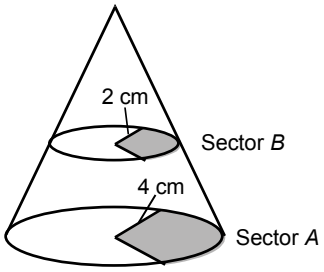
A. 13.0 cm B. 13.1 cm C. 43.0 cm D. 43.1 cm

17. The figure shows three identical circles with radii 21. Find the perimeter of the shaded region.



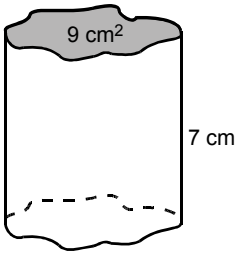
A. 10.5π B. 21π C. 42π D. 66.0π

18. In the figure, the angles at the centre of sector *A* and sector *B* are the same. If the area of sector *A* is $4\frac{4}{9}\pi\,\text{cm}^2$, find the area of sector *B*.



A. $\frac{10}{9}\pi\,\text{cm}^2$ B. $2\frac{4}{9}\pi\,\text{cm}^2$ C. $2\pi\,\text{cm}^2$ D. $\frac{20}{9}\pi\,\text{cm}^2$

19. Find the volume of the prism as shown in the figure.

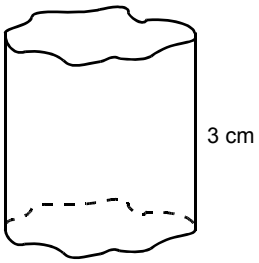


A. 21 cm^3 B. 42 cm^3 C. 56 cm^3 D. 63 cm^3

20. Find the volume of a cylinder with a base radius of 6 cm and a height of 3 cm.

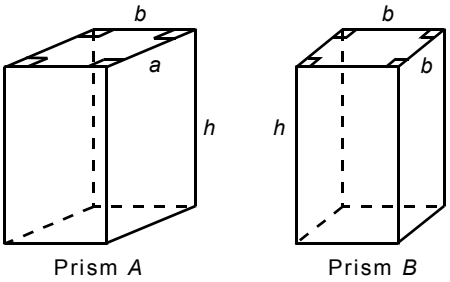
A. 18π cm^3 B. 98π cm^3 C. 108π cm^3 D. 108 cm^3

21. The figure shows a prism. If its volume is 48 cm^3 and its height is 3 cm, find the area of its cross-section.



A. 3 cm^2 B. 4 cm^2 C. 9 cm^2 D. 16 cm^2

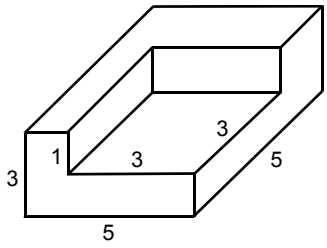
22. In the figure, which of the following prisms has a larger volume if $a > b$?



A. Prism *A* B. Prism *B*

C. They have the same volume. D. It cannot be determined.

23. The figure is formed by a large cuboid with a small cuboid being cut away. Find the volume of the figure.

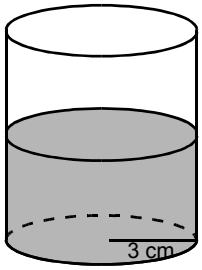


A. 36 B. 39 C. 51 D. 66

24. If 288 cm^3 of water is poured into a prism with a square base, the water level rises 8 cm. Find the length of the side of the square base.

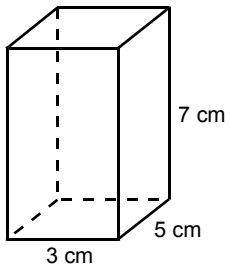
A. 6 cm B. 8 cm C. 9 cm D. 12 cm

25. If 3 identical marbles are dropped into a cylinder with a base radius of 3 cm, the water level rises 5 cm. Find the volume of each marble.



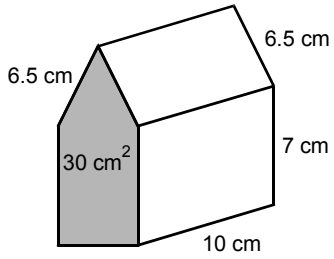
A. 12π cm^3 B. 15π cm^3 C. 36π cm^3 D. 45π cm^3

26. In the figure, find the total surface area of the prism.



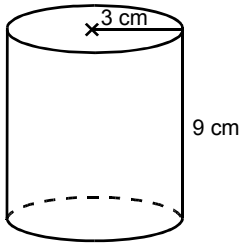
A. 71 cm^2 B. 105 cm^2 C. 127 cm^2 D. 142 cm^2

27. In the figure, the area of the shaded region is 30 cm^2. Find the total surface area of the prism (excluding the bottom).



A. 165 cm^2 B. 200 cm^2 C. 300 cm^2 D. 330 cm^2

28. In the figure, find the total surface area of the cylinder.

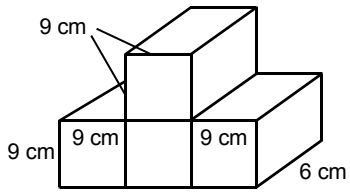


A. 72π cm^2 B. 81π cm^2 C. 162π cm^2 D. 243π cm^2

29. A cylindrical pen-stand with a base radius of 4 cm is made of a piece of cardboard. If the area of the cardboard used is 116π cm^2, find the height of the pen-stand.

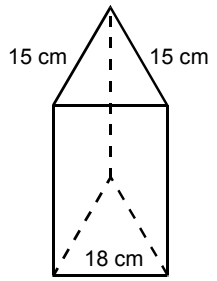
A. 12.5 cm B. 13.5 cm C. 25 cm D. 29 cm

30. The figure shows a prism formed by four identical prisms with square bases. Find the total surface of the prism.



A. 864 cm^2 B. 972 cm^2 C. 1 080 cm^2 D. 1 188 cm^2

31. The figure shows a gift in the shape of a triangular prism. If a wrapping paper of 1 176 cm^2 can just wrap up the gift, find the height of the gift.



A. 18 cm B. 20 cm C. 21 cm D. 21.7 cm

32. By measurement, the length of a pencil is 17.0 cm. The measurement is corrected to 3 significant figures. Find the upper limit of the length of the pencil.

A. 17 cm B. 17.0 cm C. 17.5 cm D. 17.05 cm

33. By measurement, the base of a triangle is 7 cm and the height is 6 cm. The measurements are corrected to the nearest cm. Find the upper limit of the area of the triangle.

A. 24 cm^2 B. 24.375 cm^2 C. 42 cm^2 D. 48.75 cm^2

34. By measurement, the length of a rectangle is 4.0 cm and the width is 6.0 cm. The measurements are corrected to 2 significant figures. Find the difference between the upper limit and the lower limit of the area of the rectangle.

A. 1 cm^2 B. 0.1 cm^2 C. 0.4 cm^2 D. 0.01 cm^2

35. By measurement, the radius of a coin is 1.1 cm. The measurement is corrected to 2 significant figures. Find the possible range of the area of the coin.

A. Between 1.1π cm^2 and 1.4π cm^2

B. Between $1.102\ 5\pi$ cm^2 and 1.21π cm^2

C. Between 1.21π cm^2 and $1.322\ 5\pi$ cm^2

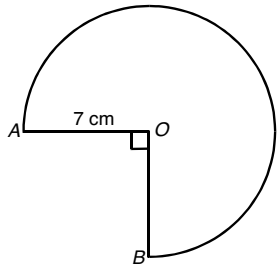
D. Between $1.102\ 5\pi$ cm^2 and $1.322\ 5\pi$ cm^2

Level 1

1. Find the circumference of a circle with a diameter of 8 cm. (Take $\pi = 3.14$)

2. Find the diameter of a circle which has a circumference of 88 cm. (Take $\pi = \frac{22}{7}$)

3. Find the perimeter of the following figure. (Correct your answer to the nearest 0.1 cm.)

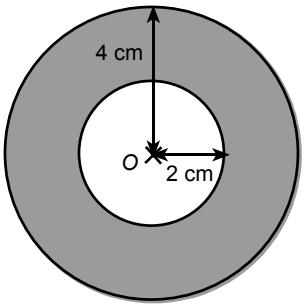


4. The radius of a wheel is 20 cm. How far does it travel in 500 revolutions? (Express your answer in terms of π.)

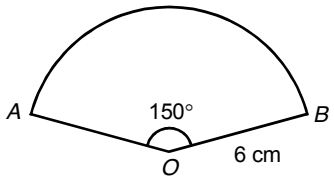
5. Find the area of a circle with a radius of 21 cm. (Take $\pi = \frac{22}{7}$)

6. Find the diameter of a circle which has an area of 25 cm^2. (Correct your answer to the nearest 0.1 cm.)

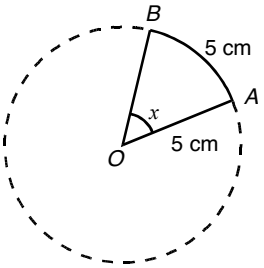
7. The following figure is formed by two concentric circles. Find the area of the shaded region. (Express your answer in terms of π.)



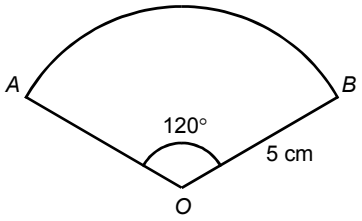
8. Find the length of $\overset{\frown}{AB}$ in the following figure. (Express your answer in terms of π.)



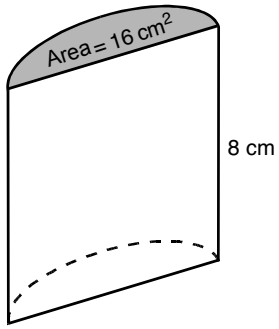
9. In the figure, find x. (Correct your answer to 1 decimal place.)



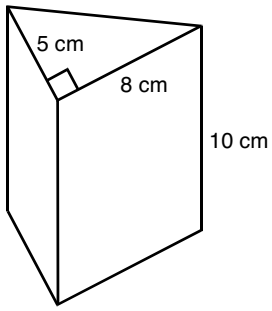
10. In the figure, find the length of $\overset{\frown}{AB}$ and the area of sector AOB. (Correct your answers to 2 decimal places.)



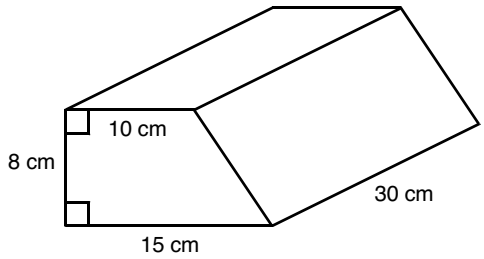
11. Find the volume of the prism as shown in the figure.



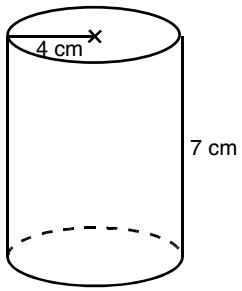
12. Find the volume of the following prism.



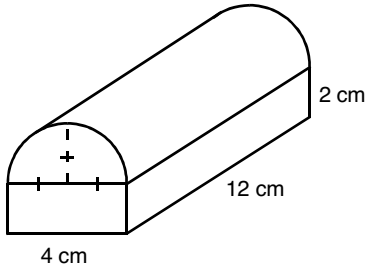
13. Find the volume of the following prism.



14. In the figure, find the volume and the total surface area of the prism. (Correct your answers to 3 significant figures.)



15. Find the total surface area and the volume of the prism as shown in the figure. (Correct your answers to 2 decimal places.)



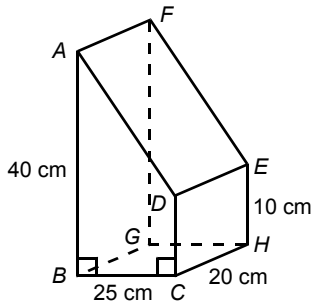
16. The volume of a cylinder with base radius 7 cm is 308 cm^3.

(a) Find the height of the cylinder.

(b) Hence, find the total surface area of the cylinder.

(Take $\pi = \frac{22}{7}$)

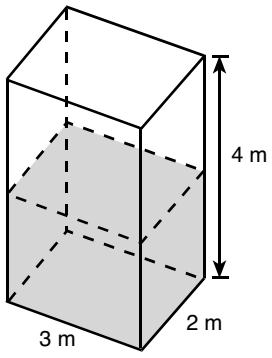
17. The figure shows a file holder in the form of a prism. If AB = 40 cm, BC = 25 cm, CH = 20 cm and EH = 10 cm,



(a) find the volume of the file holder.

(b) find the total external surface area of the file holder.

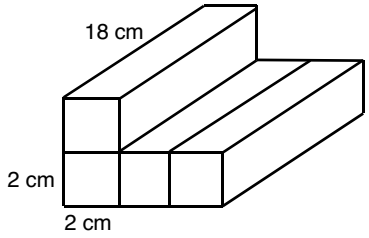
18. The dimensions of a rectangular tank are $3\,\text{m} \times 2\,\text{m} \times 4\,\text{m}$. If the tank is half-filled with water as shown below,



(a) find the volume of water.

(b) find the total area of the wet surfaces.

19. The prism below is made by four identical prisms with square bases of sides 2 cm each and lengths of 18 cm each. Find the volume and the total surface area of the prism.



20. By measurement, the length and the width of a rectangular table are 80 cm and 25 cm respectively. The measurements are corrected to 2 significant figures.

(a) **(i)** Find the upper limit and lower limit of the length.

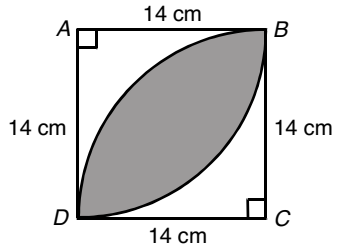
(ii) Find the upper limit and lower limit of the width.

(b) Find the possible range of the area of the table.

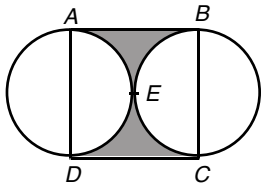
Level 2

21. If the diameter of the wheel of a car is 60 cm and it makes 4 revolutions per second, find the speed of the car in m/s. (Take $\pi = 3.14$)

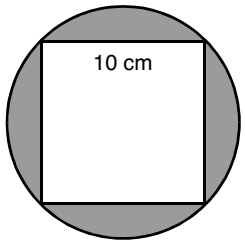
22. The following figure is formed by quarters of a circle and a square of sides 14 cm. Find the perimeter and the area of the shaded region. (Take $\pi = \frac{22}{7}$)



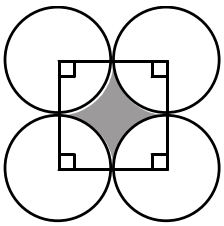
23. The figure shows two identical circles with radii of 6 cm touching each other at E. AD and BC are the diameters of the two circles, and $ABCD$ is a square. Find the area of the shaded region. (Take $\pi = 3.14$)



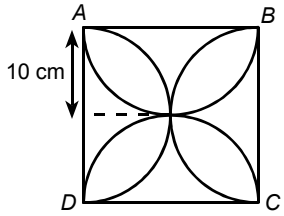
24. The following figure is formed by a circle and a square with sides of 10 cm each. Find the area of the shaded region. (Take $\pi = 3.14$)



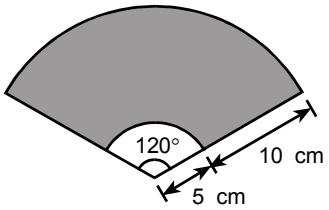
25. The following figure is formed by circles with radii of 8 cm and a square. Given that the centres of the circles are the vertices of the square. Find the area of the shaded region. (Correct your answer to 1 decimal place.)



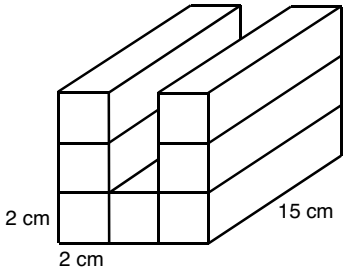
26. In the figure, a flower is drawn inside square *ABCD*. The flower is formed by semi-circles with radii of 10 cm. Find the perimeter of the flower in terms of π.



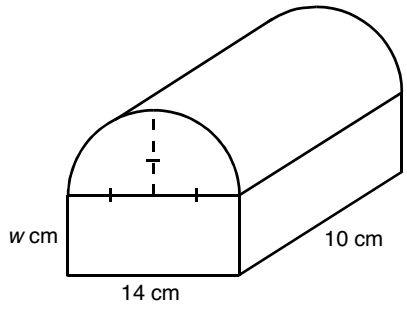
27. Find the shaded area of the paper fan in the figure. (Correct your answer to 1 decimal place.)



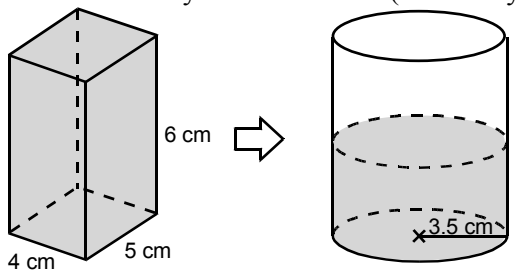
28. The prism below is made by seven rectangular prisms with square bases of sides 2 cm each and lengths of 15 cm each. Find the volume and the total surface area of the prism.



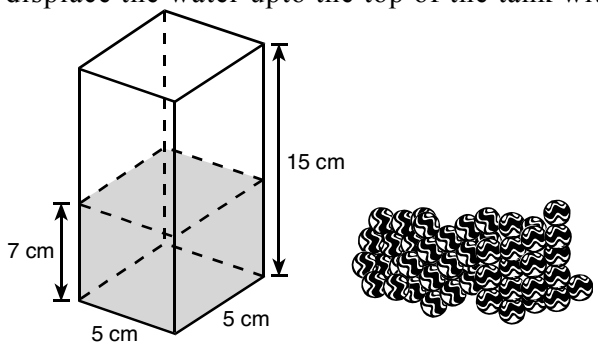
29. The figure shows a prism which is formed by half of a cylinder and a cuboid. If its length is 10 cm, its volume is 1 470cm^3 and the width of the rectangular cross-section is w cm, find the value of w. (Take $\pi = \frac{22}{7}$)



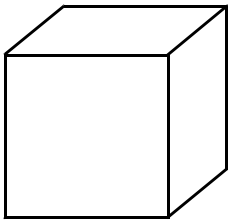
30. In the figure, a rectangular tank is filled with water. If all water in the tank is poured into an empty cylindrical tank with a base radius of 3.5 cm without overflowing, find the depth of water in the cylindrical tank. (Correct your answer to 2 decimal places.)



31. The figure shows a rectangular tank with a square base which contains water of 7 cm deep. Each side of the square base is 5 cm and the height of the tank is 15 cm. If marbles with volumes of $4\,cm^3$ each are dropped into the tank, how many marbles are required to displace the water upto the top of the tank without overflowing?



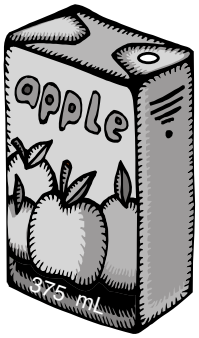
32. The figure shows a cube. By measurement, the length of each side is 13 cm. The measurement is corrected to 2 significant figures.



(a) Find the upper limit and lower limit of the length of each side.

(b) Find the possible range of the volume of the cube.

33. The figure shows a packet of 375 mL soft drink. By measurement, the length, width and height are 6.5 cm, 4.2 cm and 13.0 cm respectively. The measurements are corrected to 1 decimal place.



(a) **(i)** Find the upper limit and lower limit of the length.

(ii) Find the upper limit and lower limit of the width.

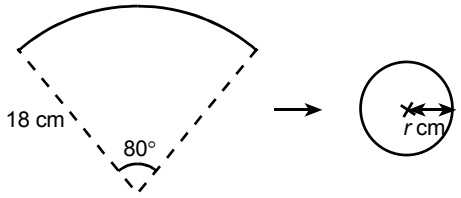
(iii) Find the upper limit and lower limit of the height.

(b) Find the possible range of the capacity.

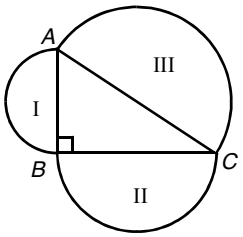
(a) Does the result in **(b)** match with the marked content "375 mL" on the package?

Level 3

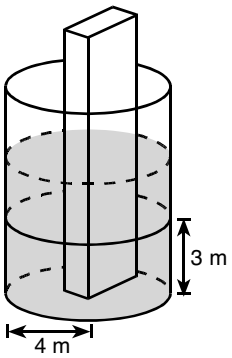
34. In the figure, an arc of a circle with a radius of 18 cm subtends 80° at the centre. If it is bent to form a circle with a radius of r cm, find the value of r.



35. In the figure, ΔABC is a right-angled triangle with a right angle $\angle ABC$. Regions I, II and III are formed by three semi-circles with AC, BC and AB as their respective diameters. If the area of region I is 9π cm^2 and the area of region II is 16π cm^2, find the area of region III in terms of π.



36. The figure shows a cylindrical tank with a base radius of 4 m which originally contains water of 3 m deep. A rectangular metal bar with a height of 10 m is put into the tank vertically. If the length and width of the rectangular base of the metal bar are 1 m and 2 m respectively,



(a) find the rise in water level.

(b) find the total area of the wet surfaces of the metal bar.

(Correct your answers to 3 decimal places.)