Answer & Solutions

Level-I

1. (a) Area of rhombus = side × height
$= 13 \times 20 = 260 \text{ cm}^2$

2. (a) In a circle, circumference = $2\pi r$

Hence, $44 = 2\pi r \quad \therefore r = \frac{44}{2\pi}$

Now, area of circle $= \pi r^2 = \pi \times \frac{44}{2\pi} \times \frac{44}{2\pi} = 154 \text{ m}^2$

3. (a) Let the length and breadth of a rectangle are $9x$ m and $5x$ m respectively.
In a rectangle, area = length × breadth
$\therefore \quad 720 = 9x \times 5x$
or $\quad x^2 = 16 \Rightarrow x = 4$
Thus, length = 9 × 4 = 36 m
and breadth = 5 × 4 = 20 m
Therefore, perimeter of rectangle $= 2(36 + 20) = 112\text{m}$

4. (d) Required no. of squares $= \frac{5^2}{1^2} = 25$

5. (c) Let the area of two squares be $9x$ and x respectively.
So, sides of both squares will be
$\sqrt{9x}$ and $\sqrt{x}$ respectively. [since, side = $\sqrt{\text{area}}$]
Now, perimeters of both squares will be
$4 \times \sqrt{9x}$ and $4\sqrt{x}$ respectively.
[since , perimeter = 4 × side]

Thus, ratio of their perimeters $= \frac{4\sqrt{9x}}{4\sqrt{x}} = 3 : 1$

6. (d) Perimeter of the circle $= 2\pi r = 2(18 + 26)$

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 88 \Rightarrow r = 14$

$\therefore$ Area of the circle

$= \pi r^2 = \frac{22}{7} \times 14 \times 14 = 616 \text{ cm}^2.$

7. (a) In a rectangle,

$$\frac{(\text{perimeter})^2}{4} = (\text{diagonal})^2 + 2 \times \text{area}$$

$$\Rightarrow \frac{(14)^2}{4} = 5^2 + 2 \times \text{area}$$

49 = 25 + 2 × area

$\therefore \text{Area} = \frac{49 - 25}{2} = \frac{24}{2} = 12 \text{ cm}^2$

8. (c) Circumference of circle = Area of circle

or $\pi d = \pi \left(\frac{d}{2}\right)^2$ [where d = diameter]

$\therefore d = 4$

9. (a) In a parallelogram.
Area = Diagonal × length of perpendicular on it.
$= 30 \times 20 = 600 \text{ m}^2$

10. (c) In a triangle,

Area $= \frac{1}{2} \times$ length of perpendicular × base

or $615 = \frac{1}{2} \times$ length of perpendicular × 123

$\therefore$ Length of perpendicular $= \frac{615 \times 2}{123} = 10$ m.

11. (a) Circumference of circular bed = 30 cm

Area of circular bed $= \frac{(30)^2}{4\pi}$

Space for each plant = 4 cm^2
$\therefore$ Required number of plants

$= \frac{(30)^2}{4\pi} \div 4 = 17.89 = 18$ (Approx)

12. (d) Side of square carpet $= \sqrt{\text{Area}} = \sqrt{169} = 13\text{ m}$
After cutting of one side,
Measure of one side = 13 – 2 = 11 m
and other side = 13 m (remain same)
$\therefore$ Area of rectangular room = 13 × 11 = 143 m^2

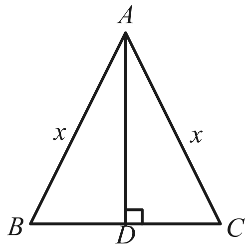
13. (a) If area of a circle decreased by x % then the radius of a circle decreases by

$(100 - 10\sqrt{100 - x})\% = (100 - 10\sqrt{100 - 36})\%$

$= (100 - 10\sqrt{64})\%$

$= 100 - 80 = 20\%$

14. (b) Let ABC be the isosceles triangle and AD be the altitude.
Let $AB = AC = x$. Then, $BC = (32 - 2x)$.



Since, in an isosceles triangle, the altitude bisects the base. So, $BD = DC = (16 - x)$.

In ΔADC, $AC^2 = AD^2 + DC^2$

$\Rightarrow x^2 = (8)^2 + (16 - x)^2$

$\Rightarrow 32x = 320 \Rightarrow x = 10.$

$\therefore BC = (32 - 2x) = (32 - 20)$ cm = 12 cm.

Hence, required area $= \left(\frac{1}{2} \times BC \times AD\right)$

$= \left(\frac{1}{2} \times 12 \times 10\right) \text{cm}^2 = 60 \text{ cm}^2.$

15. **(c)** Area of field = 576 km^2. Then,

each side of field = $\sqrt{576} = 24$ km

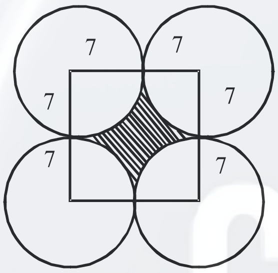
Distance covered by the horse

= Perimeter of square field

= 24 × 4 = 96 km

$\therefore$ Time taken by horse $= \frac{\text{distance}}{\text{speed}} = \frac{96}{12} = 8$ h

16. **(b)**



The shaded area gives the required region.

Area of the shaded region

= Area of the square – area of four quadrants of the circles

$= (14)^2 - 4 \times \frac{1}{4} \pi (7)^2$

$= 196 - \frac{22}{7} \times 49 = 196 - 154 = 42 \text{ cm}^2$

17. **(b)** Perimeter = Distance covered in 8 min.

$= \left(\frac{12000}{60} \times 8\right) \text{m} = 1600 \text{ m}.$

Let length = $3x$ metres and breadth = $2x$ metres.

Then, $2(3x + 2x) = 1600$ or $x = 160$.

$\therefore$ Length = 480 m and Breadth = 320 m.

$\therefore$ Area = $(480 \times 320)\ \text{m}^2 = 153600\ \text{m}^2$.

18. **(c)** Length of wire $= 2\pi \times R = \left(2 \times \frac{22}{7} \times 56\right)$ cm = 352 cm.

Side of the square $= \frac{352}{4}$ cm = 88 cm.

Area of the square = $(88 \times 88)\ \text{cm}^2 = 7744\ \text{cm}^2$.

19. **(a)** Let the length of the room be ℓ m

Then its, breadth = $\ell/2$

Therefore, $\ell \times \frac{\ell}{2} = \frac{5000}{25}$

or $\ell^2 = 400$

or $\ell = 20$ m

Also, $2\ell h + 2 \times \frac{\ell}{2} \times h = \frac{64800}{240}$

$\Rightarrow 3\ell h = 270$

or $h = \frac{270}{3 \times 20} = \frac{270}{60} = 4.5\text{m}$

20. **(a)** Let the edge of the third cube be x cm.

Then, $x^3 + 6^3 + 8^3 = 12^3$

$\Rightarrow x^3 + 216 + 512 = 1728$

$\Rightarrow x^3 = 1000 \Rightarrow x = 10.$

Thus the edge of third cube = 10 cm.

21. **(b)** Area of the inner curved surface of the well dug

$= [2\pi \times 3.5 \times 22.5] = 2 \times \frac{22}{7} \times 3.5 \times 22.5$

= 44 × 0.5 × 22.5 = 495 sq. m.

$\therefore$ Total cost = 495 × 3 = ₹ 1485.

22. **(a)** In a cube,

Area = 6 $(\text{side})^2$

or 150 = 6 $(\text{side})^2$

$\therefore$ side $= \sqrt{25} = 5$ m

Length of diagonal $= \sqrt{3} \times \text{side} = 5\sqrt{3}$ m

23. **(c)** Required length = length of the diagonal

$= \sqrt{12^2 + 9^2 + 8^2} = \sqrt{144 + 81 + 64} = \sqrt{289} = 17$ m

24. **(c)** In a sphere, volume $= \frac{4}{3}\pi r^3$

and surface area $= 4\pi r^2$

According to question, $\frac{4}{3}\pi r^3 \div 4\pi r^2 = 27$

or $r = 27 \times 3 = 81$ cms

25. **(a)** Let depth of rain be h metre. Then,

volume of water

= area of rectangular field × depth of rain

or 3000 = 500 × 300 × h

$\therefore h = \frac{3000}{500 \times 300}\text{m} = \frac{3000 \times 100}{500 \times 300}\text{cms} = 2$ cms

26. **(c)** Volume of cylinder = $(\pi \times 6 \times 6 \times 28)\ \text{cm}^3$

$= (36 \times 28)\ \pi\ \text{cm}^3$.

Volume of each bullet $= \left(\frac{4}{3}\pi \times \frac{3}{4} \times \frac{3}{4} \times \frac{3}{4}\right)\text{cm}^3$

$= \frac{9\pi}{16}\text{cm}^3.$

Number of bullets = $\dfrac{\text{Volume of cylinder}}{\text{Volume of each bullet}}$

$= \left[(36\times 28)\pi\times\frac{16}{9\pi}\right] = 1792.$

27. **(c)** Let h be the required height then, $\frac{22}{7}\times(60)^2\times h$

$= 30\times 60\times\frac{22}{7}\times(1)^2\times(600)$

$\Rightarrow\quad 60\,h = 30\times 600$

$\Rightarrow\quad h = 300$ cm = 3 m

28. **(a)** Let radius of the 3rd spherical ball be R,

$\therefore\quad \frac{4}{3}\pi\left(\frac{3}{2}\right)^3 = \frac{4}{3}\pi\left(\frac{3}{4}\right)^3 + \frac{4}{3}\pi(1)^3 + \frac{4}{3}\pi R^3$

$\Rightarrow\quad R^3 = \left[\left(\frac{3}{2}\right)^3 - \left(\frac{3}{4}\right)^3\right] - 1^3$

$= \frac{27}{8} - \frac{27}{64} - 1 = \frac{125}{64} = \left(\frac{5}{4}\right)^3 \Rightarrow\quad R = \frac{5}{4} = 1.25$

$\therefore$ Diameter of the third spherical ball $= 1.25\times 2 = 2.5$ cm.

29. **(c)** Let 'A' be the side of bigger cube and 'a' be the side of smaller cube

Surface area of bigger cube = $6\,A^2$

or $384 = 6A^2$

$\therefore A = 8$ cm.

Surface area of smaller cube = $6\,a^2$

$96 = 6a^2$

$\therefore\quad a = 4$ mm = 0.4 cm

So, Number of small cube = $\dfrac{\text{Volume of bigger cube}}{\text{Volume of smaller cube}}$

$= \frac{(8)^3}{(0.4)^3} = \frac{512}{0.064} = 8,000$

30. **(d)** Volume of the tank = 246.4 litres = 246400 cm^3.

Let the radius of the base be r cm. Then,

$\left(\frac{22}{7}\times r^2\times 400\right) = 246400$

$\Rightarrow r^2 = \left(\frac{246400\times 7}{22\times 400}\right) = 196 \Rightarrow r = 14.$

$\therefore\quad$ Diameter of the base = $2r$ = 28 cm = .28 m

31. **(a)** Total surface area of the remaining solid = Curved surface area of the cylinder + Area of the base + Curved surface area of the cone

$= 2\pi rh + \pi r^2 + \pi r\ell$

$= 2\pi\times 8\times 15 + \pi\times(8)^2 + \pi\times 8\times 17$

$= 240\pi + 64\pi + 136\pi$

$= 440\,\pi$ cm^2

32. **(d)** $4\pi(r+2)^2 - 4\pi r^2 = 352$

$\Rightarrow (r+2)^2 - r^2 = \left(352\times\frac{7}{22}\times\frac{1}{4}\right) = 28.$

$\Rightarrow (r+2+r)(r+2-r) = 28$

$\Rightarrow 2r+2 = \frac{28}{2} \Rightarrow 2r+2 = 14 \Rightarrow r = 6$ cm

33. **(b)** Volume of material in the sphere

$= \left[\frac{4}{3}\pi\times\left\{(4)^3-(2)^3\right\}\right]\text{cm}^3 = \left(\frac{4}{3}\pi\times 56\right)\text{cm}^3.$

Let the height of the cone be h cm.

Then, $\frac{1}{3}\pi\times 4\times 4\times h = \left(\frac{4}{3}\pi\times 56\right)$

$\Rightarrow h = \left(\frac{4\times 56}{4\times 4}\right) = 14$ cm.

34. **(b)** Given, playground is rectangular.

Length = 36 m, Breadth = 21 m

Now, perimeter of playground = 2(21 + 36) = 114

Now, poles are fixed along the boundary at a distance 3m.

$\therefore$ Required no. of poles = $\frac{114}{3} = 38$.

35. **(a)** Let width of the field = b m

$\therefore$ length = $2\,b$ m

Now, area of rectangular field = $2b\times b = 2b^2$

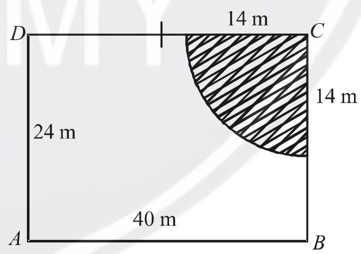
Area of square shaped pond = $8\times 8 = 64$

According to the question,

$64 = \frac{1}{8}(2b^2) \Rightarrow b^2 = 64\times 4 \Rightarrow b = 16\text{m}$

$\therefore\quad$ length of the field = $16\times 2 = 32$ m

36. **(a)**



Area of the shaded portion

$= \frac{1}{4}\times\pi(14)^2 = 154$ m^2

37. **(b)** Let ℓ be the length and b be the breadth of cold storage.

$L = 2B,\ H = 3$ metres

Area of four walls = $2[L\times H + B\times H] = 108$

$\Rightarrow\quad 6BH = 108\quad\Rightarrow\quad B = 6$

$\therefore\quad L = 12,\ B = 6,\ H = 3$

Volume = $12\times 6\times 3 = 216$ m^3

38. (c) Surface area of the cube = (6×8^2) sq. ft. = 384 sq. ft.

Quantity of paint required = $\left(\frac{384}{16}\right)$kg = 24 kg.

$\therefore$ Cost of painting = ₹ (36.50 × 24) = ₹ 876.

39. (c) Volume of block = (6 × 9 × 12) cm^3 = 648 cm^3.
Side of largest cube = H.C.F. of 6 cm, 9 cm, 12 cm = 3 cm.
Volume of the cube = (3 × 3 × 3) = 27 cm^3.

$\therefore$ Number of cubes = $\left(\frac{648}{27}\right) = 24$.

40. (d) Circumference of the base of ice-cream cup
= Diameter of the sheet = 28 cm

$2\pi r = 28$

$r = \frac{14}{\pi}$ cm = 4.45 cm

Slant height of cone = radius of the sheet = 14 cm
$\therefore$ $14^2 = (4.45)^2 + h^2$
or $h^2 = 196 - 19.80 = 176.20$
$\therefore$ $h = 13.27$ cm

41. (d) Required no. of squares $= \frac{5^2}{1^2} = 25$

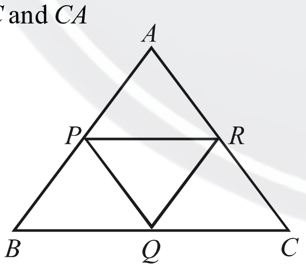
42. (d) Volume of the cone is given by = 1/3 × $\pi r^2 h$
Here, $r = 4.2$ cm, $h = 10.2 - r = 6$ cm
Therefore the volume of the cone = 1/3 π × $(4.2)^2$ × 6 cm
= 110.88 cm^3

Volume of the hemisphere = $\frac{1}{2} \times \frac{4}{3} \pi r^3 = 155.23$ cm^3

Total volume = 110.88 + 155.232 = 266.112

43. (a) Volume of mud dugout = 10 × 4.5 × 3 = 135 m^3
Let the remaining ground rise by = h m
Then {(20 × 9) – (10 × 4.5)} h = 135
135 h = 135 ⇒ h = 1 m

44. (c) Consider for an equilateral triangle. Hence ΔABC consists of 4 such triangles with end points on mid pts AB, BC and CA



$\Rightarrow \frac{1}{4} ar(\Delta ABC) = ar(\Delta PQR)$

$\Rightarrow ar(\Delta PQR) = 5$ sq. units

45. (c) $\frac{\text{Area of uncut portion}}{\text{Area of cut portion}} = \frac{(\pi \times 20 \times 20) - (100\pi)}{(4 \times \pi \times 5 \times 5)}$

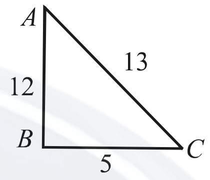
$= \frac{300\pi}{100\pi} = \frac{3}{1}$

46. (b) In the figure $\angle ACB$ is 90°
(angle subtended by diameter = 90°)
$AC = 5, AB = 13$
Using pythagoras theorem,

$AB^2 = AC^2 + CB^2 \Rightarrow CB = \sqrt{13^2 - 5^2} = 12$

Area of $\Delta ABC = \frac{1}{2} \times 5 \times 12 = 30$

47. (b)



ABC forms a right angled triangle

$\therefore$ Area $= \frac{1}{2} \times 12 \times 5 = 30$

Area of rectangle $= 30 = \ell \times 10$ or $\ell = 3$ units

$\therefore$ Perimeter = 2 (10 + 3) = 26

($\because AE = FD$)

48. (d) $(\text{side})^2$

$= \left(\frac{1}{2} \times \text{one diagonal}\right)^2 + \left(\frac{1}{2} \times \text{other diagonal}\right)^2$

$13^2 = \left(\frac{1}{2} \times \text{one diagonal}\right)^2 + \left(\frac{1}{2} \times 24\right)^2$

$169 - 144 = \left(\frac{1}{2} \times \text{diagonal}\right)^2$

$25 = \left(\frac{1}{2} \times \text{diagonal}\right)^2$

$5 = \frac{1}{2} \times \text{diagonal}$ $\therefore$ diagonal = 10

$\therefore$ Area $= \frac{1}{2} \times 10 \times 24 = 120$ sq. cm.

49. (b) $AC^2 = AB^2 + BC^2 \Rightarrow AC = 10$

We have $r = (A/s)$; $A = \frac{1}{2} \times (6 \times 8) = 24$

$s = (6 + 8 + 10)/2 = 12$
$r = A/s = 24/12 = 2$.

50. (b) Circumference of base $= 2\pi r = 6$ $\therefore$ $r = \frac{3}{\pi}$

51. (c) Volume of spherical shell

$= \frac{4\pi}{3}(R^3 - r^3) = \frac{4\pi}{3}(12^2 - 10^3)$

$= \frac{4}{3} \times \pi \times (12 - 10)(12^2 + 12 \times 10 + 10^2)$

$= \frac{4}{3} \times \pi \times 2 \times 364 \text{ cm}^3$

Weight = volume × density

$= \frac{4}{3} \times \pi \times 364 \times 4.8 = 14.64 \text{ kg}$

52. **(d)** Let *ABCD* be a square with side = 6 cm. Then the radius of the circle touches the square = 3 cm.
Area of circle = $\pi(r)^2 = 9\pi \text{ cm}^2$

53. **(c)** $\because$ Circumference $= \frac{p}{360} = 2\pi R$

54. **(a)** Area of shaded region = Area of equilateral $\Delta ABC - 3$ (Area of sector AQO)

$= \frac{\sqrt{3}}{4} \times (2)^2 = 3 \times \frac{60}{360} \times \frac{22}{7} \times (1)^2$

$= \sqrt{3} - \frac{11}{7} = 1.73 - 1.57 = 0.16$ sq. units.

55. **(c)** 2 semicircles = 1 circle with equal radius

So $2\pi r = 132 \Rightarrow 2r = \frac{132}{3.14} = 42$ m diameter

Area of track = Area within external border – Area within internal border.

$\Rightarrow \pi(23^2 - 21^2) + 90 \times 46 - 90 \times 4^2$

$\Rightarrow 88\pi + 360 \Rightarrow 636.3 \text{ m}^2$

56. **(e)** Circumference = 792

$2\pi r = 792$

$r = \frac{792}{2\pi} = \frac{792 \times 7}{22 \times 2} = 126 \text{ m}$

57. **(e)** Let the width of rectangle = b

$39 \times b = 1209$

$b = \frac{1209}{39} = 31$ metres.

Perimeter = 2 (39 + 31) = 140 metres.

58. **(d)** Area of field = 3584 m^2

Let the length and breadth be $7x$ and $2x$

Then $7x \times 2x = 3584 \text{ m}^2$

$14x^2 = 3584 \text{ m}^2$

$x^2 = 256$

$x = 16$ m

Length = $7x$ = 112 m, Breadth = $2x = 16 \times 2 = 32$ m

Perimeter = $2(l + b) = 2(112 + 32) = 288$ m

59. **(d)** Base = 2 + 2 × altitude

Let, altitude be A

Area of $\Delta = \frac{1}{2} \times$ Base × Altitude

$12 = \frac{1}{2} \times (2 + 2A) \times A$

$12 = A \times (1 + A)$

$12 = A + A^2$

$A^2 + A - 12 = 0$

$(A - 3)(A + 4) = 0$

$A = 3, A = -4$

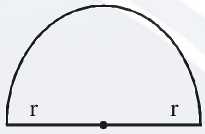
Altitude = 3 cm

60. **(c)** Volume of sphere = Surface area of sphere

$\frac{4}{3}\pi r^3 = 4\pi r^2$ [where, $r \rightarrow$ radius]

$\Rightarrow r = 3$

61. **(b)**



Length of railing to surround
= Length of Arc + Length of diameter

Area of semicircular field = 308

$308 = \frac{1}{2}\pi r^2$

$308 = \frac{1}{2} \times \frac{22}{7} \times r^2$

$\frac{2 \times 308 \times 7}{22} = r^2$

r = 14 m

Length of railing = $\pi r + 2r$

$= \frac{22}{7} \times 14 + 2 \times 14 = 44 + 28 = 72$ m

62. **(b)** According to condition given

Volume of right circular cone = Slant surface area

$\frac{1}{3}\pi r^2 h = \pi r l$ [where, $r \rightarrow$ radius; $h \rightarrow$ height; $l \rightarrow$ slant height]

$\frac{1}{3} r h = l$

$\frac{1}{3} rh = \sqrt{h^2 + r^2} \left[\because l^2 = h^2 + r^2\right]$

Squaring on both sides

$\frac{1}{9} r^2 h^2 = h^2 + r^2$

Dividing equation by r^2h^2 on both sides

$\frac{1}{9} = \frac{h^2}{r^2h^2} + \frac{r^2}{r^2h^2}$

$\frac{1}{r^2} + \frac{1}{h^2} = \frac{1}{9}$ units

63. (a) Volume of right circular cylinder = Curved surface area of cylinder

$\pi r^2 h = 2\pi rh$ [where, r → radius; h → height]

$\Rightarrow r = 2$ units

64. (c) Radius of cylinder = r units and height = r units

∴ Required ratio $= 2\pi r^2 + 2\pi r^2 = 4\pi r^2$

$: 2\pi r^2 + \pi r^2 = 3\pi r^2 = 4 : 3$

65. (c) Let side of triangle = x

$$\therefore \frac{\sqrt{3}}{4}x^2 = a \quad ...(1)$$

and $\frac{\sqrt{3}}{2}x = b$

$$x = \frac{2b}{\sqrt{3}} \quad ...(2)$$

Putting x in equation (1)

$$\frac{\sqrt{3}}{4}\left(\frac{2b}{\sqrt{3}}\right)^2 = a$$

$$\frac{b^2}{a} = \sqrt{3}$$

66. (b) Volume of sphere $= \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \times 9 \times 9 \times 9$

$= 972\ \pi$ cubic.cm.

If the length of wire be h cm., then

$\pi \times (0.2)^2 \times h = 972\ \pi$

$\Rightarrow h = \frac{972}{0.2 \times 0.2} = 24300$ cm = 243 metre

67. (a) Volume of water flowing from the pipe in 1 minute

$= \pi \times 0.25 \times 0.25 \times 1000$ cu.cm.

Volume of conical vessel

$= \frac{1}{3}\pi \times 15 \times 15 \times 24$ cu.cm.

∴ Required time $= \frac{\pi \times 15 \times 15 \times 24}{3\pi \times 0.25 \times 0.25 \times 1000}$

= 28 minutes 48 seconds

68. (c) $\frac{V_1}{V_2} = \frac{r_1^2 h_1}{r_2^2 h_2}$

$\Rightarrow \frac{4}{1} = \frac{25}{16} \times \frac{h_1}{h_2}$

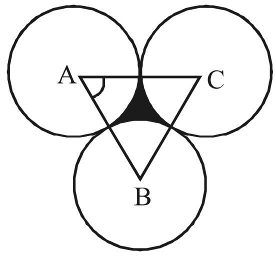
$\Rightarrow \frac{h_1}{h_2} = \frac{16 \times 4}{25} = \frac{64}{25}$

69. (d) AB = BC = CA = 2a cm.

∠BAC = ∠ACB = ∠ABC = 60°

Area of ΔABC $= \frac{\sqrt{3}}{4} \times (\text{side})^2$

$= \frac{\sqrt{3}}{4} \times 4a^2 = \sqrt{3}a^2$ sq.cm.



Area of three sectors

$= 3 \times \frac{60}{360} \times \pi \times a^2$

$= \frac{\pi a^2}{2}$ sq.cm.

Area of the shaded region

$= \sqrt{3}a^2 - \frac{\pi}{2}a^2 = \left(\frac{2\sqrt{3} - \pi}{2}\right)a^2$ sq.cm.

70. (d) Total surface are of cone $= \pi r(l + r)$

$S = \frac{22}{7} \times 3 \times \left(\sqrt{3^2 + 4^2} + 3\right)$

$= \frac{22}{7} \times 3 \times 8 = \frac{528}{7}$

S = 75.4 sq. cm

71. (d) Maximum number of boxes $= \frac{800 \times 700 \times 600\ \text{cm}^3}{8 \times 7 \times 6\ \text{cm}^3}$

= 1000000

72. (c) $\pi r_1^2 h_1 = \pi r_2^2 h_2$

$\frac{r_1}{r_2} = \sqrt{\frac{h_2}{h_1}} = \sqrt{\frac{2}{1}}$

$r_1 : r_2 = \sqrt{2} : 1$

73. (c) $2\pi r = 22$ cm

$r = \frac{22 \times 7}{2 \times 22} = \frac{7}{2}$ cm

Height, h = 12 cm

Volume of cylinder $= \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 12 = 462\ \text{cm}^3$

74. (a) Radius of cylinder = Radius of sphere= R

Height of cylinder = 2R

Volume of cylinder $= \pi R^2 \times (2R) = 2\pi R^3$

75. (b) If the height of the godown be h meter, then

$2(15 \times 12) = 2 \times h(15 + 12)$

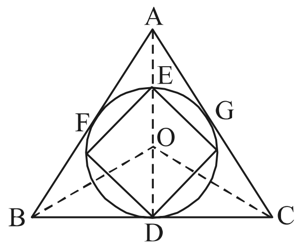
$\Rightarrow 27h = 15 \times 12$

$\Rightarrow h = \frac{15 \times 12}{27} = \frac{20}{3}$ meter

∴ Volume of the godown

$= \frac{15 \times 12 \times 20}{3} = 1200$ cu.meter

76. (d)



In the given figure ABC is an equilateral Δ of a side with a circle inscribed in it and a square inscribed in the circle. AD, BO and CO are the angle bisectors of $\angle A$, $\angle B$ and $\angle C$ and O is the centre of the circle.
We know that the angle bisector from the vertex of an equilateral triangle is the perpendicular bisector of the opposite side.
AD is the perpendicular bisector of BC.

$\Rightarrow BD = \frac{a}{2}$ and $\angle DBO = \frac{1}{2}\angle B = \frac{1}{2} \times 60° = 30°$

Now in ΔBOD

$\tan 30° = \frac{OD}{BD} = \frac{\text{Radius of circle}}{\frac{a}{2}}$

$\Rightarrow$ Radius of circle $= \frac{1}{\sqrt{3}} \times \frac{a}{2} = \frac{a}{2\sqrt{3}}$

Now in right ΔEDG
$EG^2 + GD^2 = ED^2$ (Pythagoras theorem)

$2(EG)^2 = (2OD)^2 = \left(\frac{a}{\sqrt{3}}\right)^2 = \frac{a^2}{3}$

Side of the square $= \sqrt{\frac{a^2}{6}} = \frac{a}{\sqrt{6}}$

Now ar (ΔABC) : ar $(DEFG)$

$= \frac{\frac{\sqrt{3}}{4}a^2}{\frac{a}{\sqrt{6}} \times \frac{a}{\sqrt{6}}} = \frac{\frac{\sqrt{3}}{4}}{\frac{1}{6}} = 3\sqrt{3} : 2$

77. (a) Let length $= l$, breadth $= b$, height $= h$.
$l + b + h = 24$ (given) ... (i)
Diagonal of parallellopiped = 15 cm

$\sqrt{l^2 + b^2 + h^2} = 15$ or $l^2 + b^2 + h^2 = 225$

Squaring eqn. (i) on both sides
$l^2 + b^2 + h^2 + 2lb + 2bh + 2hl = 576$
$2(lb + bh + hl) = 576 - 225 = 351$
[$\because$ Surface area of parallellopiped $= 2(lb + bh + hl)$]

78. (c) Diagonal of a cube $= 6\sqrt{3}$

$\sqrt{3} \times \text{side} = 6\sqrt{3}$
$\therefore$ Side of a cube = 6

Surface area of cube $= 6 \times (\text{side})^2 = 6 \times 6^2$
Volume of cube $= (\text{side})^3 = (6)^3$

Required ratio $= \frac{6 \times 6^2}{6^3} = \frac{1}{1}$ or 1 : 1

79. (b) Length of arc in 18 seconds $= \left(\frac{18}{3600}\right) \times$ circumference

$= \frac{18}{3600} \times 2 \times \frac{22}{7} \times 35 = 1.1$ cm

80. (a) In a right angled Δ, the length of circumradius is half the length of hypotenuse.
$\therefore \quad H^2 = 6^2 + 8^2$
$H^2 = 36 + 64 \Rightarrow 100$
$H = 10$ cm
Circumradius = 5 cm

81. (b) Circumradius of a triangle

$= \frac{abc}{\sqrt{(a+b+c)(a+b-c)(b+c-a)(a+c-b)}}$

$= \frac{3 \times 4 \times 5}{\sqrt{(3+4+5)(3+4-5)(4+5-3)(3+5-4)}}$

$= \frac{60}{\sqrt{12 \times 2 \times 6 \times 4}} = 2.5$ cm

82. (d) Let the side of square = 'x'
Area of square $= x^2$

New length of rectangle $= \frac{130}{100}x$

New Breadth of rectangle $= \frac{120}{100}x$

Hence, Area of so formed rectangle $= \frac{130}{100} \times \frac{120}{100} \times x^2$

$= \frac{156}{100}x^2$

Therefore, area of rectangle exceeds the area of square by 56%

83. (b) Volume of cubical box $= 3.375\ m^3$

Length of edge of the box $= \sqrt[3]{3.375} = 1.5$ m

84. (c) Angle made by clock in 30 minutes = 180°

$\therefore$ Area of sector covered by minute hand $= \frac{\theta}{360°} \times \pi r^2$

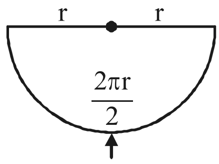
$= \frac{180°}{360°} \times \frac{22}{7} \times 7 \times 7 = 77$ sq.cm

85. (b) Perimeter of a semicircular area = 18 cm

$\Rightarrow \quad \frac{2\pi r}{2} + 2r = 18$

$\Rightarrow \quad r(\pi + 2) = 18$

$r = \frac{18}{\frac{22}{7} + 2} = \frac{18 \times 7}{22 + 14} = 3\frac{1}{2}\text{cm}$



86. (c) Circumference = 33 cm

$2\pi r = 33$

$\therefore \quad r = \frac{33 \times 7}{2 \times 22} = \frac{21}{4}$

$\text{Volume} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \frac{22}{7} \times \frac{21}{4} \times \frac{21}{4} \times 16 = 462$

87. (b) Volume of rectangular parallelopiped = 1296

Ratio of edges = 1 : 2 : 3

∴ x, 2x and 3x are length, breadth and height of parallelopiped respectively.

$x \times 2x \times 3x = 1296$

$\Rightarrow \quad 6x^3 = 1296 \Rightarrow x^3 = 216$

$\Rightarrow \quad x = \sqrt[3]{216} = 6$

Length = 6, Breadth = 12, Height = 18

Required surface area = 2 (lb + bh + hl)

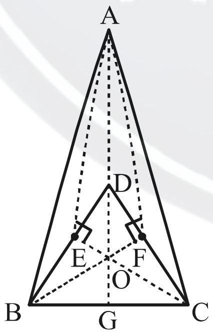
= 2 (6 × 12 + 12 × 18 + 18 × 6) = 792 sq.cm

88. (a) Now, T.S.A of pyramid

= ar (ΔABD) + ar (ΔADC) + ar (ΔABC) + ar (ΔBDC)

$\therefore \quad \text{T.S.A of pyramid} = \frac{1}{2} \times BD \times AE + \frac{1}{2} \times DC \times AF$

$+ \frac{1}{2} \times BC \times AG + \frac{\sqrt{3}}{4} \times (side)^2$



($\therefore AE = AF = AG$ = height of isosceles Δ (h))

$\Rightarrow \quad 270\sqrt{3} = \frac{1}{2} \times h[BD + DC + BC] + \frac{\sqrt{3}}{4}(\text{side})^2$

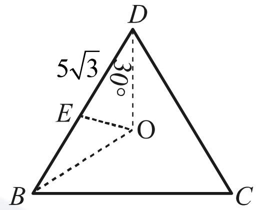
$\Rightarrow \quad 270\sqrt{3} = \frac{1}{2} \times h[10\sqrt{3} + 10\sqrt{3} + 10\sqrt{3}] + \frac{\sqrt{3}}{4}(10\sqrt{3})^2$

$\Rightarrow \quad 270\sqrt{3} = 15\sqrt{3}h + 75\sqrt{3}$

$\Rightarrow \quad 195\sqrt{3} = 15\sqrt{3}h$

$\Rightarrow \quad h = 13\text{cm}$ ...(1)

Now to find height of pyramid (H), we use



In ΔODE, $\tan 30° = \frac{OE}{ED} = \frac{OE}{5\sqrt{3}}$

$\frac{1}{\sqrt{3}} = \frac{OE}{5\sqrt{3}} \Rightarrow OE = 5\text{cm}$ ...(2)

From (1) & (2), we use pythagorals theorem, in Δ AEO

$(AE)^2 = (EO)^2 + (AO)^2$ or $h^2 = (OE)^2 + H^2$

$\Rightarrow \quad (13)^2 - (5)^2 = H^2 \Rightarrow 144 \Rightarrow H = 12$ cm

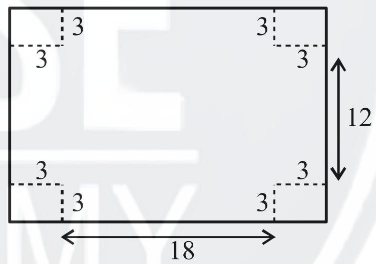
89. (c) Volume of cylinder = 3 × volume of cone

$\pi r_1^2 h = 3 \times \frac{1}{3}\pi r_2^2 h$ (heights are equal)

$r_1 = r_2$

$d_1 = d_2$

90. (c)



$\ell = 18$ cm, $b = 12$ cm, $h = 3$ cm

$S = 2(\ell h + bh) + \ell b$ {Box is open from upper side}

= 2 (54 + 36) + 216

= 396 cm^2

91. (d) $(16)^2 + (12)^2 = 400 = (20)^2$

$A = \frac{1}{2} \times 16 \times 12 = 96 \text{ cm}^2$

92. (a) Volume of cylinder = volume of sphere (Given)

$\pi r^2 h = \frac{4}{3}\pi r^3$

$h = \frac{4}{3}r$

$h = \frac{4}{3} \times 6\text{cm} = 8$ cm

93. (a) Volume of air in room = 204 m^3
Area of floor × height of room = 204 m^3
Area of floor ×6 = 204 m^3

∴ Area of floor = $\frac{204}{6}$ = 34 m^2

94. (d) Total surface area of cube = 96 cm^2
$6a^2 = 96$ cm^2
$a^2 = 16$ cm^2 ⇒ $a = 4$ cm
Now, volume of cube = $a^3 \Rightarrow (4)^3 = 64$ cm^3

95. (d) $\frac{360}{250} = \left(\frac{8}{x}\right)^2$

$\left(\frac{6}{5}\right)^2 = \left(\frac{8}{x}\right)^2$

$x = \frac{20}{3} = 6\frac{2}{3}$cm

96. (d) $A = \ell b$
$A' = (2\ell)(2b) = 4\ell b = 4A$

% Change = $\frac{4A - A}{A} \times 100 = 300\%$

97. (d) Area of base = $\frac{1}{2} \times r \times a + \frac{1}{2} \times r \times b + \frac{1}{2} \times r \times c$

$= \frac{1}{2} r(a + b + c)$

$= r \times s = 4 \times 14 = 56$ cm^2

[where r = inradius, s = semi-perimeter]
volume of prism = area of base × height
366 = 56 × h
h = 6.5 cm [approx]

98. (a) Given,
(Circumference – radius) of circle = 37 cm
$(2\pi r - r) = 37 \Rightarrow r(2\pi - 1) = 37$

$r\left(2 \times \frac{22}{7} - \frac{1}{1}\right) = 37 \Rightarrow r\left(\frac{44-7}{7}\right) = 37$

$r\left(\frac{37}{7}\right) = 37 \Rightarrow$ r = 7 cm

Now, Area of circle = $\pi r^2 = \frac{22}{7} \times (7)^2$

= 22 × 7 = 154 sq. cm

99. (c) Sum of interior angles of polygon = (n – 2) × 180°
(n – 2) × 180° = 1440

$n - 2 = \frac{1440}{180} = 8$

n = 10
Hence, the number of sides is 10.

100. (a) Consecutive integer = 3, 4 and 5
Smallest side 3 units.

101. (a)

102. (a) ΔABC ~ ΔPQR (given)

$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR}$

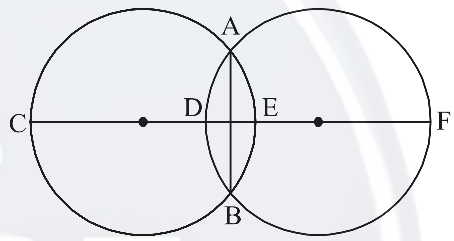
(Corresponding sides are proportional)

$\Rightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{AB+BC+AC}{PQ+QR+PR}$

$\Rightarrow \frac{AB+BC+AC}{PQ+QR+PR} = \frac{AB}{PQ} \Rightarrow \frac{\text{Perimeter of ABC}}{\text{Perimeter of PQR}} = \frac{AB}{PQ}$

$\Rightarrow \frac{36}{24} = \frac{AB}{10} \Rightarrow AB = \frac{36 \times 10}{24} \Rightarrow 15$ cm

103. (c)



∵ Radius are equal
Then, CE = DF
CD + DE = DE + EF
CD = EF
EF = 4.5 cm

104. (c) Area of hexagon = $6 \times \frac{\sqrt{3}}{4} a^2 = \frac{3\sqrt{3}}{2} a^2$

or $\frac{9}{2\sqrt{3}} a^2$ sq. units

105. (c) Let length, breadth and height of parallelopiped be l, b and h respectively.
l + b + h = 24 cm

$\sqrt{l^2 + b^2 + h^2} = 15$cm $\Rightarrow l^2 + b^2 + h^2 = 225$ cm^2
$(l + b + h)^2 - 2(lb + hb + lh) = 225$
$(24)^2 - 225 = 2(lb + bh + hl)$
$351 = 2(lb + bh + hl)$
Total surface area is 351 cm^2.

106. (d) Let radius of base of cone be r and height of cylinder be h.
Vol. of cone = Vol. of cylinder

$\frac{1}{3}\pi r^2 \times 24 = \pi\left(\frac{r}{3}\right)^2 \times h$

h = 72 cm

107. (b) Let radius of internal and external circular Plot be r and R respectively.

$2\pi R - 2\pi r = 33$ m

Width of path, $(R - r) = \frac{33 \times 7}{2 \times 22} = \frac{21}{4} = 5.25$m

108. (b) Vol. of cone $= \frac{1}{3}\pi \times (2.5 \text{ cm})^2 \times 11$ cm

Vol. of one sphere $= \frac{4}{3}\pi(0.25\text{cm})^3$

Vol. of all spheres = Vol. of water flows out

$n \times \frac{4}{3}\pi(0.25\text{cm})^3 = \frac{2}{5} \times \frac{\pi}{3} \times (2.5\text{cm})^2 \times 11\text{cm}$

$2n \times \frac{25}{100} \times \frac{25}{100} \times \frac{25}{100} = \frac{1}{5} \times \frac{25}{10} \times \frac{25}{10} \times 11$

$n = 440$

109. (b) Total cost of plot

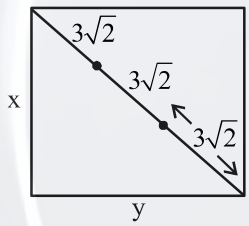
= ₹ 630 × 1800

∴ Booking amount

$= \frac{630 \times 1800 \times 45}{100}$

= ₹ 510300

110. (b)



$x^2 + y^2 = (9\sqrt{2})^2$

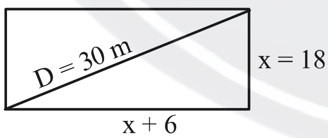
$2x^2 = 81 \times 9$

$x = 9$

111. (c) $x + x + x + 6 + x + 6 = 84$

$4x + 12 = 84$

$x = 18$ m



$18 + 6 = 24$

$D^2 = (x + 6)^2 + x^2$

$D^2 = 24^2 + 18^2$

$D^2 = 576 + 324 = 900$

$D = 30$ m

Base of triangle = 30 m

Height of triangle = x+ 6 = 24 m

Area of triangle $= \frac{1}{2} \times 30 \times 24 = 360 \text{ m}^2$