MENSURATION

Rectilinear Figure: A figure made up of straight line segments is called a **rectilinear figure**.

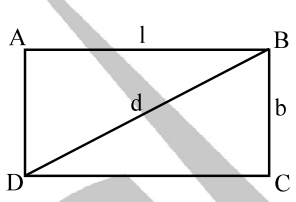
AREA OF RECTANGLE AND SQUARE

Rectangle :

Area = length × breadth or A = ℓ × b

Perimeter = 2 (length + breadth) or

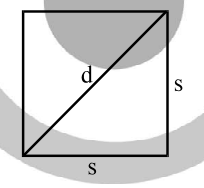
P = 2(ℓ + b)



Square :

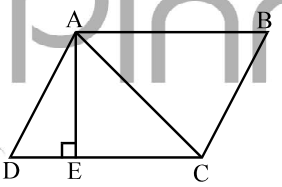
Area = (side)^2 or A = s^2

Perimeter = 4 × side or P = 4s



AREA OF QUADRILATERALS

Area of a Parallelogram :



Consider parallelogram ABCD.

Let AC be a diagonal

In ΔADC and ΔCBA

AD = CB, CD = AB

AC is common

$\therefore$ ΔADC $\cong$ ΔCBA

$\therefore$ Area of parallelogram ABCD

= Area of ΔADC + Area of ΔABC

= 2 × Area of ΔADC

= 2 × (½ CD × AE)

(where AE $\perp$ DC))

= DC × AE

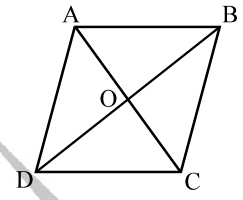
i.e., Area of parallelogram = base × height

Area of a Rhombus :

Since a rhombus is also a prallelogram, its area is given by

Area of rhombus = base × height

The area of a rhombus can also be found if the length of the diagonals are given. Let ABCD be a rhombus. We know that its diagonals AC and BD bisect each other at right angles.



Area of rhombus ABCD = area of ∆ABD + area of ∆CBD

= ½ (BD × AO) + ½(BD × CO)

(since AO ⊥ BD and CO ⊥ BD)

= ½ BD (AO + CO)

= ½ BD × AC

i.e., Area of rhombus

= ½ × product of diagonals

Area of a Trapezium :

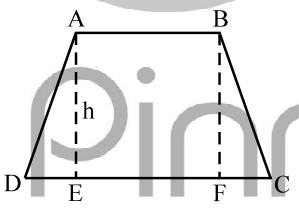
Let ABCD be a trapezium with AB || DC. Draw AE and BF perpendicular to DC.

Then AE = BF = height of trapezium = h

Area of trapezium ABCD = Area of ∆ADE

+ Area of rectangle ABFE

+ Area of ∆BCF



= ½ × DE × h + EF × h + ½ FC × h

= ½ h (DE + 2EF + FC)

= ½ h (DE + EF + FC + EF)

= ½ h (DC + AB) (since EF = AB)

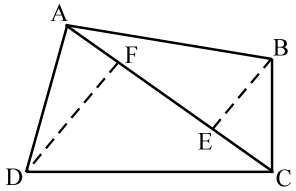
i.e.,Area of trapezium = ½ ×

(sum of parallel sides)

× (distance between parallel sides)

Area of a Quadrilateral :

Let ABCD be a quadrilateral, and AC be one of its diagonals. Draw perpendiculars BE and DF from B and D respectively to AC.



Area of quadrilateral ABCD

= Area of ΔABC + Area of ΔADC

= ½ AC × BE + ½ AC × DF

= ½ AC (BE + DF)

If AC = d, BE = h_1 and DF = h_2 then

Area of quadrilateral = ½d (h_1 + h_2)

AREA OF IRREGULAR RECTILINEAR FIGURES

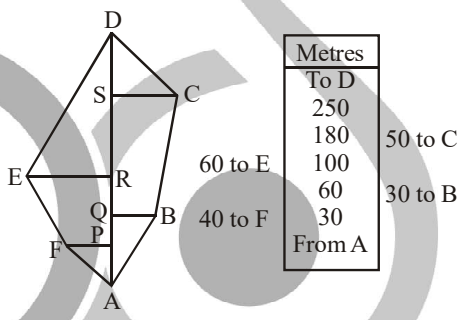
For field ABCDEF, to find its area, we proceeds as follows :

1. Select two farthest corners (A and D) such that the line joining them does not intersect any of the sides. Join the corners. The line joining them is called the **base line**. In this case the base line is AD.

2. From each corner draw perpendiculars FP, BQ, ER and CS to AD. These are called **offsets**.

3. Measure and record the following lengths: AP and PF, AQ and QB, AR and RE, AS and SC.

4. Record these measurements as shown.



The field has been divided into four right triangles and two trapezia. In the trapezia, the parallel sides are perpendicular to the base line.

The area of the field is the sum of the areas of the triangles and trapezia.

Area of ΔAPF = ½ × AP × FP = ½ × 30 × 40 m^2 = 600 m^2

Area of ΔAQB = ½ × AQ × QB = ½ × 60 × 30 m^2 = 900 m^2

Area of trapezium PREF = ½ × PR (PF + RE) = ½ × 70 × 100 m^2 = 3500 m^2

Area of trapezium BQSC = ½ × QS (BQ + SC) = ½ × 120 × 80 m^2 = 4800 m^2

Area of ΔSCD = ½ × SD × SC = ½ × 70 × 50 m^2 = 1750 m^2

Area of ΔERD = ½ × RD × ER = ½ × 150 × 60 m^2 = 4500 m^2

Total area = (600 + 900 + 3500 + 4800 + 1750 + 4500) m^2 = 16050 m^2

POINTS TO REMEMBER

1. Area of rectangle = length × breadth

2. Perimeter of rectangle = 2 (length + breadth)

3. Area of parallelogram = base × height

4. Area of rhombus = ½ × product of diagonals.

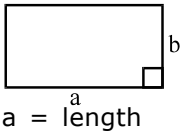
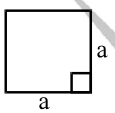
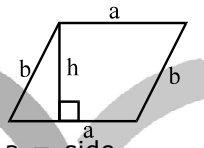
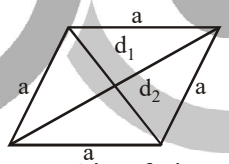
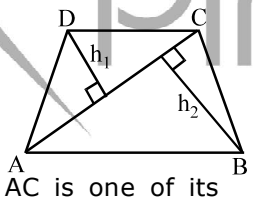
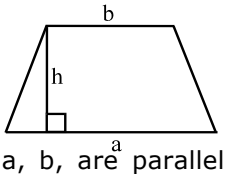
5. Area of trapezium = ½ × (sum of parallel sides) × (distance between parallel sides)

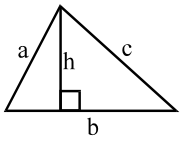
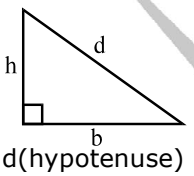
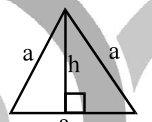
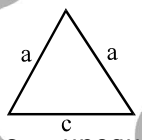
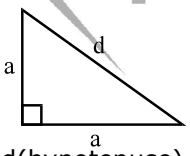
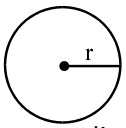
6. Area of quadrilateral = ½ × d (h_1 + h_2) where d is a diagonal and h_1, h_2 are the lengths of perpendiculars from the remaining vertices on the diagonal.

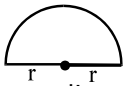
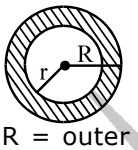
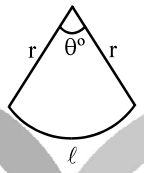
INTRODUCTION

Triangles, quadrilaterals, circles etc. lie in one plane. They have two dimensions only—a length and a breadth. They are called "**two dimensional**" figures. Solids do not lie in one plane. They have three dimensions—length, breadth and height. They occupy space. Solids are called "**three dimensional**" figures.

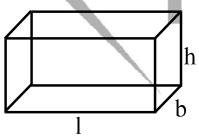
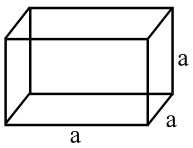
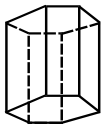
Formulae to calculate area of some geometrical figures :

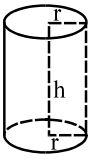
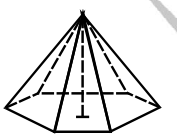
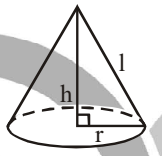
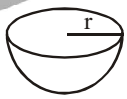
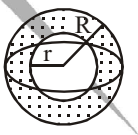
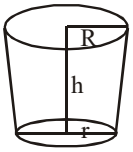
S.No.	Name	Figure	Perimeter in units of length	Area in square units
1.	Rectangle	 a = length b = breadth	2(a + b)	ab
2.	Square	 a = side	4a	a^2 or $\frac{1}{2}(\text{diagonal})^2$
3.	Parallelogram	 a = side b =side adjacent to a h = distance between the opp. parallel sides	2(a + b)	ah
4.	Rhombus	 a = side of rhombus; d_1d_2 are the two diagonals	4a	$\frac{1}{2} d_1d_2$
5.	Quadrilateral	 AC is one of its diagonals and h_1, h_2 are the altitudes on AC from D, B respectively.	Sum of its four sides	$\frac{1}{2}$ (AC) (h_1 + h_2)
6.	Trapezium	 a, b, are parallel sides and h is the distance between parallel sides	Sum of its four sides	$\frac{1}{2}$ h (a + b)

S.No.	Name	Figure	Perimeter in units of length	Area in square units
7.	Triangle	 b is the base and h is the altitude a, b,c are three sides of Δ.	a + b + c = 2s where s is the semi perimeter.	$\frac{1}{2}$ b × h or $\sqrt{s(s-a)(s-b)(s-c)}$
8.	Right triangle	 d(hypotenuse) $=\sqrt{b^2+h^2}$	b + h + d	$\frac{1}{2}$bh
9.	Equilateral triangle	 a = side h = altitude $=\frac{\sqrt{3}}{2}$a	3a	(i) $\frac{1}{2}$ah (ii) $\frac{\sqrt{3}}{4}a^2$
10.	Isosceles triangle	 c = unequal side a = equal side	2a + c	$\frac{c\sqrt{4a^2-c^2}}{4}$
11.	Isosceles right triangle	 d(hypotenuse) = a$\sqrt{2}$, a = Each of equal sides.The angles are 90º, 45º, 45º.	2a + d	$\frac{1}{2}a^2$
12.	Circle	 r = radius of the circle $\pi=\frac{22}{7}$ or3.1416	$2\pi r$	πr^2

S.No.	Name	Figure	Perimeter in units of length	Area in square units
13.	Semicircle	 r=radius of the circle	$\pi r + 2r$	$\frac{1}{2}\pi r^2$
14.	Ring (shaded region)	 R = outer radius r = inner radius	.....	$\pi(R^2 - r^2)$
15.	Sector of a circle	 θ^o = central angle of the sector, r = radius of the sector ℓ = length of the arc	$\ell + 2r$ where $\ell = \frac{\theta}{360} \times 2\pi r$	$\frac{\theta}{360} \times \pi r^2$

Volume of some solid figures :

S.No.	Nature of the Volume solid	Shape of the Abbreviations solid	Lateral/curved area	Total surface area	Abbreviations used
1.	Cuboid		2h (l + b)	2(lb+bh + lh)	lbh	l = length b = breadth h = height
2.	Cube		$4a^2$	$6a^2$	a^3	a=length of edge
3.	Right prism		(perimeter of base) × Height	2(area of one end) + lateral surface area	Area of base × height	

S.No.	Nature of the Volume solid	Shape of the Abbreviations solid	Lateral/curved surface area	area	Total	surface used
4.	Right circular cylinder		$2\pi rh$	$2\pi r(r + h)$	$\pi r^2 h$	r = radius of base h = height of the cylinder
5.	Right pyramid		$\frac{1}{2}$(Perimeter of the base) × (slant height)	Area of the base + lateral surface area	$\frac{1}{3}$(Area of base) × height	
6.	Right circular cone		πr l	$\pi r(l + r)$	$\frac{1}{3}\pi r^2 h$	h = height r = radius l = slant height
7.	Sphere		–	$4\pi r^2$	$\frac{4}{3}\pi r^3$	r = radius
8.	Hemi-sphere		$2\pi r^2$	$3\pi r^2$	$\left(\frac{2}{3}\pi r^3\right)$	r = radius
9.	Spherical shell		–	$4\pi(R^2 - r^2)$	$\frac{4}{3}\pi(R^3 - r^3)$	R = outer radius r = inner radius
10.	Volume of Bucket		$\frac{\pi h}{3}$ $(R^2 + r^2 + Rr)$	R = larger radius r = smaller radius h = height		

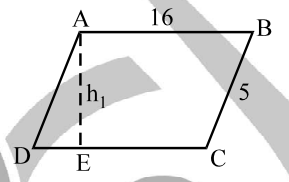
SOLVED EXAMPLES

Ex.1 A rectangle and a parallelogram have the same area of 72 cm^2. The breadth of the rectangle is 8 cm. The height of the parallelogram is 9 cm. Find the base of the parallelogram and the length of the rectangle.

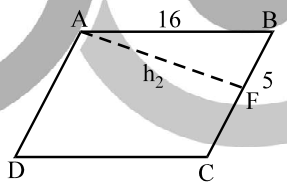
Sol. Area of rectangle
$= \ell \times b = \ell \times 8 = 72$
$\therefore \quad \ell = 9$ cm
Area of parallelogram = base × height
= base × 9 = 72
$\therefore$ Base = 8 cm

Ex.2 The area of a parallelogram is 64 cm^2. Its sides are 16 cm and 5 cm. Find the two heights of the parallelogram.

Sol. (i) Area = base × height
$= 16 \times h_1 = 64$
$\therefore \quad h_1 = 4$cm

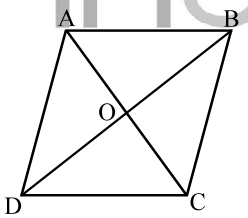


(ii) Area = base × height
$= 5 \times h_2 = 64$
$\therefore \quad h_2 = 12.8$ cm



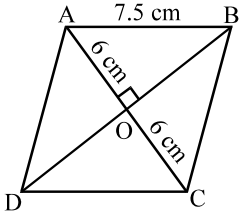
Ex.3 The diagonals of a rhombus measure 10 cm and 24 cm. Find its area. Also find the measure of its side.

Sol. AC = 10 cm, BD = 24 cm
Area = ½ $(d_1 \times d_2)$
= ½ × 10 × 24 cm^2
= 120 cm^2
In ΔABO, $\angle AOB = 90^o$,
AO = ½ AC = 5 cm,
BO = ½ BD = 12 cm.
$\therefore \quad AB^2 = AO^2 + OB^2 = 25 + 144$
$= 169 = 13 \times 13$
$\therefore$ AB = 13 cm
$\therefore$ Measure of ℓ side = 13 cm



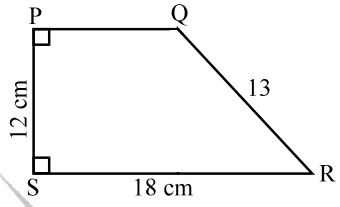
Ex.4 In rhombus ABCD, AB = 7.5 cm, and AC = 12 cm. Find the area of the rhombus.

Sol. In ΔABO, $\angle AOB = 90^o$,
AO = ½ AC = 6 cm,
AB = 7.5 cm
$\therefore \quad OB^2 = AB^2 - OA^2$
$= (7.5)^2 - 6^2 = 56.25 - 36 = 20.25$
$\therefore \quad OB = \sqrt{20.25} = 4.5$ cm
$\therefore$ BD = 2 × OB = 9 cm
Area of rhombus
$= \frac{1}{2} d_1 \times d_2 = \frac{1}{2} \times 9 \times 12\ cm^2 = 54 cm^2$



Ex.5 In the trapezium PQRS, $\angle P = \angle S = 90^o$, PQ = QR = 13 cm, PS = 12 cm and SR = 18 cm. Find the area of the trapezium.

Sol. The parallel sides are PQ and SR, and the distance between them is PS, since $\angle P = \angle S = 90^o$



$\therefore$ Area = ½ × sum of parallel sides × heights

= ½ × (13 + 18) × 12 cm^2

= 186 cm^2

Ex.6 In trapezium ABCD, AB = AD = BC = 13 cm and CD = 23 cm. Find the area of the trapezium.

Sol. From B draw BE || AD, and BF $\perp$ DC

Since ABED is a parallelogram,

DE, = 13 cm.

$\therefore$ EC = 23 cm – 13 cm = 10 cm

Also BE = 13 cm.

Therefore BEC is an isosceles triangle.

Since BF $\perp$ EC, therefore F is the midpoint of EC

$\therefore$ FC = ½ × 10 cm = 5 cm

In the right triangle BFC

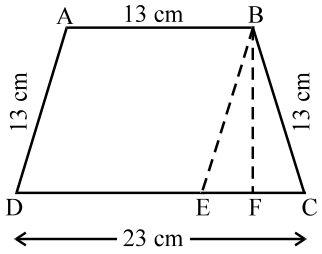
$BF^2 = BC^2 - FC^2 = 13^2 - 5^2 = 144$

$\therefore$ BF = 12 cm

Area of trapezium = ½ sum of parallel sides × height

= ½ (13 + 23) × 12 cm^2

= 216 cm^2



Note: We can also say : Area of ABCD = Area of ABED + Area of ΔBCE can be found by Hero's formula as all its sides are known.

Ex.7 In a quadrilateral ABCD, AC = 15 cm, The perpendiculars drawn from B and D respectively to AC measure 8.2 cm and 9.1 cm. Find the area of the quadrilateral.

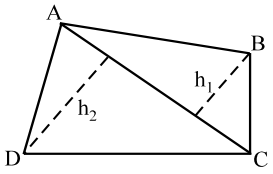
Sol. Area of quadrilateral

= ½ d (h_1 + h_2)

= ½ × 15 × (8.2 + 9.1) cm^2

= ½ × 15 × 17.3 cm^2

= 129.75 cm^2



Ex.8 PQRS is a trapezium, in which SR || PQ, and SR is 5 cm longer than PQ. If the area of the trapezium is 186 cm^2 and the height is 12 cm, find the lengths of the parallel sides.

Sol. Let PQ = x cm; then SR = (x + 5)

Area of PQRS

= ½ × 12 × (x + x + 5) cm^2

= 186 cm^2

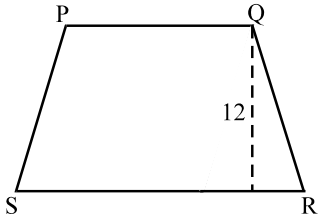
$\therefore$ 6(2x + 5) = 186

or 2x + 5 = 31

$\therefore$ x = 13

$\therefore$ PQ = 13 cm,

SR = 13 cm + 5 cm = 18 cm

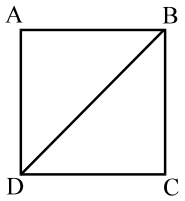


Ex.9 Show that area of a square $= \frac{1}{2} \times$ (diagonal)^2. Find the area of a square whose diagonal = 2.5 cm.

Sol. In right triangle BCD

(diagonal)^2

$= DC^2 + CB^2 = s^2 + s^2 = 2s^2$



But area of square $= s^2$

$\therefore$ (diagonal)$^2 = 2 \times$ area

or area $= \frac{1}{2} \times$ (diagonal)^2

If diagonal = 2.5 cm

area $= \frac{1}{2} \times (2.5)^2$ cm^2 $= \frac{6.25}{2}$ cm^2

$= 3.125$ cm^2.

Ex.10 The area of a square is 42.25 m^2. Find the side of the square. If tiles measuring 13 cm × 13 cm area paved on the square area. find how many such tiles are used for paving it.

Sol. The area of the square

$= 42.25$ m^2 $= 422500$ cm^2

The side of the square $= \sqrt{\text{area}} = \sqrt{422500}$ cm $= 650$ cm

The area of 1 tile

$= 13$ cm $\times 13$ cm $= 169$ cm^2

Number of tiles required

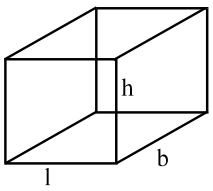
$= 422500 \div 169 = 2500$

Ex.11 A room is 5 metres long. 4 metres broad and 3 metres high. Find the area of the four walls. Also find the area of the ceiling and the area of the floor. If it costs Re 0.30 to whitewash 1 dm^3 of wall, find the cost of whitewashing the four walls and the ceiling.

Sol. Area of four walls

$= \ell h + bh + \ell h + bh = 2h(\ell + b)$

$= 6 \times 9$ m^2 $= 54$ m^2



Area of ceiling = Area of floor $= 20$ m^2

Since 1 m^2 = 100 dm^2,

$\therefore$ 54 m^2 = 5400 dm^2 and

20 m^2 = 2000 dm^2

Cost of whitewashing the four walls at the rate of Re 0.30 per dm^2

$=$ Rs $(5400 \times 0.30) =$ Rs 1620

Cost of whitewashing the ceiling at the rate of Re 0.30 per dm^2

$=$ Rs $(2000 \times 0.30) =$ Rs 600

Total cost of white washing

$=$ Rs 1620 + Rs 600

$=$ Rs 2220

Ex.12 The length and breadth of a rectangular field is in the ratio 4 : 3. If the area is 3072 m^2, find the cost of fencing the field at the rate of Rs 4 per metre.

Sol. Let the length and breadth of the field be 4x and 3x metres respectively. The area of the field

$= 4x \times 3x = 12x^2 = 3072\ m^2$

Hence $x^2 = 3072 \div 12 = 256$

or $x = \sqrt{256} = 16$

Length

$= 4x = 64$ m; Breadth $= 3x = 48$ m

Length of fencing = Perimeter of the field

$= 2\ (64 + 48)$ m $= 224$ m

Cost of fencing at Rs 4 per meter

= Rs (224×4) = Rs 896

Ex.13 Find the volume and surface area of a cuboid of $\ell = 10$ cm, b = 8 cm and h = 6 cm.

Sol. $V = \ell \times b \times h = 10\ cm \times 8\ cm \times 6\ cm = 480\ cm^3$

Surface area $= 2\ (\ell b + \ell h + bh)$

$= 2(10\ cm \times 8\ cm + 10\ cm \times 6\ cm + 8\ cm \times 6\ cm)$

$= 2(80 + 60 + 48)\ cm^2 = 376\ cm^2$

Ex.14 How many matchboxes of size 4 cm × 3 cm × 1.5 cm can be packed in a cardbord box of size 30 cm × 30 cm × 20 cm ?

Sol. Volume of cardboard box

$= 30\ cm \times 30\ cm \times 20\ cm$

$= 18000\ cm^3$

Volume of each matchbox

$= 4\ cm \times 3\ cm \times 1.5\ cm$

$= 18\ cm^3$

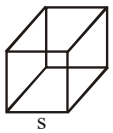
$\therefore$ Number of matchboxes that can fit in the cardboard box

$= 18000\ cm^3 \div 18\ cm^3 = 1000$

Ex.15 The dimensions of a cube are doubled. By how many times will its volume and surface area increase ?

Sol. Let the side of the original cube be s

Then side of the new cube = 2s



(i) Volume of original cube

$= s \times s \times s$

$= s^3$ cubic units

Volume of new cube $= 2s \times 2s \times 2s$

$= 8s^3$ cubic units

$\therefore$ Volume increases eight times if the side is doubled.

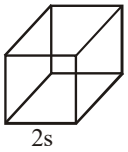
(ii) Surface area of original cube = $6s^2$

Surface area of new cube

$= 6(2s)^2 = 24s^2$

$= 4(6s^2)$

$\therefore$ Surface area increases four times.



Ex.16 The outer surface of a cube of edge 5m is painted. if the cost of painting is Re 1 per 100 cm^2, find the total cost of painting the cube.

Sol. Surface area of cube

$= 6s^2 = 6 \times 5m \times 5m = 150m^2$

$= 150 \times 10000\ cm^2$

Cost of painting 100 cm^2 is Re 1.

$\therefore$ Cost of painting

150 × 10000 cm^2 is

Rs $\frac{1}{100} \times 150 \times 10000$ = Rs 15,000

Ex.17 A right circular cylinder has a height of 1 m and a radius of 35 cm. Find its volume, area of curved surface and total area.

Sol. h = 1m, r = 35 cm = 0.35 m

Volume $= \pi r^2 h = \frac{22}{7} \times 0.35 \times 0.35 \times 1\ m^3 = 0.385\ m^3$

Area of curved surface $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 0.35 \times 1m^2 = 2.2\ m^2$

Total surface area $= 2\pi r(h + r)$

$= 2 \times \frac{22}{7} \times 0.35\ (1 + 0.35)\ m^2$

$= \frac{2 \times 22 \times 0.35 \times 1.35}{7} m^2 = 2.97\ m^2$

Ex.18 An open cylindrical tank is of radius 2.8m and height 3.5m. What is the capacity of the tank ?

Sol. Capacity = volume of cylinder

$= \pi r^2 h = \frac{22}{7} \times 2.8 \times 2.8 \times 3.5\ m^3 = 86.24\ m^3$

Ex.19 A metal pipe 154 cm long, has an outer radius equal to 5.5 cm and an inner radius of 4.5 cm. What is the volume of metal used to make the pipe ?

Sol. Outer volume

$= \pi r^2 h = \frac{22}{7} \times (5.5)^2 \times 154 \text{ cm}^3$

Inner volume $= \frac{22}{7} \times (4.5)^2 \times 154 \text{ cm}^3$

$\therefore$ Volume of metal = outer volume – inner volume

$= \frac{22}{7} \times 154 \times (5.5)^2 - \frac{22}{7} \times 154 \times (4.5)^2$

$= \frac{22}{7} \times 154 [(5.5)^2 - (4.5)^2]$

$= \frac{22}{7} \times 154 (5.5 + 4.5) (5.5 - 4.5)$

$= \frac{22}{7} \times 154 \times 10 \times 1 = 4840 \text{ cm}^3$

Ex.20 A cylindrical roller is used to level a rectangular playground. The length of the roller is 3.5 m and its diameter is 2.8 m. if the roller rolls over 200 times to completely cover the playground, find the area of the playground.

Sol. When the roller rolls over the ground once completely, It covers a ground area equal to its curved surface area.

Area of curved surface $= 2\pi rh = 2 \times \frac{22}{7} \times 1.4 \times 3.5 \text{ m}^2$

$\therefore$ Area of ground $= \frac{200 \times 2 \times 22 \times 1.4 \times 3.5}{7} \text{m}^2 = 6160 \text{ m}^2$

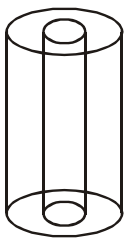
Ex.21 A cylindrical pipe has an outer diameter of 1.4m and an inner diameter of 1.12m. Its length is 10m. It has to be painted on the outer and inner surfaces as well as on the rims at the top and bottom. If the rate of painting is 0.01 per cm^2, find the cost of painting the pipe.

Sol. Outer surface area $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 0.7 \times 10\text{m}^2 = 44\text{m}^2$

Inner surface area $= 2\pi rh$

$= 2 \times \frac{22}{7} \times 0.56 \times 10\text{m}^2 = 35.2\text{m}^2$



Area of two rims

$= 2 \times \frac{22}{7} \times (0.7^2 - 0.56^2) = 1.1088\text{m}^2$

$\therefore$ Total area to be painted

$= 44\text{m}^2 + 35.2\text{m}^2 + 1.1088\text{m}^2$

$= 80.3088 \text{ m}^2$

Rate of painting = Re 0.01 per cm^2

= Re 0.01 × 10000 per m^2

= Rs 100 per m^2

∴ Total cost = Rs 80.3088 × 100

= Rs 8030.88

Ex.22 Earth is dug out to a depth of 15 m from a circular plot of land of radius 7 m. The earth is then spread out evenly on an adjacent rectangular plot of dimensions 16 m × 7 m. Find the height of the earth on the rectangular plot.

Sol. Volume of dug out earth = $\pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 15 m^3 = 2310 m^3$

Let the height of the earth on the rectangular plot be h

Then volume of earth on the plot

$= \ell \times b \times h$

$= 16 \times 7 \times h\ m^3 = 112h\ m^3$

Since volume of earth on the plot

= volume of dug out earth

∴ 112 h = 2310

or $h = \frac{2310}{112} m = 20.625m$

Ex.23 A rectangular piece of paper of width 20 cm and length 44 cm is rolled along its width to form a cylinder. What is the volume of the cylinder so formed ?

Sol. The length of the rectangle becomes the circumference of the base of the cylinder.

∴ $2\pi r = 44$, where r is the radius of the cylinder.

∴ $r = \frac{44 \times 7}{2 \times 22} = 7$ cm

The width of the rectangle becomes the height of the cylinder.

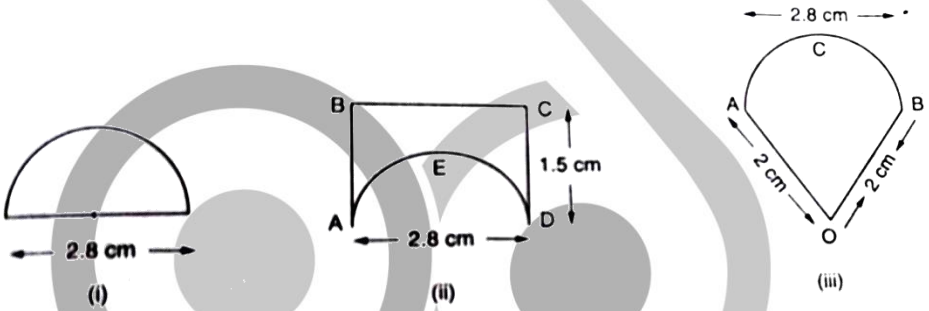
∴ Volume = $\pi r^2 h$

$= \frac{22}{7} \times 7 \times 7 \times 20\ cm^3 = 3080\ cm^2$

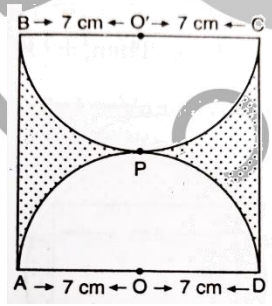
EXERCISE – 1

• Area of basic plane figures

1. Find the ratio of the areas of the incircle and circumcircle of a square.
2. If the radius of a circle is decreased by 50%, find the percentage decrease in its area.
3. The dimensions of a room are 16 × 14 × 10 metres. There are 4 windows of 1.3 × 1.4 m and 2 doors of 2m × 1m. What will be the cost of white washing the walls and painting the doors and window, if the rate of white washing is Rs. 5 per m^2 and the rate of painting is Rs. 8 per m^2.
4. The area of square ABCD is 16 cm^2. Find the area of the square joining the mid-points of the sides.
5. The base of a parallelogram is thrice its height. If the area is 867 cm^2, find the base and height of the parallelogram.
6. An ant is moving around a few food particles of different shapes scattered on the floor. For which particle would the ant have to take a longer round?



7. The diagonal of a quadrilateral is 20 m in length and the perpendiculars to it from the opposite vertices are 8.5 m and 11 m. find the area of the quadrilateral.
8. Find the area of shaded region in fig., if ABCD is a square of side 14 cm and APD and BPC are semi-circles.

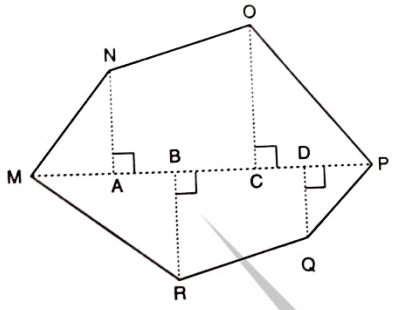


9. An athetic track 14 m wideconsists of two straight sections 120 m long joining semi-circular ends whose inner radius is 35 m. Calculate the area of the shaded region.

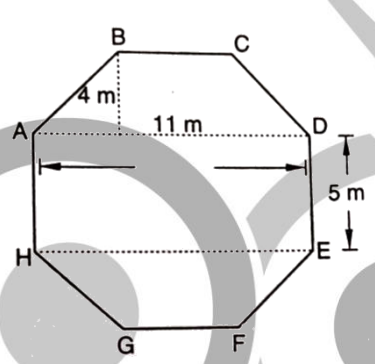
• Area of trapezium and polygon

10. The area of the trapezium is 105 cm^2 and its height is 7 cm. if one of the parallel sides is longer than the other by 6 cm, find the two parallel sides.
11. The parallel sides of a trapezium are 20 cm and 10 cm. Its non-parallel sides are both equal, each being 13 cm. find the are of the trapezium.
12. In the adjoining figures AB||DC and DA is perpendicular to AB. Further, DC = 7 cm, CB = 10 cm and AB = 13 cm. find the area of the quadrilateral ABCD.
13. The parallel sides DC and AB of a trapezium are 12 cm and 36 cm respectively. Its non-parallel sides are each equal to 15 cm. Find the area of the trapezium.
14. The cross-section of a canal is a trapezium in shape. If the canal is 10 m wide at the top 6 m wide at the bottom and the area of cross-section is 72 m^2 determine its depth.

15. If the area of a trapezium is 28 cm^2 and one of the its parallel sides is 6 cm, find the other parallel side if its altitude is 4 cm.
16. Find the area of the hexagon shown in fig., if MP = 9 cm, MD = 7 cm, MC = 6 cm, MB = 4 cm, MA = 2 cm, AN = 3 cm, OC = 5 cm, DQ = 2 cm and BR = 4 cm.

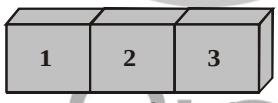


17. Top surface of a raised platform is in the shape of a regular octagon as shown in fig., find the area of the octagonal surface?



• Surface area of cube and cuboid

18. Three cubes of edge 5 cm are put side by side and fused together as shown. The block is to be painted on all sides. Find the total surface area of the block and the cost of painting at Rs 25 per cm^2.



19. 20 cubical tin boxes each with edge 12 cm are to be made. Find the cost of the tin sheet required at the rate of Rs 130 per m^2.
20. A roll of paper 35 cm by 22 cm was cut and 25 cubes with edge 2 cm were made from it. Find the area of the paper left.
21. A cuboid has a length of 17.6 cm and breadth of 12.8 cm. If its volume is 2365.44 cm^3, find the height.
22. Eight cuboidal metal boxes with dimensions 60 cm × 45 cm × 30 cm are to be painted. If the rate of painting is Rs 200 per m2, find the total cost of painting.
23. The dimensions of a tin box are 12 cm × 10.5 cm × 8 cm. If 20 such boxes are to be made, find the area of the tin sheet required in m^2.
24. A cuboidal water tank can hold 60,000 litres of water. If the length and breadth of the tank are 10 m and 4 m, find its height.
25. The four walls of a room-6 m long, 3 m broad and 3.5 m high are to be painted. If the rate of painting is Rs 650 per m^2, find the total cost of painting.
26. The four walls and bottom surface of a swimming pool are to be painted. Find the total cost of painting at the rate of Rs 450 per m^2, if the dimensions of the pool are length = 10 m, breadth = 4 m and depth = 2 m.
27. If each edge of a cube is increased by 50%, find the percentage increase in its surface area.
28. A cuboidal oil tin is 30 cm by 40 cm by 50 cm. Find the cost of the tin required for making 20 such tins if the cost of tin sheet is Rs. 20 per square metre.
29. Find the volume of a cube whose surface area is 54 cm^2.

30. The dimensions of a cuboid are in the ratio 5 : 3 : 1 and its total surface area is 414 m^2. Find the dimensions.
31. A classroom is 11 m long, 8 m wide and 5 m high. Find the sum of the areas of its floor and the four walls (including doors, windows, etc.)
32. Show that the product of the areas of the floor and two adjacent walls of a cuboid is the square of its volume.
33. A cuboid has total surface area of 50 m^2 and lateral surface area is 30 m^2. Find the area of its base.

- **Volume of cube and cuboid:**

34. Find the volume and surface area of a cuboid 16 m long, 14 m broad and 7 m high.
35. Find the length of the longest pole that can be placed in a room 12 m long, 8 m broad and 9 m high.
36. The volume of a wall, 5 times as high as it is borad and 8 times as long as it is high, is 12.8 cu. metres. Find the breadth of the wall.
37. Find the number of bricks, each measuring 24 cm × 12 cm × 8 cm, required to construct a wall 24 m long, 8 m high and 60 cm thick, if 10% of the wall is filled with mortar?
38. The diagonal of a cube is 6cm. Find its volume and surface area.
39. The surface area of a cube is 1734 sq. cm. Find its volume.
40. A rectangular block 6 cm by 12 cm by 15 cm is cut up into an exact number of equal cubes. Find the least possible number of cubes.
41. Two cubes have their volumes in the ratio 1 : 27. Find the ratio of their surface areas.
42. A cubical box with edge 18 cm is filled with smaller cubes of edge 3 cm. How many small cubes are there in the box?
43. An iron cube with edge 15 cm was melted and recast into 125 smaller cubes of equal edge. Find the edge length of the smaller cube.
44. Four cubes with edge 6 cm and three cubes with edge 8 cm were filled with a liquid. Find the total volume of the liquid in Iitres.
45. A cuboid has a volume of 4805 cm^3 and its breadth and height are equal to 15.5 cm. Find the length.
46. A carton is 1.8 m long, 80 cm wide and 60 cm high. How many bars of dimension 6 cm × 4.5 cm × 40 mm can be placed in the carton.
47. A metal cuboidal block with dimension 2 m × 1.5 m × 22.5 cm is melted and made into 200 cubes. What is the length of edge of each cube?
48. A cuboidal vessel is 10 cm long and 8 cm wide. How high must it be made to hold 480 cubic centimetres of a liquid?
49. A match box measures 4 cm by 2.5 cm by 1.5 cm. What will be the volume of a packet containing 12 such match boxes? How many such packets can be placed in a cardboard box whose size is 60 cm × 30 cm × 24 cm?
50. A cuboidal vessel is 10 cm long and 5 cm wide. How high it must be made to hold 300 cm^3 of a liquid?
51. What will happen to the volume of a cuboid if its:
    (i) Halved (ii) trebled?
52. Three cuboids of dimensions 5 cm × 6 cm × 7 cm, 4 cm × 7 cm × 8 cm and 2 cm × 3 cm × 13 cm are melted and a cube is made. Find the side of cube.
53. How many wooden cuboical blocks of side 25 cm can be cut from a log of wood of size 3 m by 75 cm by 50 cm, assuming that there is no wastage?
54. A rectangular water reservoir contains 42000 litres of water. Find the depth of the water in the reservoir if its base measures 6 m by 3.5 m.

55. How many bricks of size 22 cm × 10 cm × 7 cm are required to construct a wall 33 m long, 3.5 m high and 40 cm thick, if cement and sand used in the construction occupy $\frac{1}{10}$ th part of the wall?
56. If the rainfall on a certain day was 5 cm, how many litres of water fell on 1 hectare field on that day?
57. How much clay is dug out in digging a well measuring 3 m by 2 m by 5 m?
58. The capacity of a certain cuboidal tank is 50000 litres of water. Find the breadth of the tank, if its height and length are 10 m and 2.5 m respectively.
59. How many planks each of which is 3 m long, 15 cm broad and 5 cm thick can be prepared from a wooden block 6 m long, 75 cm broad and 45 cm thick?

• Surface area of right circular cylinder

60. Find the height of a cylinder whose radius is 7 cm and the total surface area is 968 cm^2?
61. The ratio between the curved surface area and the total surface area of a right circular cylinder is 1 : 2. Find the ratio between the height and radius of the cylinder.
62. A road roller takes 750 complete revolutions to move once over to level a road. Find the area of the road if the diameter of a road roller is 91 cm and length is 1.25 m.
63. An iron pipe 20 cm long has exterior diameter equal to 25 cm. If the thickness of the pipe is 1 cm, find the whole surface of the pipe.
64. A rectangular sheet of paper, 44 cm × 20 cm, is rolled along its length to form a cylinder. Find the total surface area of the cylinder thus generated.
65. The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Calculate the ratio of their curved surface areas.
66. The height of a right circular cylinder is 10.5 cm. If three times the sum of the areas of its two circular faces is twice the area of the curved surface area. Find the radius of its base.

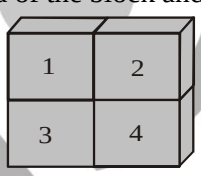
• Volume of cylinder:

67. The area of the base of a right circular cylinder is 154 cm^2 and its height is 15 cm. Find the volume of the cylinder.
68. The radii of two right circular cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 4. Calculate the ratio of their curved surface areas and also the ratio of their volumes.
69. If the radius of the base of a right circular cylinder is halved, keeping the height same, what is the ratio of the volume of the reduced cylinder to that of the original.
70. The volume of a cylinder is 448 π cm^3 and height 7 cm. Find its lateral surface area and total surface area.

71. A well with 10 m inside diameter is dug 14 m deep. Earth taken out of it is spread all around to a width of 5 m to form an embankment. Find the height of embankment.
72. The circumference of the base of a cylinder is 88 cm and its height is 15 cm. find the volume of the cylinder.
73. The diameter of the base of a right circular cylinder is 42 cm and its height is 10 cm. find the volume of the cylinder
74. A rectangular strip 25 cm × 7 cm is rotated about the longer side. Find the volume the solid, thus generated.
75. The radii of two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3. Calculate the ratio of their volumes.
76. The ratio between the curved surface area and the total surface area of a right circular cylinder is 1 : 2. Find the volume of the cylinder, if its total surface area is 616 cm^2.

EXERCISE – 2

1. Water flows into a tank 200 m × 150 m through a rectangular pipe 1.5 m × 1.25 m $\cong$ kmph. In what time (in minutes) will the water rise by 2 metres?
2. The dimensions of an open box are 50 cm, 40 cm and 23 cm. Its thickness is $6\sqrt{3}$ cm. If 1 cubic cm of metal used in the box weighs 0.5 gms, find the weight of the box.
3. A cube of edge 15 cm is immersed completely in a rectangular vessel containing water. If the dimensions of the base of vessel are 20 cm × 15 cm, find the rise in water level.
4. Three solid cubes of sides 1 cm, 6 cm and 8 cm are melted to form a new cube. Find the surface area of the cube so formed.
5. How many iron rods, each of length 7 m and diameter 2 cm can be made out of 0.88 cubic metre of iron ?
6. The radii of two cylinders are in the ratio 3 : 5 and their heights are in the ratio of 2 : 3. Find the ratio of their curved surface areas.
7. If 1 cubic cm of cast iron weighs 21 gms, then find the weight of a cast iron pipe of length 1 metre with a bore of 3 cm and in which thickness of the metal is 1 cm.
8. A cubical tank with edge 2 m is filled with water. How many buckets of capacity 10 litre can be filled from the tank?
9. Four cubic blocks with edge 4 cm were kept two on top of two and fused together into a block as shown. Find the total surface area of the block and the cost of painting it at Rs 32 per cm^2.



10. A bag is filled with tin cubic boxes, each with edge 3.2 cm. If there are 50 cubic boxes and the weight of 1 cm^3 of tin is 8 g, find the weight in the bag.
11. From a cubic tank filled with water, 144 buckets of capacity 12 litres could be filled. Find the length of edge of the tank .
12. 25 cubical blocks of wood were painted on all sides. If the total cost of painting at the rate of Rs 8 per cm^2 was Rs 30,000, find the length of edge of a block. (All blocks are of equal size,)
13. The area of the base of a cuboid is 44 cm^2. Find the height, if the volume is 378.4 cm^3. [Hint: Area of base = l × b.]
14. A wooden beam cuboidal in shape is 4 m long and 50 cm wide. If it contains 0.5 m^3 of wood, what is its thickness?
15. Ten iron bars with dimensions 0.2 m × 10 cm × 60 cm are placed in a truck. Find the total weight of the bars if 1 cm^3 of iron weighs 8 g.
16. How many buckets of capacity 15 litres can be filled from a water tank 4 m long, 2 m broad and 1.2 m high?
17. A trench 5 m long and 2 m wide is dug 1.5 m deep. The soil from this is spread evenly on a patch of ground 15 m long and 1.25 m broad. What is the height of the soil spread over· the patch?
18. A garden is in the form of a rhombus whose side is 30 metres and the corresponding altitude is 16 m. find the cost of leveling the garden at the rate of Rs. 2 per m^2.
19. The area of a rhombus is equal to the area of a triangle whose base and the corresponding altitude are 24.8 cm and 16.5 cm respectively. If one of the diagonals of the rhombus is 22 cm, find the length of the other diagonal.

20. The weight of a metal block of size 5 cm by 4 cm by 3 cm is 1 kg. Find the weight of a block of the same metal of size 15 cm by 8 cm by 3 cm.
21. The volume of a cuboidal box is 48 cm^3. If its height and length are 3cm and 4 cm respectively, find its breadth.
22. An 8 m long cuboidal beam of wood when sliced produces four thousand 1 cm cubes and there is no wastage of wood in this process. If one edge of the beam is 0.5 m, find the third edge.
23. A solid rectangular piece of iron measures 6 m by 6 cm by 2 cm. Find the weight of this piece, if 1 cm^3 of iron weighs 8 gm.
24. A beam 5 m long and 40 cm wide contains 0.6 cubic metre of wood. How thick is the beam?
25. The walls and ceiling of a room are to be plastered. The length, breadth and height of the room are 4.5 m, 3 m and 350 cm, respectively. Find the cost of plastering at the rate of Rs. 8 per square metre.
26. The central hall of a school is 80 m long and 8 m high. It has 10 doors each of size 3 m × 1.5 m and 10 windows each of the size 1.5 m × 1 m. If the cost of white –washing the walls of the hall at the rate of Rs. 1.20 per m^2 is Rs. 2385.60, find the breadth of the hall.
27. The dimensions of a cinema hall are 100 m, 50 m and 18 m and 18 m. How many persons can sit in the hall, if each person requires 150 m^3 of air?
28. The dimensions of a rectangular box are in the ratio of 2 : 3 : 4 and the difference between the cost of covering it with sheet of paper at the rates of Rs. 8 and Rs. 9.50 per m^2 is Rs. 1248. Find the dimensions of the box. 8 m, 12 m, 16 m
29. A field is 150 m long and 100 m wide. A plot (outside the field) 50 m long and 30 m wide is dug to a depth of 8 m and the earth taken out from the plot is spread evenly in the field. By how much is the level of field raised?
30. The cost of preparing the walls of a room 12 m long at the rate of Rs. 1.35 per square metre is Rs. 340.20 and the cost of matting the floor at 85 paise per square metre is Rs. 91.80. find the height of the room.
31. If V is the volume of a cuboid of dimensions a, b, c and S is its surface area, then prove that
$$\frac{1}{V}=\frac{2}{S}\left(\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$$
32. The lateral surface area of a hollow cylinder is 4224 cm^2. It is cut along its height and formed a rectangular sheet of width 32 cm. Find the perimeter of rectangular sheet.
33. A company packages its milk powder in cylindrical containers whose base has a diameter of16.8 cm and height 20.5 cm. Company places a label around the curved surface of the container. If the label is placed 1.5 cm from the top and the bottom, what is the surface area of the label?
34. A cylindrical vessel, without lid, has to be tin-coated on its both sides. If the radius of the base is 70 cm and its height is 1.4 cm, calculate the cost of tin-coating at the rate of Rs. 3.50 per 1000 cm^2
35. Find the number of coins, 1.5 cm in diameter and 0.2 cm thick, to be melted to form a right circular cylinder of height 10 cm and diameter 4.5 cm.
36. The volume of a metallic cylindrical pipe is 748 cm^3. Its length is 14 cm and its external radius is 9 cm. find its thickness.
37. The rain water that falls on a roof of area 6160 m^2 is collected in a cylindrical tank of diameter 14 m and height 10 m and thus the tank is completely filled. Find the height of rain water on the roof.
38. A solid cylinder has total surface area of 462 square cm. Its curved surface area is one –third of its total surface area. Find the volume of the cylinder.
39. A lead pencil consists of a cylinder of wood with a solid cylinder of graphite filled into it. The diameter of the pencil is 7 mm, the diameter of the graphite is 1 mm and the length of the pencil is 10 cm. Calculate the weight of the whole pencil, if the specific gravity of the wood is 0.7 gm/cm^3 and that of the graphite is 2.1 gm/cm^3.

40. The curved surface area of a cylindrical pillar is 264 m^2 and its volume is 924 m^3. Find the diameter and the height of the pillar.
41. How many cubic metres of earth must be dug-out to sink a well 21 m deep and 6 m diameter?
42. A hollow garden roller, 63 cm wide with a girth of 440 cm, is made of 4 cm thick iron find the volume of the iron.
43. A rectangular sheet of paper 30 cm × 18 cm can be transformed into the curved surface of a right circular cylinder in two ways i.e., either by rolling the paper along its length or by rolling it along its breadth. Find the ratio of the volumes of the two cylinders thus formed.
44. The diagonal of a cube is $6\sqrt{3}$ cm. Find its volume and surface area.
45. A hollow garden roller of 42 cm diameter and length 147 cm is made of cast iron 2 cm thick. Find the volume of iron used in the roller.
46. The radii of two cylinders are in the ratio 3 : 5 and their heights are in the ratio of 2 : 3. Find the ratio of their curved surface areas.
47. True or false
    (i) The surface area of a cuboid formed by joining face to face 3 cubes of side x is 3 times the surface area of a cube of side x.
    (ii) Two cuboids with equal volumes will always have equal surface areas.
    (iii) Two cylinders with equal volume will always have equal surface areas
    (iv) The surface area of a cube formed by cutting a cuboid of dimensions 2 × 1 × 1 in 2 equal parts is 2 sq. units.
    (v) The area of a trapezium become 4 times if its height gets doubled.
48. Match following figures with their areas:

(i)	Equilateral Δ of side a	(a) $\frac{3a^2}{4}$
(ii)	Right angled triangle with sides a, $\sqrt{3}$ a, 2a	(b) $\frac{3a^2}{\sqrt{2}}$
(iii)	Square with diagonal = $\frac{\sqrt{3a}}{\sqrt{2}}$	(c) $\frac{\sqrt{3a^2}}{4}$
(iv)	Rectangle with sides = $\frac{\sqrt{3a}}{\sqrt{2}}$, $\sqrt{3}$ a	(d) $\frac{\sqrt{3}}{2}a^2$

EXERCISE – 3

1. The areas of two circular fields are in the ratio 16 : 49. If the radius of the latter is 14 m, then what is the radius of the former:
   (a) 4 m (b) 8 m (c) 18 m (d) 32 m
2. If the ratio of areas of two circles is 4 : 9, then the ratio of their circumferences will be:
   (a) 2 : 3 (b) 3 : 2 (c) 4 : 9 (d) 9 : 4
3. The perimeter of a circle is equal to the perimeter of a square. Then, their areas are in the ratio:
   (a) 4 : 1 (b) 11 : 7 (c) 14 : 11 (d) 22 : 7
4. The diameter of a wheel is 1.26 m. How far will it travel in 500 revolutions?
   (a) 1492 m (b) 1980 m (c) 2530 m (d) 2880 m
5. The number of revolutions a wheel of diameter 40 cm makes in travelling a distance of 176 m, is:
   (a) 140 (b) 150 (c) 160 (d) 166
6. The radius of a wheel is 0.25 m. The number of revolutions it will make to travel a distance of 11 km will be:
   (a) 2800 (b) 4000 (c) 5500 (d) 7000
7. The wheel of an engine, meters in circumference makes 7 revolutions in 9 seconds. The speed of the train in km per hour is:
   (a) 130 (b) 132 (c) 135 (d) 150
8. The wheel of a motorcycle, 70 cm in diameter, makes 40 revolutions in every 10 seconds. What is the speed of the motorcycle in km/hr?
   (a) 22.32 (b) 27.68 (c) 31.68 (d) 36.24
9. Wheels of diameters 7 cm and 14 cm start rolling simultaneously from X and Y, which are 1980 cm apart, towards each other in opposite directions. Both of them make the same number of revolutions per second. If both of them meet after 10 seconds, the speed of the smaller wheel is:
   (a) 22 cm/sec (b) 44 cm/sec (c) 66 cm/sec (d) 132 cm/sec
10. A toothed wheel of diameter 50 cm is attached to a smaller wheel of diameter 30 cm. How many revolutions will the smaller wheel make when the larger one makes 15 revolutions?
    (a) 18 (b) 20 (c) 25 (d) 30
11. Find the diameter of a wheel that makes 113 revolutions to go 2 km 26 decametres.
    (a) m (b) m (c) m (d) m
12. The font wheels of a wagon are 2p feet in circumference and the rear wheels are 3p feet in circumference. When the front wheels have made 10 more revolutions than the rear wheels, how many feet has the wagon travelled?
    (a) 30p (b) 60p (c) 90p (d) 150 p
13. A circular ground whose diameter is 35 meters, has a 1.4 m broad garden around it. What is the area of the garden in square metres?

(a) 160.16 (b) 176.16 (c) 196.16 (d)Data inadequate

14. A circular garden has a circumference of 440 m. These is a 7 m wide border inside the garden along its periphery. The area of the border is:

(a) 2918 m^2 (b) 2921 m^2 (c) 2924 m^2 (d) 2926 m^2

15. The area of two concentric circles forming a ring are 154 sq. cm and 616 sq. cm. The breadth of the ring is:

(a) 7 cm (b) 14 cm (c) 21 cm (d) 28 cm

16. A circular park has a path of uniform width around it. The difference between outer and inner circumferences of the circular path is 132 m. Its width is:

(a) 20 m (b) 21 m (c) 22 m (d) 24 m

17. A circular swimming pool is surrounded by a concrete wall 4 ft. wide. If the area of the concrete wall surrounding the pool is that of the pool, then the radius of the pool is:

(a) 8 ft (b) 16 ft (c) 20 ft (d) 30 ft

18. The ratio of the outer and the inner perimeters of a circular path is 23 : 22. If the path is 5 meters wide, The diameter of the inner circle is:

(a) 55 m (b) 110 m (c) 220 m (d) 230 m

19. What will be the area of a semi-circle of 14 m diameter?

(a) 22 m^2 (b) 77 m^2 (c) 154 m^2 (d) 308 m^2

20. A semi-circular shaped window has diameter of 63 cm. Its perimeter equals:

(a) 126 cm (b) 162 cm (c) 198 cm (d) 251 cm

21. The length of a room is 5.5 m and width is 3.75 m. Find the cost of paving the floor by slabs at the rate of Rs 800 per sq. metre.

(a) Rs. 15,000 (b) Rs. 15,550 (c) Rs. 15600 (d) Rs. 16,500

22. The length of a rectangle is 18 cm and its breadth is 10 cm. When the length is increased to 25 cm, what will be the breadth of the rectangle if the area remains the same?

(a) 7 cm (b) 7.1 cm (c) 7.2 cm (d) 7.3 cm

23. A rectangular plot measuring 90 meters by 50 meters is to be enclosed by wire fencing. If the poles of the fence are kept 5 metres apart, how many poles will be needed?

(a) 55 (b) 56 (c) 57 (d) 58

24. A length of a rectangular plot is 60% more than its breadth. If the difference between the length and the breadth of that rectangle is 24 cm, what is the area of that rectangle?

(a) 2400 sq. cm (b) 2480 sq. cm (c) 2560 sq. cm (d)Data inadequate

25. A rectangular parking space is marked out by painting three of its sides. If the length of the unpainted side is 9 feet, and the sum of the lengths of the painted sides is 37 feet, then what is the area of the parking space in square feet?

(a) 46 (b) 81 (c) 126 (d) 252

26. The difference between the length and breadth of a rectangle is 23m. If its perimeter is 206 m then its area is:

(a) 1520 m^2 (b) 2420 m^2 (c) 2480 m^2 (d) 2520 m^2

27. The length of a rectangular plot is 20 metres more than its breadth. If the cost of fencing the plot @ Rs. 26.50 per metre is Rs. 5300, what is the length of the plot in meters?

(a) 40 (b) 50 (c) data inadquete (d) none of these

28. The breadth of a rectangular field is 60% of its length. If the perimeter of the field is 800 m., what is the area of the field?

(a) 18750 sq. m (b) 37500 sq. m (c) 40000 sq. m (d) 48000 sq. m

29. The ratio between the length and the perimeter of a rectangular plot is 1 : 3. What is the ratio between the length and breadth of the plot?

(a) 1 : 2 (b) 2 : 1 (c) 3 : 2 (d) Data inadequate

30. The ratio between the length and the breadth of a rectangular park is 3 : 2. If a man cycling along the boundary of the park at the speed of 12 km/hr completes one round in 8 minutes, then the area of the park (in sq.) is:

(a) 15360 (b) 153600 (c) 30720 (d) 307200

31. Three cubes of side 4 cm each are joined end to end to form a cuboid. The surface area of the resulting cuboid and total surface area of the three cubes are in the ratio:

(a) 1 : 1 (b) 7 : 3 (c) 7 : 9 (d) 9 : 7

32. The radii of three cylindrical jars of equal height are in the ratio 1 : 2 : 3. Second jar is full with water which is first poured into the first jar. After filling the first jar, water is poured into the third jar. Which of the following statements is true?

(a) Third jar is half full (b) Third jar is one third full

(c) Third jar is two thirds full (d) Third jar is four ninths full.

33. The two diagonals of a rhombus are 64 cm and 48 cm. What is its area?

(a) 1639 sq. cm (b) 1250 sq. cm (c) 1600 sq. cm (d) 1536 sq. cm

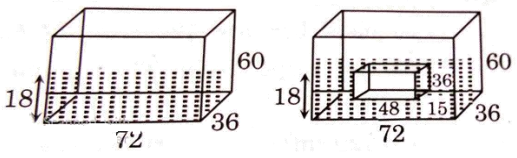
34. The length of a rectangular plot is 20 m more than its breadth. If the cost of fencing the plot at the rate of ₹ 26.50 per m is ₹ 5300, then what is the length of the plot?

(a) 10 cm (b) 20 cm (c) 60 cm (d) 80 cm

35. The base of a solid cylinder of height 10 cm has radius 7 cm. Its total surface area is:

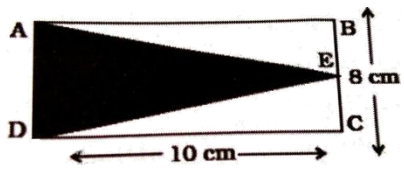
(a) 748 cm^2 (b) 514 cm^2 (c) 154 cm^2 (d) 176 cm^2

36. A tank 72 cm long, 60 cm high, 36 cm wide contains water to a depth of 18 cm. A metal block 48 cm by 36 by 15 cm is put into the tank and totally submerged. What is the rise in water – level?



(a) 10 cm (b) 20 cm (c) 30 cm (d) 40 cm

37. What is the area of the triangle ADE in the following figure?



(a) 45 cm² (b) 50 cm² (c) 55 cm² (d) 40 cm²

38. The ratio the length and the perimeter of a rectangular plot 1 : 3 and the ratio between the breadth and perimeter of the plot is 1 : 6. What is the ratio between the length and area of that plot?

(a) 2 : 1 (b) 1 : 6 (c) 1 : 8 (d) Data inadequate

39. The area of a quadrilateral ABCD, in which $\angle ABD = 90°, \angle BCD$ is an equilateral triangle of side 24 cm and AD = 26 cm is:

(a) 120 cm² (b) 249.41 cm² (c) 369.41 cm² (d) 469.41 cm²

40. The parallel sides of a tapezium are 60 cm and 77 cm and non – parallel sides are 26 cm and 26 cm. The approximate area of trapezium is:

(a) 1683 cm² (b) 204 cm² (c) 1440 cm² (d) 1600 cm²

41. The areas of the three adjacent faces of a cuboidal box are 120 cm², 72 cm² and 60 cm² respectively. The volume of the box is:

(a) 720 cm^3 (b) 864 cm³ (c) 936 cm³ (d) 1060 cm³

42. The sum of the length, breadth and the height of a cuboid is 20 cm and the length of its diagonal is 12 cm. Find the total surface area of the cuboid:

(a) 156 cm² (b) 256 cm² (c) 169 cm² (d) 269 cm²

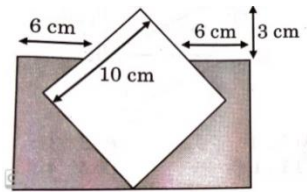
43. The diamesions of a piece of iron in the shape of a cuboid are 270 cm × 100 cm × 64 cm. If it is melted and recast into a cube then the surface area of the cube will be:

(a) 14400 cm² (b) 44200 cm² (c) 57600 cm² (d) 86400 cm²

44. The length of a rectangle is increased by 50%. By what per cent should be the breadth be becreased to get the same area?

(a) 50% (b) $33\frac{1}{3}$ % (c) 25% (d) $40\frac{1}{2}$%

45. Sam has 3 indetical squares. He places one square on top of 2 squares as shown in the figure. What is the area of the overlap?



(a) 88 cm² (b) 92 cm² (c) 78 cm² (d) 112 cm²

46. Find the ratio of the area of a square to that of the square drawn on its diagonal.

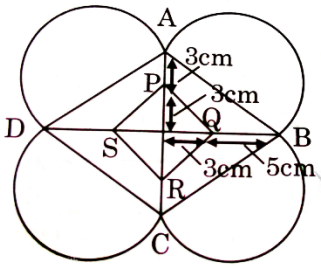
(a) 1 : 2 (b) $1 : \sqrt{2}$ (c) 2 : 1 (d) $\sqrt{2} : 1$

47. A covered wooden box has the inner dimensions as 115 cm, 75 cm and 35 cm and the thickness of wood is 2.5 cm. The volume of the wood is –

(a) 81000 cu. Cm (b) 81775 cu.cm

(c) 82125 cu. Cm (d) None of these

48. A design has been drawn on a tile. ABCD and PQRS both are in the shape of a rhombus. Find the total area of semicircles drawn on each side of rhombus ABCD.



(a) 142.843 cm² (b) 128.973 cm² (c) 39.286 cm² (d) 157.14 cm²

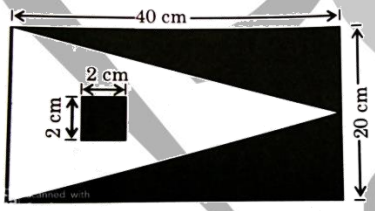
49. If the height of a cylinder becomes $\frac{1}{2}$ of the original height and the radius is doubled, then volume of cylinder becomes ____ of its original volume.

(a) 2 times (b) $\frac{1}{2}$ times (c) $\frac{1}{4}$ times (d) 3 times

50. The area of a quadrilateral is 342 sq. m. The perpendiculars from two of its opposite vertices to the dagonal are 12 m and 12 m. What is the length of the diagonal?

(a) 28.6 m (b) 25. 3 m (c) 28. 5 cm (d) 22. 5 m

51. Find the total area of shaded region in the given figure.



(a) 400 cm² (b) 404 cm² (c) 396 cm² (d) 275 cm²

52. There are two boxes shown in the figure. Which box requires more amount of material to be made?

(a) Box (i)

(b) Box (ii)

(c) Both requires equal amount of material

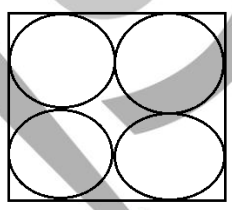
(d) Can't be determined

53. A patient in a hospital is given soup daily in a cylindrical bowl of diameter 7 cm. If the bowl is filled with soup to a height of 4 cm, how much soup the hospital has to prepare daily to serve 250 patients?

(a) 38 L (b) 40 L (c) 39.5 L (d) 38. 5 L

EXERCISE – 4

1. What is the percentage change in the total surface area of a cylinder with volume $\frac{48400}{7}$ cu.cm, and radius 10 cm when it is cut into two equal parts along its horizontal cross section?
   (a) 35.26% (b) 25.48% (c) 15.25% (d) 31.25%
2. A swimming pool is 24 m long and 15 m broad, when a number of men dive into the pool, the height of the water rises by 1 cm. If the average amount of water displaced by one of the men be 0.1 cu. M, how many men are there in the pool?
   (a) 42 (b) 46 (c) 32 (d) 36
3. The length and breadth of a hall are 8 m 75 cm and 6 m 25 cm respectively. The largest possible size of the square tiles which can be used to pave the floor is:
   (a) 25 cm × 25 cm (b) 75 cm × 75 cm (c) 50 cm × 50 cm (d) 125 cm × 125 cm
4. A powder tin has a square base of side 12 cm with height equal to 10 cm. A second tin is cylindrical with base diameter 14 cm and height 16 cm. The difference in their capacities is: (in cm^3)
   (a) 1064 (b) 1440 (c) 1024 (d) 1120
5. Four identical coins are placed in a square. For each coin, the ratio of area to circumference is same as the ratio of circumference to area. Then, find the area of the square that is not covered by the coins.



   (a) $\frac{96}{7}$ sq. units (b) $\frac{80}{3}$ sq. units (c) $\frac{95}{8}$ sq. units (d) $\frac{32}{5}$ sq. units
6. The perimeter of a rectangular garden is 420 cm. If its length is increased by 20% and breadth is decreased by 40%, we get the same perimeter. Then, the length and breadth of the new formed rectangular garden, respectively are
   (a) 115 cm and 95 cm (b) 168 cm and 42 cm
   (c) 210 cm and 210 cm (d) 95 cm and 115 cm
7. What is the length of the greatest rod that can be placed in a room whose length is 10, breadth 8 m and height 6 m. Given that $\sqrt{2}$ = 1.42.
   (a) 13.2 (b) 14.2 (c) 15.2 (d) 16.2
8. Two cubes, each of edge 12 cm are joined end to end. Find the surface area of resulting cuboid.
   (a) 1450 cm^2. (b) 1440 cm^2 (c) 1420 cm^2 (d) 1410 cm^2
9. Three cubes whose edges are 3 cm, 4 cm and 5 cm respectively are melted to form a single cube. Find the surface area of the new cube.
   (a) 210 cm^2 (b) 213 cm^2 (c) 224 cm^2 (d) 216 cm^2

10. Three cubes of metal whose edges are in the ratio 3 : 4 : 5 are melted down into a single cube whose diagonal is $12\sqrt{3}$ cm. Find the edge of smallest of the three given cubes.
    (a) 6 cm (b) 7 cm (c) 8 cm (d) 9 cm
11. If the radius of the base of the right circular cylinder is reduced by 50%. Keeping the same height, what is the ratio of the volume of the reduced cylinder to that of the original.
    (a) 1 : 9 (b) 1 : 8 (c) 1 : 4 (d) 1 : 2
12. The radii of the two cylinders are in the ratio 2 : 3 and their heights are in the ratio 5 : 3 what is the ratio of their volumes?
    (a) 20 : 27 (b) 18 : 27 (c) 15 : 21 (d) 11 : 15
13. The volume of the metallic cylindrical pipe is 748 cm^3. Its length is 14 cm and its external radius is 9 cm. Find its thickness.
    (a) 4 (b) 3 (c) 2 (d) 1
14. Find the number of coins 1.5 cm in diameter and 0.2 cm thick to be melted to form a right circular cylinder whose height is 8 cm and diameter 6 cm.
    (a) 620 (b) 640 (c) 660 (d) 680
15. The vertical height of a conical tent is 42 dm and its diameter of the base is 54 dm. How many persons can it accommodate if each person is to be allowed 2916 dm^3 of space? (π = 22/7)
    (a) 11 (b) 10 (c) 9 (d) 8
16. A piece of metal in the form of a cone of radius 3 cm and height 7 cm melted and cast into a cube. Find the side of cube (nearest to a whole number)
    (a) 5 cm (b) 4 cm (c) 3 cm (d) 2 cm
17. A right circular cylinder and a right circular cone have equal bases heights. If their curved surfaces are in the ratio 8 : 5, what is the ratio of their base to their heights?
    (a) 3 : 4 (b) 5 : 4 (c) 6 : 7 (d) 9 : 8
18. Three solid spheres of gold whose radii are 1 cm, 6 cm and 8 cm respectively are melted into a single solid sphere. Find the radius of the sphere.
    (a) 6 cm (b) 7 cm (c) 8 cm (d) 9 cm
19. It needs 50 ml paint for painting a picture 50 cm × 25 cm. How much paint is needed to paint a similar picture 100 cm × 50cm?
    (a) 100 ml (b) 400 ml (c) 750 ml (d) 200 ml
20. The sides of a rectangular plot are in the ratio of 4 : 3 and its area is 1452 m^2. Find the cost of fencing it at Rs. 2.50 per metre.
    (a) Rs. 480 (b) Rs. 385 (c) Rs. 375 (d) Rs. 365
21. How many metres of carpet 50 cm wide will be required to cover the floor of a room 30 m × 20m?
    (a) 1000 (b) 600 (c) 2400 (d) 1200

22. A room is 15 metres long, 4 metres broad and 3 metres high. Find the cost of white washing its four walls at 50 p. per m^2.

(a) Rs. 60 (b) Rs. 57 (c) Rs. 55 (d) Rs. 52

23. The area of four walls of room is 120 m^2 and its length is twice the breadth, the height being 4 metres. Find the area of the floor.

(a) 50 m^2 (b) 60 m^2 (c) 75 m^2 (d) 100 m^2

24. Find the cost fencing a circular field at the rate of 50 paise per metre if its area is 138600 m^2. (π = 22/7)

(a) Rs. 660 (b) Rs. 540 (c) Rs. 700 (d) Rs. 800

25. The inside circumference of a circular field is 1188 m. A road 7 m wide is constructed on the outside. Find its area.

(a) 8070 m^2 (b) 8270 m^2 (c) 8370 m^2 (d) 8470 m^2

26. The area of two circular fields is in the ratio 16 : 49. If the radius of the latter is 14 m, what is the radius of the former?

(a) 32 m (b) 18 m (c) 8 m (d) 4 m

27. The radii of the two circular field is in the ratio 3 : 5. The area of the first field is what percent less than the area of the second?

(a) 50% (b) 60% (c) 40% (d) 64%

28. What is the radius of a circular field whose area is equal to the sum of the areas of the three circular fields with radii 4 m, 4 . 5 m and 6 m respectively?

(a) 9 m (b) 10. 5 m (c) 10 m (d) 8. 5 m

29. If all the sides of a triangle be increased by 200 percent what is the corresponding increase in its area?

(a) 300% (b) 400% (c) 600% (d) 800%

30. How much paint is required for painting the outer surface of the water tank 2 m × 4 m × 3m?

(a) 56 litres (b) 55 litres (c) 52 litres (d) 50 litres

31. The edge of three iron cubes are 6 cm. 8 cm 10 cm respectively. A new cube was made by melting them. Find the edge of the new cube.

(a) 8 (b) 12 (c) 14 (d) 10

32. A closed wooden box 44 cm long, 32 wide and 28 cm high of wood 2.5 cm thick. Find the quantity of wood used.

(a) 16215 cm^3 (b) 15005 cm^3 (c) 16205 cm^3 (d) 15205 cm^3

33. The circumference of a circle is 100 m. What is the side of a square inscribed in the circle?

(a) $\frac{100\sqrt{2}}{\pi}$ (b) $\frac{50\sqrt{2}}{\pi}$ (c) $\frac{100}{\pi}$ (d) $50\sqrt{2}$

34. A wire is in the form of a circle of radius 28 cm. What is the area of the square into which the wire is bent (π = 22/7)

(a) 1936 cm^3 (b) 1866 cm^3 (c) 19.36 cm^3 (d) None of these

35. If the length of a rectangle is increased by 50% and its breadth is decreased by 25%, what is the change percent in its area?

(a) 12.5% increase (b) 10% increase (c) 25% increase (d) 20% decrease

36. A reservoir is 45 m long and 12 m broad. How many kilo litres of water must be poured into it to raise the water level by 2 metres. [1 cub metric can contain 1 kiloliter]

(a) 540 (b) 1280 (c) 1080 (d) 1380

37. How many cubes can be cut out of a metre cube? Given that the parameter of the small cube is 4 cm.

(a) 7500 (b) 15625 (c) 9261 (d) 17576

38. A water tank whose dimensions are 1.5 m, 0.75 m and 0.48 m is full. Its contents are emptied into another empty tank whose base area is 1 m^2. How much the water level shall rise?

(a) 64 cm (b) 54 cm (c) 5.4 cm (d) 34 cm

39. A hall is 100 m × 75 m × 22m, the number of persons, who can be accommodated in it, each requiring 50 cm^3 of air are :

(a) 2200 (b) 1100 (c) 2500 (d) 3300

40. The diagonal of cube is 15 m what is its volume?

(a) $375\sqrt{3}$ m^3 (b) 375 m^3 (c) $125\sqrt{3}$ m^3 (d) $750\sqrt{3}$ m^3

41. A cubic metre of a certain metal is hamered to from a fine sheet so as to cover one hectare of lang. What is the thickness of the sheet?

(a) 1 cm (b) 0. 1 cm (c) 0. 01 cm (d) 0.001 cm

42. A conical flask of radius r and height h is full of water. It is emptied into another cylindrical flask of radius xr. If this flask becomes full, what is its height?

(a) $3x^2h$ (b) $\frac{h}{3x^2}$ (c) $\frac{xh}{3}$ (d) $\frac{3h}{x}$

43. It is required to construct a conical circus tent of radius 21 m and 35 m slant height. If the width of the canvas cloth is 3 metre, then what will be the length of the cloth which shall do the needful.

(a) 700 ml (b) 1250 m (c) 776.5 m (d) 770 m

44. Two spheres have volumes in the ratio 64 : 729. If 160 ml paint is required for painting the surface area of the smaller sphere, how much paint is required to paint the larger one?

(a) 729 ml (b) 750 ml (c) 216 ml (d) 810 ml

45. The diagonal of a square A is a + b, the diagonal of a square B with twice the area of A is:

(a) 2 (a + b) (b) $\sqrt{2}$ (a + b) (b) $a + 2b$ (d) 2a + 4b

46. The length of a rectangle is 1 cm more than its width and its perimeter is 14 cm, then the area of the rectangle is

(a) 16 cm^2

(b) 14 cm^2 (b) 12 cm^2 (c) 10 cm^2 (d) none of these

47. If each of the dimensions of a rectangle is increased by 100%, then the area is increased by

(a) 100% (b) 200% (c) 300% (d) 400%

48. If the length of a rectangle is increased by $\frac{1}{3}$ rd and the width is decreased by $\frac{1}{3}$ rd, then the area of the rectangle is decreased by the fraction

(a) 2/3 (b) 1/6 (c) 1/9 (d) 1/8

49. The length of a given rectangle is increased by 20% and the breadth is decreased by 20%, then the area

(a) Remains the same (b) Increase by 5%

(c) Decreases by 5% (d) Decreases by 4%

50. A room is rectangular in shape and has a flat roof. It is 10 m wide, 13 m long and 5 m high. It is to be painted inside and outside and on the floor but not on the ceiling, then the total area to be painted is

(a) 360 m² (b) 460 m² (c) 490 m² (d) 590 m²

51. The side of an equilateral triangle are (2a – b) cm, (a + 3b) cm and (2a – 2b + 1), then the perimeter of the triangle is:

(a) 3 cm (b) 12 cm (c) 15 cm (d) 21 cm

52. In a right triangle with sides x and y, hypotenuse z, the altitude drawn on the hypotenuse is a, then

(a) $Xy = a^2$ (b) $\frac{1}{x}+\frac{1}{y}=\frac{1}{a}$ (c) $2 + y^2 = 2a^2$ (d) $\frac{1}{x^2}+\frac{1}{y^2}=\frac{1}{a^2}$

53. If the diagonals of a rhombus are 24 dm and 10 dm, then the perimeter of the rhombus will be

(a) 68 dm (b) 60 dm (c) 52 dm (d) 50 dm

54. If the radius of the circle is increased by 100%, then the area is increased by

(a) 100% (b) 200% (c) 300% (d) 400%

55. The side of a square is 2 cm and semicircles are constructed on each side of the square, then the area of the whole figure is

(a) $(4 + 2\pi)$ cm² (b) $(4 + 4\pi)$ cm² (c) 4π cm² (d) 8π cm²

56. The area of a square that can be inscribed in a circle of radius r is

(a) r² (b) $2r^2$ (c) $4r^2$ (d) $1\pi^2$

57. If the circumference of a circle is reduced by 50%, then the area will be reduced by

(a) 50% (b) 25% (c) 75% (d) 12.5%

58. The circumference of a circle is 100 cm. Then the side of a square inscribed in the circle is

(a) $\frac{100\sqrt{2}}{\pi}$ cm (b) $\frac{50\sqrt{2}}{\pi}$ cm (c) $\frac{100}{\pi}$ cm (d) $50\sqrt{2}$ cm

59. The area of a circle inscribed in an equilateral triangle is 48π square units. Then the perimeter of the triangle is (in units)

(a) $71\sqrt{3}$ (b) $48\sqrt{3}$ (c) 72 (d) 36

60. The area of the largest triangle that can be inscribed in a semi circle whose radius r cm is

(a) 2 r cm² (b) r² cm² (c) $2r^2$ cm² (d) $\frac{1}{4}$ r² cm²

61. A cord in the form of a square encloses the area 'S' cm². If the same cord is bent into the form of a circle, then the area of the circle is

(a) $\frac{\pi S^2}{4}$ (b) $4\pi S^2$ (c) $\frac{S}{4\pi}$ (d) $\frac{4S}{\pi}$

62. A circular disc of radius 10 cm is divided into sectors with angles 120° and 150°, then the ratio of the areas of two sectors is

(a) 4 : 5 (b) 5 : 4 (c) 2 : 1 (d) 8 : 7

63. The areas of three adjacent faces of a cuboid are x, y and z, then the volume of the cuboid is:

(a) Xy (b) Xyz (c) $\sqrt{xyz}$ (d) $\sqrt[3]{xyz}$

64. Three metal cubes of volume 125 cm^3, 64cm^3 and 27cm^3 are melted to form a new cube, then the edge of the new cube formed is

(a) 12 cm (b) 6 cm (c) 20 cm (d) 10 cm

65. If 'I', 'b' and 'h' of a cuboid are increased, decreased and increased by 1%, 3% and 2% respectively, then the volume of the cuboid

(a) Increases
(b) Decreases
(c) Increases or decreases depending on original dimensions
(d) Can't be calculated with given data

66. A metal pipe has an external diameter of 4 cm and internal diameter of 3 cm and is 20 cm long, then the volume of the metal used is

(a) 22 cm^3 (b) 110 cm^3 (c) 220 cm^3 (d) 440 cm^3

67. A rectangular paper of dimensions 6 cm and 3 cm is rolled to form a cylinder with height equal to the width of the paper, then its base radius is

(a) $\frac{6}{\pi}$ cm (b) $\frac{3}{2\pi}$ cm (c) $\frac{6}{2\pi}$ cm (d) $\frac{9}{2\pi}$ cm

68. A conical container of base radius 'r' and height 'h' is full of water which is poured into a cylindrical container of radius mr, then it will occupy a height equal to

(a) $3m^2h$ (b) $\frac{h}{3m^2}$ (c) $\frac{mh}{3}$ (d) $\frac{3h}{m}$

69. The volume of a sphere of diameter 2p cm is given by

(a) $\pi p^2 cm^3$ (b) $\pi p^3 cm^3$ (c) $4\pi p^3 cm^3$ (d) $\frac{4}{3}\pi p^3 cm^3$

70. The radius of a solid sphere is 'r' cm. It is bisected, then the total surface area of the two pieces obtained is

(a) $8\pi r^2 cm^2$ (b) $4\pi r^2 cm^2$ (c) $5\pi r^2 cm^2$ (d) $6\pi r^2 cm^2$

71. The radius of a sphere is increased by 50%, then the increase in surface area of a sphere is

(a) 200% (b) 150% (c) 125% (d) 50%

72. If the volume in m^3 and the surface area in m^2 of a sphere are numerically equal, then the radius of the sphere in m is

(a) 4 (b) 2 (c) 3.5 (d) 3

73. A sphere of radius 5 cm weights 4.4 kg, then the weight of a sphere of the same material whose radius is 3 cm is

(a) 2.64 kg (b) 1.584 kg (c) 0.9504 kg (d) $\frac{4}{3}$(0.9504) kg

74. The volume of a sphere is $\frac{4}{3}\pi r^3$ cubic units, then the ratio of the volume of a cube to that of a sphere which will fit inside the cube is

(a) $\frac{4}{3}:\pi$ (b) $6:\pi$ (c) $4:3$ (d) $4:\pi$

75. If S_1 and S_2 be the whole surface of a sphere and the curved surface of circumscribed cylinder, then S_1 is equal to

(a) S_2 (b) $2S_2$ (c) $\frac{2}{3}S_2$ (d) none of these

76. A sphere has the same volume as a cylinder whose height is equal to the diameter of its cross section, then the ratio of their radii is

(a) $\sqrt{\frac{2}{3}}$ (b) $\sqrt{\frac{3}{2}}$ (c) $\sqrt{\frac{2}{3}}$ (d) $\sqrt[3]{\frac{2}{3}}$

77. A right circular cone and a cylinder have a circle of unit radius as base and their heights are equal to the radius itself and a hemisphere has the same radius, then their volumes are proportional respectively to

(a) 1 : 2 : 3 (b) 3 : 2 : 1 (c) 2 : 1 : 3 (d) 1 : 3 : 2

78. In the case of cuboid, No denotes the number of vertices, N_1 the number edges and N_2 the number of faces, then

(a) $N_0 + N_1 = N_2 + 2$ (b) $N_0 + N_2 = N_1 + 2$

(c) $N_1 + N_2 = N_0 + 2$ (d) $N_1 + N_2 = 2N_0$

79. If the diagonal of a rectangle is twice one of the sides, then the ratio of the sides of the rectangle is

(a) $\sqrt{2}:1$ (b) $\sqrt{3}:1$ (c) $2\sqrt{2}:1$ (d) $2\sqrt{3}:1$

80. The length of a rectangle exceeds its breadth by 33 cm. If the numerical values of the area and the perimeter of the rectangle are equal, then the breadth of a rectangle will be

(a) 2 cm (b) 3 cm (c) 1 cm (d) 5 cm

81. If the length of every side of a triangle is increased by 50%, then then area of the triangle will be increased by

(a) 50% (b) 100% (c) 125% (d) 150%

82. If the area of a circle is halved when its radius is decreased by n, then the radius is equal to

(a) $N(2+\sqrt{2})$ (b) $N(\sqrt{2}-1)$ (c) $N(3-\sqrt{2})$ (d) $N\sqrt{2}$

83. If the number of units in the circumference of a circle is same as the number of units in the area, then the radius of the circle will be

(a) 1 unit (b) 2 unit (c) 3 units (d) 4 units

84. The side of square is 2 cm. Semicircles are constructed on two sides of the square, then the area of the whole figure is

(a) $(4+\pi)$ cm² (b) $(4+4\pi)$ cm² (c) 4π cm² (d) 8π cm²

85. A piece of wire 132 dm long is bent successively in the shape of an equilateral triangle, a square, a regular hexagon and a circle. Then the area included is largest when the shape is

(a) Triangle (b) Square (c) Hexagon (d) Circle

86. A wire, in the shape of an equilateral triangle, encloses an area 'S' cm². If the same wire is bent to form a circle, then the area of the circle will be

(a) $\frac{\pi S^2}{\pi}$ (b) $\frac{3\pi S^2}{\pi}$ (c) $\frac{3S}{\pi}$ (d) $\frac{3S\sqrt{3}}{\pi}$

87. Two cubes have volumes in the ratio 1 : 27, then the ratio of the area of the face of one to that of the other is

(a) 1 : 3 (b) 1 : 6 (c) 1 : 9 (d) 1 : 18

88. The ratio of the height of a circular cylinder to the diameter of its base is 1 : 2, then the ratio of the areas of its curved surface to the sum of the areas of its two ends is

(a) 1 : 1 (b) 1 : 2 (c) 2 : 1 (d) 1 : 3

89. The curved surface of a circular cylinder of height 'h' and the curved surface area of the cone of slant height '2h' having the same circular base, are in the ratio of

(a) 1 : 2 (b) 2 : 1 (c) 1 : 1 (d) 1 : 3

90. The volume of the greatest sphere cut off from a cylindrical wood of base radius 1 cm and height 5 cm is

(a) $\frac{4}{3} \times (5\pi)$cm³ (b) $\frac{4}{3}\pi$ cm³ (c) 5π cm³ (d) $\frac{10\pi}{3}$ cm³

91. A solid cylinder of glass whose diameter is 1.5 m and height 1 m is melted and recasted into a sphere, then the radius of the sphere is

(a) 1 m (b) 0.75 m (c) 1.25 m (d) 1.5 m

92. The perimeter of a right angled triangle is 60 cm and its hypotenuse is 26 cm, then the area of the triangle is

(a) 120 cm² (b) 121 cm² (c) 119 cm² (d) 125 cm²

93. The side of a regular hexagon is 'p' cm, then its area is

(a) $\frac{\sqrt{3}}{2}p^2$cm² (b) $\frac{3\sqrt{3}}{2}p^2$cm² (c) $2\sqrt{3}p^2$cm² (d) $6\pi^2$cm²

94. If every side of a triangle is doubled, then the area of the new triangle is 'K' times the area of the old one. The value of K is

(a) 2 (b) 3 (c) $\sqrt{2}$ (d) 4

95. If the longer side of a rectangle is doubled and the other reduced to half, then the area of the new rectangle goes up by

(a) 50% (b) 100% (c) 150% (d) No change

96. If a rectangle of sides 5 cm and 15 cm is to be divided into three squares of equal area, then the sides of the squares will be

(a) 4 cm (b) 6 cm (c) 7 cm (d) None of these

97. Three cubes of metal whose edges are 3 cm, 4 cm and 5 cm are melted to form a new cube whose side is

(a) 4 cm (b) 5 cm (c) 6 cm (d) 12 cm

98. A closed tea box has 47 cm × 47 cm × 60 cm internal dimensions, then the total area of tin foil needed for lining it is

(a) 1. 57 m (b) 1. 81 m (c) 1. 46 m (d) 2. 10 m

99. The length, breadth and height of a cuboid are in the ratio of 5 : 4 : 2 and the total surface area is 1216 cm², then the volume of the cuboid is

(a) 2460 cm³ (b) 2560 cm³ (c) 2660 cm³ (d) 2700 cm³

100. A wood 1 cm thick required to make a box of dimensions 24 cm × 22 cm × 17 cm, is

(a) 2276 cm³ (b) 2500 cm³ (c) 2600 cm³ (d) 2376 cm³

101. The volume of a solid cubical box whose surface area is 600 cm² is

(a) 1000 cm³ (b) 1200 cm³ (c) 1100 cm³ (d) 900 cm³

102. If two cubes each of side 12 cm are joined end to end, then the surface area a the resulting cuboid is

(a) 1728 cm² (b) 1440 cm² (c) 1445 cm² (d) 1450 cm²

103. The number of bullets of radius 2 cm that can be made from a cube of lead whose side is 44 cm is

(a) 2540 (b) 2541 (c) 2560 (d) 2575

104. If the radius of a lead shot 9 cm is melted and recanted into a right circular cylinder of height 8 cm and radius 6 cm, then the internal radius of the shot is (approx.).

(a) 6 cm (b) 7 cm (c) 8 cm (d) 9 cm

105. If a sphere has the same curved surface area as total surface area of cone of vertical height 40 cm and radius 30 cm, then the radius of the sphere is

(a) $10\sqrt{6}$ cm (b) $10\sqrt{3}$ cm (c) $10\sqrt{2}$ cm (d) 12 cm

106. If the sphere of radius 6 cm is melted and drawn into a wire of radius 0.2 cm, then the length of the wire is

(a) 75 cm (b) 72 cm (c) 72 cm (d) 75 cm

107. If the radius of the base of a right circular cone is halved, keeping the height same, then the ratio of the volume of the reduced cone to that of the original cone is

(a) 2 : 1 (b) 4 : 1 (c) 1 : 4 (d) 1 : 2

108. The slant height of a right circular cone is 10 m and its height is 8 m, then the area of its curved surface is

(a) 80π m² (b) 60π m² (c) 65π m² (d) 707π m²

109. The cost of canvas required for a conical tent, of height 8 m and diameter of base 12 m, at the rate of Rs. 3.50 per m² is

(a) Rs. 620 (b) Rs. 600 (c) Rs. 640 (d) Rs. 660

110. The volume of the cone whose vertical height is 8 m and the area of the base 156 m² is

(a) 416 m³ (b) 415 m³ (c) 312 m³ (d) 468 m³

111. The total surface area of a hemisphere of radius r is given by

(a) $2\pi r^2$ (b) $7\pi r^2$ (c) $3\pi r^2$ (d) $4\pi r^2$

112. The total surface area of the cylindrical iron pillar surmounted by a cone of radius and height equal to that of the cylinder (r = 6 cm, h = 8 cm) is

(a) 190π cm² (b) 192π cm² (c) 195π cm² (d) 198π cm²

113. The curved surface area of a right circular cone of height 84 cm and diameter 70 cm is

(a) 10010 cm² (b) 100000 cm² (c) 10020 cm² (d) 11000 cm²

114. The curved surface area of a cone of slant height 1 and radius r is given by

(a) $\frac{1}{3}\pi lr^2$ (b) πlr (c) πlr^2 (d) $\frac{1}{3}\pi lr$

115. A conical tent of radius of 12 m and height 16 m is to be made, then the cost of canvas required at the rate of Rs. 10 per m^2 is

(a) Rs. 7445 (b) Rs. 7543 (c) Rs. 7550 (d) Rs. 7500

116. A cone of height 10 cm and radius 10 cm is to be divided into two parts by cutting through the mid point of the vertical axis. Then the volume of the conical part is

(a) $\frac{1000}{3}$ πcm^3 (b) $\frac{500}{3}$ πcm^3 (c) $\frac{250}{3}$ πcm^3 (d) $\frac{125}{3}$ πcm^3

117. A circus tent is cylindrical to a height of 5 m and conical above it. If its diameter is 140 m and the slant height of the cone is 60 m, then the total surface area of the canvas required is

(a) 1540 m^2 (b) 3080 m^2 (c) 4620 m^2 (d) None of these

118. If the area of the base of a right circular cone is 51 m^2 and volume is 68 m^3, then tis vertical height is

(a) 3.5 m (b) 4 m (c) 4. 5 m (d) 5 m

119. If the diameter of a right cone is 6 cm and its vertical height is 4 cm, then its curved surface area is

(a) 47. 1 cm^2 (b) 48 cm^2 (c) 49 cm^2 (d) 50 cm^2

120. A right circular cylinder and a right circular cone, both having the same radius and height, then the ratio of their volumes is

(a) 2 : 1 (b) 3 :1 (c) 1 : 2 (d) 1 : 3

121. If the height and radius of a cone are doubled, then the volume of the cone becomes

(a) 2 times (b) 4 times (c) 8 times (d) 10 times

122. The total area of sheet required to make an open cone of height 24 cm and radius 7 cm is

(a) 470 cm^2 (b) 450 cm^2 (c) 425 cm^2 (d) 550 cm^2

123. If two cones have their heights in the ratio 1 : 3 and radii 3 : 1, then the ratio of their volumes is

(a) 1 : 3 (b) 3 : 1 (c) 2 : 3 (d) 3 : 2

124. If the area of the base of a cone is 770 cm^2 and the curved surface area is 814 cm^2, then its volume is

(a) $616\sqrt{5}$ cm^3 (b) $616/\sqrt{5}$ cm^3 (c) $616\sqrt{3}$ cm^3 (d) $616/\sqrt{2}$ cm^3

125. If the radius and height of a cone are in the ratio 5 : 12 and its volume is 314 cm^3, then its slant height is

(a) 12 cm (b) 10 cm (c) 13 cm (d) 15 cm

126. If the surface area of a sphere is 324π cm^2, then its volume is

(a) 950π cm^3 (b) 972π cm^3 (c) 975π cm^3 (d) 980π cm^3

127. The number of balls of radius 1 cm that can be made from a sphere of radius 10 cm will be

(a) 1000 (b) 10000 (c) 100000 (d) 100

128. Two right circular cones of dimensions h = 4.1 cm, r = 2.1 cm and h = 4. 3 cm, r = 2.1 cm are melted to form a sphere of radius

(a) 2. 5 cm (b) 2. 7 cm (c) 2.1 cm (d) 2 cm

129. The number of balls of radius 2 cm that can be made out of a cube of side 44 cm are

(a) 2525 (b) 2541 (c) 2500 (d) 2560

130. If the radius of a sphere is doubled, then the volume of a sphere becomes

(a) Doubled (b) Six times (c) Four times (d) Eight times

131. Three spheres of radii 6 cm, 8 cm and 10 cm are melted to form a sphere of radius

(a) 11 cm (b) 13 cm (c) 24 cm (d) None of these

132. If a sphere and a cube have the same volume, then the ratio of the diameter of the sphere to the edge of the cube is

(a) $\sqrt{6} : \sqrt{\pi}$ (b) $3\sqrt{3\pi} : 3\sqrt{\pi}$ (c) $\sqrt[3]{3\pi} : \sqrt[3]{4}$ (d) None of these

133. The number of coins, of radius 0.75 cm and thickness 0.2 cm, to be melted make a right circular cylinder of height 8 cm and radius 3 cm is

(a) 640 (b) 650 (c) 675 (d) 700

134. If the diameter of a circle is increased by 200%, then its area is increased by

(a) 100% (b) 200% (d) 300% (d) 800%

135. The height of a parallelogram of area 350 cm² and base 25 cm is

(a) 12 cm (b) 13 cm (c) 14 cm (d) 15 cm

136. A square whose diagonal is 10 cm long has area equal to

(a) 28 cm² (b) 34 cm² (c) 50 cm² (d) None of these

137. The side of a square inscribed in the circle of circumference 220 cm is

(a) 45 cm (b) 48 cm (c) $35\sqrt{2}$ cm (d) $40\sqrt{2}$ cm

138. The area of a sector of perimeter 45 cm and radius 6 cm is

(a) 44 cm² (b) 66 cm² (c) 88 cm² (d) 99 cm²

139. The side of an equilateral triangle of area $64\sqrt{3}$ cm² is

(a) 12 cm (b) 14 cm (c) 16 cm (d) 18 cm

140. A hall has dimensions 24 m × 8 m × 6 m. The length of the longest pole which can be accommodated in the hall is

(a) 26 m (b) 28 m (c) 30 m (d) 36 m

141. The base of a right angled triangle is 8 m and its hypotenuse is 10 m. Then its area is

(a) 48 m² (b) 40 m² (c) 30 m² (d) 24 m²

142. There is an equilateral triangle of side 5 cm. The maximum number of equilateral triangles (of side 1 cm) cut out will be

(a) 25 (b) 20 (c) 15 (d) 10

143. The radius of a circle whose are is equal to the sum of the areas of two circles, where radii are 5 cm and 12 cm, is

(a) 13 cm (b) 14 cm (c) 15 cm (d) None

144. The diameter of a wheel is 98 cm. The number of revolutions in which it will have to cover a distance of 1540 m is

(a) 500 (b) 600 (c) 700 (d) 800

145. If the area of 4 walls of the whose breadth is 15m and height is 8 m is 1068 m², then the length of the hall is

(a) 18 m (b) 17 m (c) 16 m (d) None of these

146. A room has dimensions 5 m × 3 m × 4 m. The length of the longest pole which can be accommodated in the hall is

(a) $5\sqrt{2}$ m (b) 25 m (c) 50 m (d) 215 m

147. The slant height of a conical tent is 35 m and its diameter is 56 m. Then the cost of constructing it at 20 paise per m³ is

(a) Rs. 3600.50 (b) Rs. 3616.00 (c) Rs. 620 (d) Rs. 3449.60

148. If a solid cylindrical vessel of base radius 5 cm and height 10 cm be melted into a solid conical vessel of the same base and height, then the number of such cones is

(a) 2 (b) 3 (c) 4 (d) 6

149. The canvas required to construct a cone of height 24 m and base radius 7 m is

(a) 500 m² (b) 520 m² (c) 550 m² (d) None of these

150. The radii of two right circular cone are in the ratio of 4 : 5 and their slant heights are in the ratio 2 : 3. Then the ratio of their curved surfaces is

(a) 6 : 17 (b) 8 : 15 (c) 1 : 1 (d) None of these

151. A rectangular sheet of cardboard is 8 cm ×4 cm. Two equal circular holes are cut out touching each other, having largest possible area. Then the area left out (in cm²) is

(a) 32 – 8π (b) 32 – 4 π (c) 32 – π (d) None of these

152. A hemispherical tank of radius $\frac{1}{2}$ m is full of water. It is connected with a pipe which empties it at the rate of 7 litres/sec. Then the time taken to empty the tank completely is

(a) 20 sec. (b) 25 sec. (c) 37.41 sec. (d) 28 sec.

153. An iron ball of 5 cm diameter is thrown into a cubical container of edge 15 cm and half filled with water. Then the rise in the level of water is

(a) 0.291 cm (b) 0.391 cm (c) 0.491 cm (d) None of these

154. A semicircular thin sheet of metal of diameter 28 cm is bent and an open conical cup is made, then the capacity of the cup is

(a) 632. 38 cm³ (b) 642.38 cm³ (c) 622.36 cm³ (d) None of these

155. A sector of a circle of radius 6 cm has an angle of 120°. It is rolled up so that the two bounding radii are joined together to form a cone. Then the radius of the resulting cone is

(a) 2 cm (b) 3 cm (c) 4 cm (d) 5 cm

156. The curved surface area of the cone formed in the above question is

(a) 15π cm³ (b) 14π cm³ (c) 12π cm³ (d) 18π cm³

ANSWER KEY

EXERCISE – 1

1. 1 : 2
2. 75%
3. Rs. 3033.84
4. 8 cm^2
5. 51 cm
6. (i) 7.2 cm (ii) 10.2 cm (iii) 8.4 cm
7. 195 m^2
8. 42 cm^2
9. 7056 m^2
10. 18 cm
11. 180 cm^2
12. 80 cm^2
13. 216 cm^2
14. 9 m
15. 8 cm
16. 45.5 cm^2
17. 119 m^2
18. 350 cm^2; Rs 8750
19. Rs 224.64
20. 170 cm^2
21. 10.5 cm
22. Rs 234
23. 1.224 m^2
24. 1.5 m
25. Rs 40,950
26. Rs 43,200
27. 125%
28. Rs. 376
29. 27 cm^3
30. 15m, 9m, 3 m
31. 278 m^2
32. 90 m^2
33. 10 m^2
34. 868 m^2
35. 17 m
36. 40 cm
37. 45000
38. 216 cm^3, 216 cm^2
39. 4913 cm^3
40. 40
41. 1 : 9

42. 216 cubes
43. 3 cm
44. 2.4 Iitres
45. 20 cm
46. 8
47. 15 cm
48. 6 cm
49. 240
51. (i) $\frac{1}{8}$ times (ii) 27 times
52. 8 cm
53. 72
54. 2m
55. 27000
56. 500000 litres
57. 30 m^3
58. 6 m
59. 90
60. 15 cm
61. 1 : 1
62. 2681.25 m^2
63. 3168 cm^2
64. 880 cm^2
65. 10 : 9
66. Rs. 440
67. 2310 cm^3
68. 5 : 9
69. 1 : 4
70. 754.28 cm^2
71. 4.66 m
72. 9240 cm^3
73. 13860 cm^3
74. 3850 cm^3
75. 20 : 27
76. 1078 cn^3

EXERCISE – 2

1. 96 min.
2. 8.04 kg
3. 11.25 cm
4. 486 cm^2
5. 400
6. 2 : 5
7. 26.4 kg
8. 800 buckets
9. Rs 8192
10. 13.11 kg
11. 1.2 m
12. 5 cm
13. 8.6 cm
14. 25 cm
15. 960 kg
16. 640 buckets
17. 80 cm
18. Rs. 960
19. 18.6 cm
20. 6 kg
21. 4 cm
22. 0.001 m
23. 57.6 kg
24. 0.3 m
25. Rs. 528
26. 48 m
27. 8 m, 12 m, 16 m
28. 600
29. 8 cm
30. 6 m
32. 328 cm
33. 924 cm^2
34. Rs. 539
35. 450
36. 1 cm
37. 25 cm
38. 539 cm^3
39. 2.805 gm
40. 14 m, 6 m
41. 594 m^3
42. 107712 cm^3
43. 5 : 3
44. 216 cm^3, 216 cm^2
45. 36960 cm^3
46. 2 : 5
47. (i) False (ii) False (iii) False (iv) False (v) False
48. (i) → (c); (ii) → (d); (iii) → (a), (iv) → (b)

EXERCISE – 3

Ques.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Ans.	b	a	c	b	a	d	b	c	c	c
Ques.	11.	12.	13	14.	15.	16.	17.	18.	19.	20.
Ans.	b	b	a	d	a	b	c	c	b	b
Ques.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
Ans.	d	c	b	c	c	d	d	b	b	b
Ques.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
Ans.	c	b	d	c	a	a	d	d	c	a
Ques.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
Ans.	a	b	d	b	a	a	c	d	a	c
Ques.	51.	52.	53.							
Ans.	b	b	d							

EXERCISE – 4

Ques.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Ans.	d	d	d	c	a	b	b	b	d	a
Ques.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Ans.	c	a		b	a	b	a	d	d	b
Ques.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.
Ans.	d	b	a	a	d	c	d	d	d	c
Ques.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
Ans.	b	d	b	a	a	c	b	b	d	a
Ques.	41.	42.	43.	44.	45.	46.	47.	48.	49.	50.
Ans.	c	b	d	d	b	b	c	c	d	
Ques.	51.	52.	53.	54.	55.	56.	57.	58.	59.	60.
Ans.	d	d	c	c	a	b	b	b	c	b
Ques.	61.	62.	63.	64.	65.	66.	67.	68.	69.	70.
Ans.	d	a	c	b	b	b	c	b	d	d
Ques.	71.	72.	73.	74.	75.	76.	77.	78.	79.	80.
Ans.	c	d	c	b	a	d	d	b	b	b
Ques.	81.	82.	83.	84.	85.	86.	87.	88.	89.	90.
Ans.	c	a	b	a	d	d	c	a	c	b
Ques.	91.	92.	93.	94.	95.	96.	97.	98.	99.	100.
Ans.	b	a	b	d	d	d	c	a	b	d
Ques.	101.	102.	103.	104.	105.	106.	107.	108.	109.	110.
Ans.	a	b	b	c	a	c	c	b	d	a
Ques.	111.	112.	113.	114.	115.	116.	117.	118.	119.	120.
Ans.	c	b	a	b	b	d	d	b	a	b
Ques.	121.	122.	123.	124.	125.	126.	127.	128.	129.	130.
Ans.	c	d	b	a	c	b	a	c	b	d
Ques.	131.	132.	133.	134.	135.	136.	137.	138.	139.	140.
Ans.	d	c	a	d	c	c	c	b	c	a
Ques.	141.	142.	143.	144.	145.	146.	147.	148.	149.	150.
Ans.	d	a	a	a	b	a	d	b	c	b
Ques.	151.	152.	153.	154.	155.	156.				
Ans.	a	c	a	c	a	c				