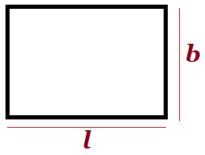
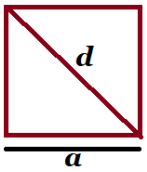
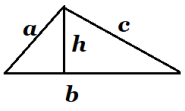
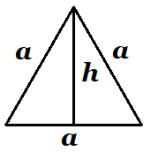
Mensuration is a branch of mathematics that deals with the study of different geometrical shapes, their perimeter,area , surface area, curved surface area, volume etc. Basically, there are two type of geometric shapes (i) 2D shapes (ii) 3D shapes

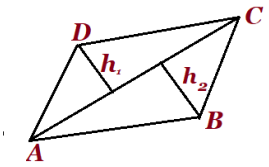
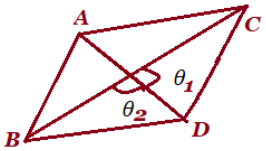
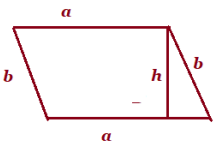
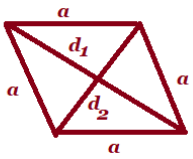
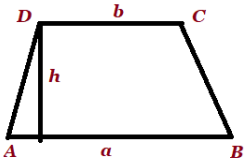
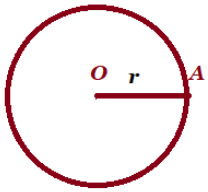
2D shapes are : circle, square, rectangle, square , parallelogram, rhombus etc.

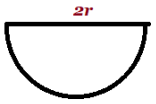
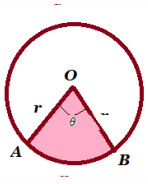
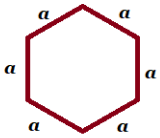
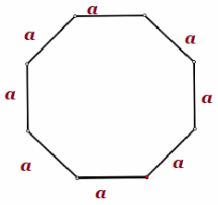
3D shapes are : cube , cylinder, cone , cuboid, sphere , prism , pyramid , cone etc.

Now let's learn all the important mensuration formulas involving 2D and 3D shapes. Using this mensuration formula list, it will be easy to solve the mensuration problems.

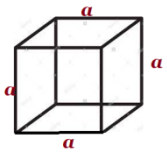
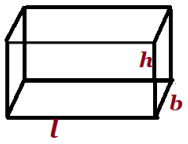
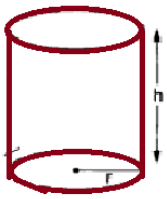
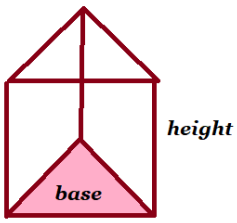
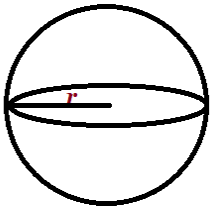
Mensuration formulas for 2D -shapes:

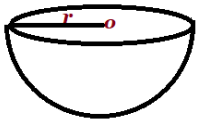
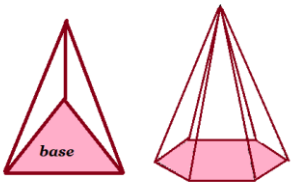
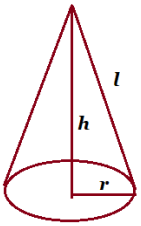
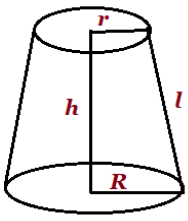
Name	Figure	Area	Perimeter
Rectangle	 l= length, b=breadth	$l \times b$	$2(l+b)$
Square	 a= side , d= diagonal	a^2 If d is given , then $A = \frac{d^2}{2}$	4 x side= 4a
Triangle (scalene)	 $s = \frac{a+b+c}{2}$ b =base, h= height or altitude of a triangle	(i) $\frac{1}{2} \times b \times c$ (ii) Heron's Formula $\sqrt{s(s-a)(s-b)(s-c)}$	a+b+c
Equilateral triangle	 a= side , h= height or altitude $h = \frac{\sqrt{3}}{2} \times a$	(i) $\frac{1}{2} \times a \times h$ (ii) $\frac{\sqrt{3}}{4}a^2$	3a

Quadrilateral	 AC=diagonals h_1, h_2altitudes on AC from the vertices D and B respectively. 	(i) $\frac{1}{2} \times AC \times (h_1 + h_2)$ (ii) $\frac{1}{2}\times$ product of diagonals x sin of the angle between them	AB+BC+CD+AD
Parallelogram	 a and b be the lengths of parallel sides and h be the height	(i)Area= base x height (ii) area= $absin\theta$, $\theta$is the angle between the sides of the parallelogram	2(a+b)
Rhombus	 a=each equal sides , d_1 and d_2 are the diagonals	$\frac{1}{2} \times d_1 \times d_2$	4a
Trapezium	 a, b are parallel sides h is the perpendicular distance between parallel sides	$\left(\frac{a+b}{2}\right) \times h$	AB+BC+CD+DA
Circle	 r=radius ,	πr^2	circumference= $2\pi r$

	$\pi = \frac{22}{7}$		
Semi-circle	 r =radius	$\frac{1}{2}\pi r^2$	$\pi r + 2r$
Sector of a circle	 o centre , r= radius l=length of arc AB, θ= angle of the sector $l = 2\pi r.\frac{\theta}{360^\circ}$	(i) $\pi r^2 \frac{\theta}{360^\circ}$ (ii) $\frac{1}{2} r \times l$	l+2r
Regular hexagon	 a= each of the equal side	$\frac{3\sqrt{3}}{2}a^2$	6a
Regular octagon	 a= each of the equal side	$2a^2\left(1+\sqrt{2}\right)$	8a

Mensuration formulas for 3D -shapes:

Name	Figure	Volume	Lateral /Curved surface area	Total surface Area
Cube	 a=side/edge	a^3	$4a^2$	$6a^2$
cuboid	 l=length, b=breadth, h=height	lbh	$2(l+b)h$	$2(lb+bh+hl)$
Right circular cylinder	 r= radius of base h=height	πr^2	$2\pi rh$	$2\pi r(h+r)$
Right triangular prism		area of base x height	perimeter of base x height	lateral surface area+2(area of base)
Sphere	 r=radius	$\frac{4}{3}\pi r^3$		$4\pi r^2$

Hemisphere	 r= radius	$\frac{2}{3}\pi r^3$	$2\pi r^2$	$3\pi r^2$
Pyramid	 l= slant height	$\frac{1}{3}\times$ base x height	$\frac{1}{2}\times$ perimeter of base x slant height	lateral surface area+base area
Cone	 l=slant height, h =height , r= radius of base	$\frac{1}{3}\times$ area of base x height=$\frac{1}{3}\pi r^2 h$	πrl	$\pi rl + \pi r^2$
Frustum of a cone		$\frac{1}{3}\pi h(r^2 + Rr + R^2)$	$\pi l(r + R)$	lateral surface area+ $\pi(R^2 + r^2)$