

Mensuration and Mensuration Formulas

Mensuration is the branch of mathematics which studies the measurement of the geometric figures and their parameters like **length, volume, shape, surface area, lateral surface area**, etc. You will study the mensuration formulas and properties of different geometric shapes and figures in maths in this article.

Mensuration Maths- Definition

A branch of mathematics which talks about the length, volume or area of different shapes is called **Mensuration**. These shapes exist in 2 dimension or 3 dimensions. Let's learn the difference between the two.

Difference Between 2D and 3D shapes

2D Shape	3D Shape
If a shape is surrounded by three or more straight lines in a plane, then it is a 2D shape.	If a shape is surrounded by a no. of surfaces or planes then it is a 3D shape.
These shapes have no depth or height.	These are also called as solid shapes and unlike 2D they have both height or depth.
These shapes have only 2-D length and breadth.	These are called Three dimensional as they have depth, breadth and length.
We can measure their area and Perimeter.	We can measure their volume, CSA, LSA or TSA.

Mensuration in Maths- Important Terminologies

Let's learn a few more definitions related to this topic.

Area	A	M^2 / cm ²	The area is the surface which is covered by the closed shape.
Perimeter	P	C m / m	The measure of the continuous line along the boundary of the given figure is called a Perimeter.

Volume	V	C m ³ / m ³	In a 3D shape, the space included is called a Volume.
Curved Surface Area	C S A	M ² / cm ²	If there's a curved surface, then the total area is called a Curved Surface area. Example: Sphere or Cylinder.


Lateral Surface area	L S A	M ² / cm ²	The total area of all the lateral surfaces that surrounds the figure is called the Lateral Surface area.
Total Surface Area	T S A	M ² / cm ²	If there are many surfaces like in 3D figures, then the sum of the area of all these surfaces in a closed shape is called Total Surface area.
Square Unit	–	M ² / cm ²	The area covered by a square of side one unit is called a Square unit.
Cube Unit	–	M ³ / cm ³	The volume occupied by a cube of one side one unit

Mensuration Formulas

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. Students can also download the mensuration formulas list PDF from the link given above.

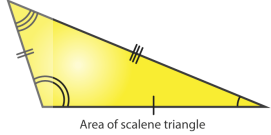
Mensuration Formulas For 2D Figures

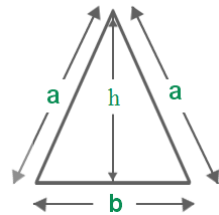
Shape	Area (Square units)	Perimeter (units)	Figure
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Sauare	a^2	$4a$	
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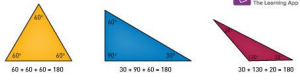
Recatngle	$l \times b$	$2(l + b)$	
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Circle	πr^2	$2\pi r$	
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Scalene Triangle	$\sqrt{s(s-a)(s-b)(s-c)}$, $s = (a+b+c)/2$	$a+b+c$	
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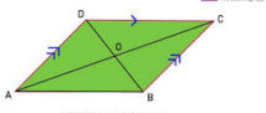
Isosceles Triangle	$\frac{1}{2} \times b \times h$	$2a + b$	
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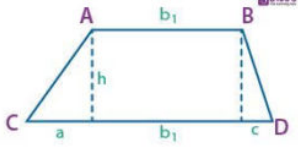
Equilateral Triangle	$\frac{\sqrt{3}}{4} a^2$	$3a$	
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Right Angle Triangle	$\frac{1}{2} \times b \times h$	$b +$ hypotenus $e + h$	
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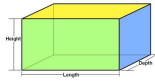
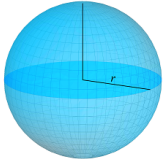
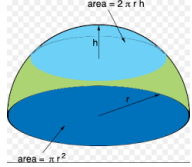
Rhombus	$(1/2) \times d_1 \times d_2$	$4 \times \text{side}$	
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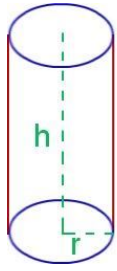

Parallelogra	$b \times h$	$2(l+b)$	
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m			 <p>Figure 1. Parallelogram</p>
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Trapezium	$(1/2) h(a+b)$	$a+b+c+d$	
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Mensuration Formulas for 3D Figures

Shape	Volume (Cubic units)	Curved Surface Area(CSA) (Square units)	Total Surface Area(TSA) (Square units)	Figure
Cube	a^3	—	$6 a^2$	
Cuboid	$l \times w \times h$	—	$2 (lb +bh +hl)$	
Sphere	$(4/3) \pi r^3$	$4 \pi r^2$	$4 \pi r^2$	
Hemisphere	$(\frac{2}{3}) \pi r^3$	$2 \pi r^2$	$3 \pi r^2$	

Cylinder	$\pi r^2 h$	$2\pi r h$	$2\pi r h + 2\pi r^2$	
Cone	$(\frac{1}{3}) \pi r^2 h$	$\pi r l$	$\pi r (r + l)$	

Mensuration Problems

Question : Find the area and perimeter of a square whose side is 5 cm?

Solution:

Given:

Side = 5 cm

Area of a square = a^2 square units

Substitute the value of "a" in the formula, we get

Area of a square = 5^2

$A = 5 \cdot 5 = 25$

Therefore, the area of a square = 25 cm^2

The perimeter of a square = $4a$ units

$P = 4 \cdot 5 = 20$

Therefore, the perimeter of a square = 20 cm.