# Heron's Formula (Mensuration)

*Mensuration*

- It is branch of mathematics which is concerned about the measurement of length ,area and Volume of plane and Solid figure

*Perimeter*

- The perimeter of plane figure is defined as the length of the boundary
- It units is same as that of length i.e. m ,cm,km

| | | |
|---|---|---|
| 1 Meter | 10 Decimeter | 100 centimeter |
| 1 Decimeter | 10 centimeter | 100 millimeter |
| 1 Km | 10 Hectometer | 100 Decameter |
| 1 Decameter | 10 meter | 1000 centimeter |

*Area*

- The area of the plane figure is the surface enclosed by its boundary
- It unit is square of length unit. i.e. $m^2$ , $km^2$

| | | |
|---|---|---|
| 1 square Meter | 100 square Decimeter | 10000 square centimeter |
| 1 square Decimeter | 100 square centimeter | 10000 square millimeter |
| 1 Hectare | 100 square Decameter | 10000 square meter |
| 1 square myraimeter | 100 square kilometer | $10^8$ square meter |

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*Perimeter and Area of Different Figure*

| N | Shape | Perimeter/height | Area |
|---|---|---|---|
| 1 | Right angle triangle<br>Base =b, Height =h<br>Hypotenuse=d | P=b+h+d<br>Height =h | $\boldsymbol{A=\frac{1}{2}bh}$ |
| 2 | Isosceles right angled triangle<br>Equal side =a | $p=2a+a\sqrt{2}$<br>Height=a | $A=\frac{1}{2}a^2$ |
| 3 | Any triangle of sides a,b ,c | P=a+b+c | $A=\sqrt{s(s-a)(s-b)(s-c)}$<br>Where $s=\frac{a+b+c}{2}$<br>This is called Heron's formula (sometimes called Hero's formula) is named after Hero of Alexandria |
| 4 | Square<br>Side =a | P=4a | **$A=a^2$** |
| 5 | Rectangle of Length and breath L and B respectively | P=2L +2B | A=LX B |
| 6 | Parallelograms<br>Two sides are given as a and b | P=2a+2b | A= BaseX height<br>When the diagonal is also given ,say d<br>Then<br>$A=2\sqrt{s(s-a)(s-b)(s-d)}$<br>Where $s=\frac{a+b+d}{2}$ |
| 7 | Rhombus<br>Diagonal $d_1$ and $d_2$ are | $p=2\sqrt{d_1^2+d_2^2}$ | $A=\frac{1}{2}d_1d_2$ |

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| | | | |
|---|---|---|---|
| | given | $side = \frac{1}{2}\sqrt{d_1^2 + d_2^2}$ | |
| 8 | Quadrilateral<br><br>a) All the sides are given a,b,c ,d<br><br>b) Both the diagonal are perpendicular to each other<br><br>c) When a diagonal and perpendicular to diagonal are given | a) P=a+b+c+d | a)<br>$A = \sqrt{(s-a)(s-b)(s-c)(s-d)}$<br>where $s = \frac{a+b+c+d}{2}$<br><br>b)<br>$A = \frac{1}{2}d_1 d_2$<br><br>where $d_1$ and $d_2$ are the diagonal<br><br>c) $A = \frac{1}{2}d(h_1 + h_2)$<br><br>where d is diagonal and $h_1$ and $h_2$ are perpendicular to that |

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