

## LESSON PLAN 10

**CLASS : 9** SUBJECT : MATHEMATICS **TEACHER'S NAME :**

NAME OF THE UNIT	SUB-TOPICS	NO OF PERIODS REQUIRED			Time line for teaching	
		Teaching	Practice	TOTAL	From	To
<b>HERON'S FORMULA</b>	10.1 AREA OF A TRIANGLE - BY HERON'S FORMULA	4	4	8		
	TOTAL	4	4	8		
<b>PRE-REQUISITES &amp; SKILLS</b>	Every Pupil is expected to have basic knowledge in # definition of a triangle # terminology related to a triangle like sides, angles, vertices, base, height, altitude etc. # classification of triangles based on sides and based on angles, # properties of a triangle # finding area of a triangle in known methods like half of its base x height. # basic mathematical operations .					

## Learning Outcomes

After Completion of this lesson every student will be able to

- # understand that the area of a triangle can be calculated even if we don't know the length of the altitude to any base.
- # make use of heron's formula in finding the area of a triangle.
- # cross check and confirm that the value obtained for area of a given triangle is same by calculating in both ways by previous formula  $1/2$  (base x height) and by heron's formula
- # utilize the heron's formula for calculating the area of a triangle .
- # appreciate the utility of "Heron's formula" in real life sums

## Teaching Learning Process

### INTRODUCTION /INDUCTION

Teacher introduces the chapter of Heron's Formula by recalling their previous knowledge on Triangle and finding its area using base and height and later familiarizes the new formula of heron for finding the area of a triangle when only the lengths of the sides are given.



Area of a Triangle  
Method 3

Heron's Formula

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

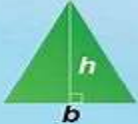
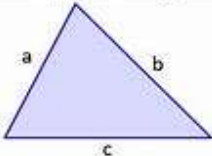
Where s is the semiperimeter

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

### Experience & Reflection

# Pupils will recollect their knowledge on Triangle and its properties and utilize that in exploring and learning new Formula for finding area of a triangle in different way.

# Students will experience the usage of the Heron's formula for finding the area of a triangle and appreciate its usage.

EXPLICIT TEACHING/TEACHER MODELLING (I DO)	GROUP WORK (WE DO)	INDEPENDENT WORK (YOU DO)	NOTES
<p><b>10.1. Area of a Triangle - By Heron's formula</b></p> <p>Teacher first recapitulates the formula for finding area of a triangle when its base and height are known and later teacher introduces the new formula i.e., Heron's formula for finding the area of a triangle</p>	<p>Pupils will work in groups and try to recall their previous memory on finding the area of a triangle when its base and height are known through discussion and now learn this new Heron's formula for finding the area of a triangle when the lengths of all sides are only known</p>	<p>Every individual will try to identify various terms of the Heron's formula and make use of it.</p>	<p>Area of a Triangle formula (old way) Heron's formula and example sums.</p> <div data-bbox="1423 540 1887 922" style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;"><b>Formula</b></p> <p style="text-align: center;"><b>Area of a Triangle.</b></p> <div style="text-align: center;">  </div> <math display="block">\text{Area} = \frac{1}{2} b \cdot h</math> </div> <div data-bbox="1423 930 1887 1354" style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><b>Heron's Formula</b></p> <p style="text-align: center;">We can use Heron's Formula to determine the area of a triangle when given the lengths of the side</p> <div style="text-align: center;">  </div> <div style="text-align: center; background-color: #fff9c4; padding: 5px; margin-top: 5px;"> <p>Let <math>s = \frac{a+b+c}{2}</math></p> <math display="block">\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}</math> </div> </div>

**Example 2 :** A triangular park ABC has sides 120m, 80m and 50m (see Fig. 12.7). A gardener *Dhania* has to put a fence all around it and also plant grass inside. How much area does she need to plant? Find the cost of fencing it with barbed wire at the rate of Rs 20 per metre leaving a space 3m wide for a gate on one side.

**Solution :** For finding area of the park, we have

$$2s = 50 \text{ m} + 80 \text{ m} + 120 \text{ m} = 250 \text{ m.}$$

i.e.,  $s = 125 \text{ m}$

Now,  $s - a = (125 - 120) \text{ m} = 5 \text{ m,}$

$s - b = (125 - 80) \text{ m} = 45 \text{ m,}$

$s - c = (125 - 50) \text{ m} = 75 \text{ m.}$

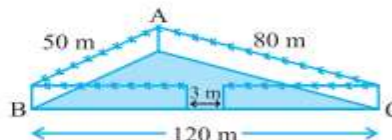


Fig. 12.7

Therefore, area of the park =  $\sqrt{s(s-a)(s-b)(s-c)}$

$$= \sqrt{125 \times 5 \times 45 \times 75} \text{ m}^2$$

$$= 375\sqrt{15} \text{ m}^2$$

Also, perimeter of the park =  $AB + BC + CA = 250 \text{ m}$

Therefore, length of the wire needed for fencing =  $250 \text{ m} - 3 \text{ m}$  (to be left for gate)

$$= 247 \text{ m}$$

And so the cost of fencing =  $\text{Rs } 20 \times 247 = \text{Rs } 4940$

**CHECK FOR UNDERSTANDING QUESTIONS**

1. Factual	<p>1) : Find the area of a triangle, two sides of which are 8 cm and 11 cm and the perimeter is 32 cm</p> <p>2) An isosceles triangle has perimeter 30 cm and each of the equal sides is 12 cm. Find the area of the triangle.</p>
2. Open Ended/Critical Thinking	<p>1) The triangular side walls of a flyover have been used for advertisements. The sides of the walls are 122 m, 22 m and 120 m. The advertisements yield an earning of Rs. 5000 per <math>m^2</math> per year. A company hired one of its walls for 3 months. How much rent did it pay?</p> <p>2) Sides of a triangle are in the ratio of 12 : 17 : 25 and its perimeter is 540 cm. Find its area</p>
3. Student Practice questions & Activities	<p>1. A traffic signal board, indicating 'SCHOOL AHEAD', is an equilateral triangle with side 'a'. Find the area of the signal board, using Heron's formula. If its perimeter is 180 cm, what will be the area of the signal board?</p> <p>2. There is a slide in a park. One of its side walls has been painted in some colour with a message "KEEP THE PARK GREEN AND CLEAN". If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour.</p>
4. Assessment	Exercise sums and worksheet on Heron's Formula