DIGITAL LESSON PLAN

Subject: Mathematics	Text Book: MATHEMATICS, NCERT, 2021
Topic: Heron's Formula	Name of School:
Unit: Heron's Formula	Name of the Student-Teacher: Mamoni Pegu
Class: IX	Date:
Time: 30 min	
Number of Students:	
Average Age: 14+	

HERON'S FORMULA

Objectives:

- Recall the Formula to calculate the area of triangle. (Knowledge)
- Recall the method to find the area of right angle triangle, equilateral triangle and isosceles triangle. (Knowledge)
- Name the discovery of heron's formula. (Knowledge)
- Solve the problems based on area of right angle triangle. (Understanding)
- Solve the problem based on area of triangle by using heron's formula. (Understanding)

INTRODUCTION

You have learned to calculate the areas rectangle, square and triangle etc. Suppose that you are sitting in a triangular garden, and you are asked to find the area of that triangular garden. We know that:

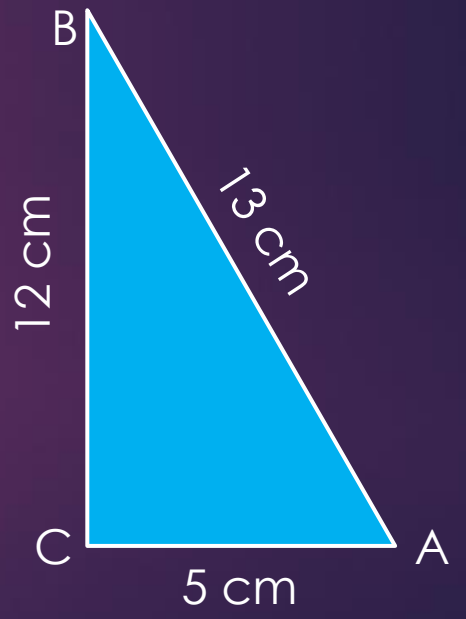
Area of a triangle = $\frac{1}{2}$ × base × height

We will use the above formula to find the area of the triangular garden.

If The Garden is Right-Triangle:

We see that when the triangle is right angled, we can directly apply the formula by using two sides containing the right angle as base and height. For example, suppose that the sides of a right triangle ABC are 5 cm, 12 cm and 13 cm; we take base as 12 cm and height as 5 cm. Then we can find the area of the garden as follows:

$$\text{Area of } \Delta ABC = \frac{1}{2} \times \text{base} \times \text{height}$$
$$= \frac{1}{2} \times 12 \times 5 \text{ cm}^2$$
$$= 30 \text{ cm}^2$$

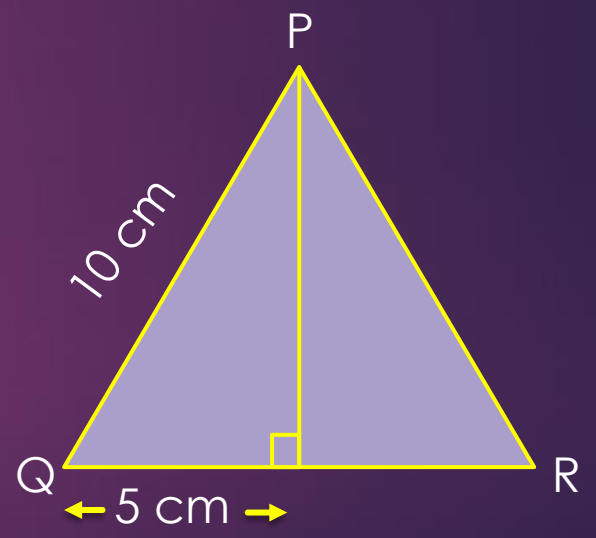


If The Garden is in Equilateral Triangular Shape:

If the Shape of the garden is Equilateral Triangle, We can find the area of the garden by using the basic formula. Before that we need to find the height of the triangular garden by using Pythagoras Theorem. For example:

$PQ^2 = PM^2 + QM^2$
$(10)^2 = PM^2 + (5)^2$
since QM = MR.
Therefore, we have $PM^2 = 75$ i.e.,
$PM = \sqrt{75}$ cm $= 5\sqrt{3}$ cm.

Then area of Δ PQR $= \frac{1}{2} \times$ base $\times$ height
$= \frac{1}{2} \times 10 \times 5\sqrt{3}$ cm^2
$= 25\sqrt{3}$ cm^2



Check Your Progress:

Note:

- a) Write your answer in your notebook.
- b) Compare your answer with the one given at the end of the

Q1. Write the Formula of area of triangle.

Q2. Find the area of a isosceles triangle whose equal sides measures 5cm and the third side is 8cm.

HERON'S FORMULA

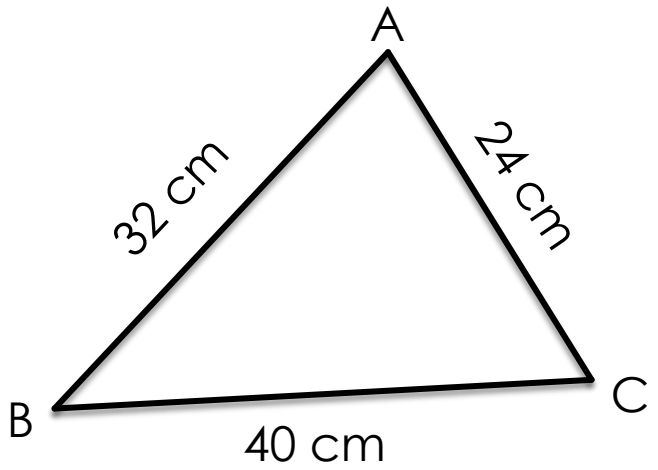
The formula given by Heron about the area of a triangle, is also known as Hero's formula. It is stated as:

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

where a, b and c are the sides of the triangle, and s = semi-perimeter, i.e., half the perimeter of the triangle = $\frac{a+b+c}{2}$

Area of A Triangle By Heron's Formula

formula is helpful where it is not possible to find the height of the triangle easily. Let us apply it to calculate the area of the triangular park ABC, where a = 40, b = 24, c = 32.



we have **s =** $\frac{40+24+32}{2}$ m = 48 m.

s – a = (48 – 40) m = 8 m,

s – b = (48 – 24) m = 24 m,

s – c = (48 – 32) m = 16 m.

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

= $\sqrt{48 \times 8 \times 24 \times 16}$ **m² = 384 m²**

EXERCISE

Q1. Write the Heron's Formula.

Q2. 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.

Q3. Find the area of a triangle two sides of which are 18cm and 10cm and the perimeter is 42cm.

Answer to Check Your Progress

Answers:

1. Area of a triangle = $\frac{1}{2}$ × base × height

2. Here, YP = PZ = $\frac{1}{2}$ YZ = 4 cm

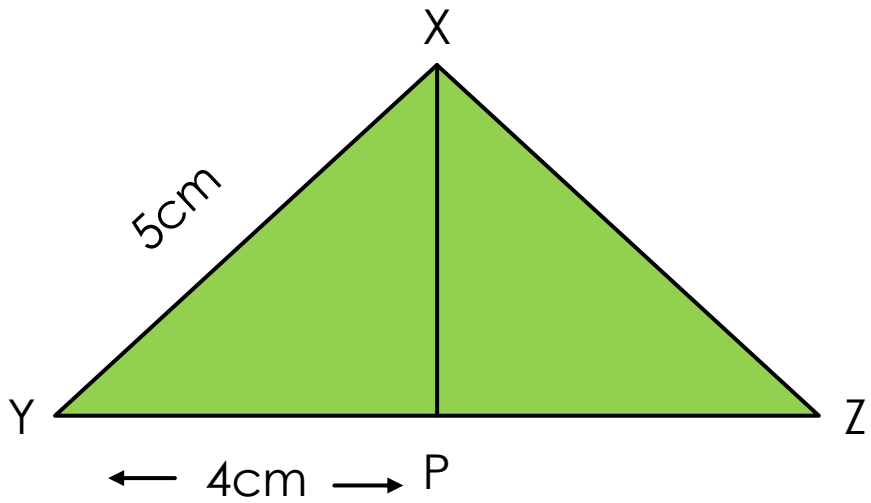
   Then, by using Pythagoras theorem, we get

   $XP^2 = XY^2 - YP^2 = 5^2 - 4^2 = 25 - 16 = 9$

   So, XP = 3 cm

   Now, area of Δ XYZ = $\frac{1}{2}$ × base YZ × height XP

   $= \frac{1}{2} \times 8 \times 3$ cm2 = 12 cm^2 .



Thanks