

9th – Heron's Formula



Remember that while using the formula $\frac{1}{2}bh$, you should always take a base and its corresponding height.

Area of a Different types of Triangles:

1. Area of $\Delta ABC = \frac{1}{2}$ base \times corresponding height
2. Area of equilateral triangle with side 'a' = $\frac{\sqrt{3}a^2}{4}$
3. Area of isosceles triangle ABC with $AB = AC = a$ and $BC = b$
altitude to base = $\sqrt{(2a+b)(2a-b)}$ and area = $b\sqrt{(2a+b)(2a-b)}$
4. Area of scalene triangle with $AB = a$, $BC = b$ and $AC = c$;
 $S = (a + b + c) / 2$ and Area = $\sqrt{s(s-a)(s-b)(s-c)}$

This is called Heron's Formula

Exercise - 1

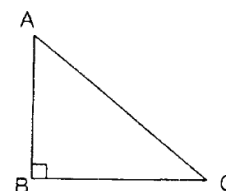
Q.1 ΔABC is a right triangle right angled at B. If $AB = 8$ cm and $AC = 16$ cm, find area of the triangle.

Q.2 In the figure given below, $AC = 10$ cm and $BC = 6$ cm. Find area of the triangle.

Q.3 ΔABC is an isosceles right triangle with $AB = BC$. If $AC = 2\sqrt{6}$ cm, find the area of the triangle.

Q.4 Calculate area of an equilateral triangle whose side is 6 cm. Also, calculate the length of its altitude.

Q.5 In the figure, $AB = AC = 10$ cm, $BC = 12$ cm. Find the altitude AD and also calculate area of ΔABC .



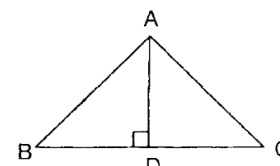
Exercise - 2

Q.1 ΔABC is an isosceles triangle with $AB = AC$. If $AB = 8$ cm and $BC = 6$ cm, find the area of ΔABC .

Q.2 In the figure given below, $AB = AC = 5$ cm and $BC = 6$ cm. Find the altitude AD and also calculate area of ΔABC .

Q.3 ΔABC is an isosceles triangle with $AB = AC = 7$ cm. If $BC = 8$ cm, find the length of AD and prove that $\text{ar}(\Delta ABC) = 2 \text{ar}(\Delta ACD)$.

Q.4 ΔABC is an isosceles right triangle with $AB = BC$. If $AC = 7$ cm, find area of the triangle.



Exercise - 3

Q.1 In ΔABC , $AB = 8$ cm, $BC = 6$ cm and $AC = 4$ cm. Find area of the triangle

Q.2 ΔABC is a right triangle, right angled at B. If $AC = 10$ cm and $BC = 8$ cm, find area of the triangle using Heron's formula.

Q.3 In ΔABC , $AB = 12$ cm, $BC = 9$ cm and $AC = 7$ cm. Find area of the triangle

Q.4 In ΔABC , $AB = 11$ cm, $BC = 12$ cm and $AC = 13$ cm. Find area of the triangle.

Now you can say that $\frac{1}{2}bh$ and $\sqrt{s(s-a)(s-b)(s-c)}$ are the two formulae applicable in all types.

Worksheet

1. The sides of a right angles triangle are 24cm, 7cm and 25cm. Find the area of the triangle: a) using Heron's formula b) using $\frac{1}{2}$ base \times height c) compare both of them
2. Find the area of triangle whose two sides are 29cm and 25 cm and perimeter is 90cm.
3. Side of triangle are in the ratio of 12:17:25 and its perimeter is 540 cm. Find the area.
4. Find the area of parallelogram PQRS with $PQ = 12$ cm, $QR = 32$ cm and $PR = 36$ cm.

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5. Given that a parallelogram and triangle have the same base and same area. If the sides of triangle are 10cm, 12cm and 18cm and base of parallelogram is 12 cm, find height of parallelogram.
6. Using Heron's formula, find area of an isosceles triangle whose each equal side is 12 cm and perimeter is 30cm.
7. A traffic signal saying "SCHOOL AHEAD" is an equilateral triangle with side "a", Find the area of the signal if its perimeter is 180cm.
8. Find the area of a quadrilateral ABCD in which AB = 3cm, BC = 4cm, CD = 4cm, DA = 5cm and AC = 5cm.
9. The perimeter of triangle is 50cm. One side of a triangle is 4cm longer than the smallest side and third side is 6cm less than twice the smallest side. Find the area of the triangle.
10. The lengths of two adjacent sides of a parallelogram are 51cm and 37cm respectively. If one of its diagonal is 20cm, find the area of the parallelogram.
11. Find the area of an isosceles trapezium whose parallel sides are 25cm and 13cm and non parallel sides are 15cm each.
12. The area of an isosceles triangle is $5\sqrt{11/4}$ cm². If its perimeter is 11 cm, find the length of its base.
13. A rhombus shaped field has green grass for 18 cows to graze. If each side of the rhombus is 30cm and its longer diagonal is 48cm. how much area of grass field will each cow be getting?
14. A floral design on a floor is made up of 16 tiles which are triangular, the sides of triangle being 9cm, 28cm and 35cm. find the cost of polishing the tiles at the rate of 50paise per cm².
15. Find the perimeter and area of the quadrilateral ABCD in which AB = 17cm, AD = 18cm, CD = 21cm, $\angle ABC = 90^\circ$ and AC = 15cm.
16. Find the area of a trapezium whose parallel sides are of length 60cm and 77 cm and non parallel sides are 25cm and 26cm.
17. A part in the shape of quadrilateral ABCD has $\angle C = 90^\circ$, AB = 9cm, BC = 12cm, CD = 5cm and AD = 8cm. How much area does it occupy?
18. In the following figure, ABC is a right triangle, right-angled at B if the side AC is 8 cm more than the side AB and the side BC is 7 cm more than the side AB, find the dimensions of ABC along with its area
19. In the figure, D,E,F are the mid points of sides BC,CA and AB of $\triangle ABC$ respectively. Points P,Q and R are mid points of sides EF,FD and DE of $\triangle DEF$ respectively. If AB = 52cm, AC = 56cm and BC = 60cm, find:
 - a) area of $\triangle PQR$
 - b) area of quadrilateral BCEF
20. The cost of painting a triangular piece of decoration wall at the rate of Rs 27 per m² is Rs 81000. If the sides of the plot are in the ratio 13:12:5, find its sides.
21. An umbrella is made by stitching 10 triangular pieces of cloth having two different colors The sides of the piece are 50 cm, 50 cm and 20 cm How much cloth of each colour is required for the umbrella?

