Exercise 12.1

Question 1: Find the area of a triangle whose sides are respectively 150 cm, 120 cm and 200 cm.
Solution:
We know, Heron's Formula

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

Semi Perimeter, $s = \frac{(a+b+c)}{2}$

Where, a, b and c are sides of a triangle

Here, a = 150 cm

b = 120 cm

c = 200 cm

Step 1: Find s
s = (a+b+c)/2

s = (150+200+120)/2

s = 235 cm

Step 2: Find Area of a triangle

Area = $\sqrt{235 \times (235-150) \times (235-120) \times (235-200)}$

$= \sqrt{235 \times (85) \times (115) \times (35)}$

$= \sqrt{80399375}$

= 8966.56

Area of triangle is 8966.56 sq.cm.

Question 2: Find the area of a triangle whose sides are respectively 9 cm, 12 cm and 15 cm.

Solution:

We know, Heron's Formula

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

Semi Perimeter, $s = \frac{(a+b+c)}{2}$

Where, a, b and c are sides of a triangle

Here, a = 9 cm

b = 12 cm

c = 15 cm

Step 1: Find s
s = (a+b+c)/2

s = (9 + 12 + 15)/2

s = 18 cm

Step 2: Find Area of a triangle

Area = $\sqrt{(18(18-9)(18-12)(18-15)}$

$= \sqrt{18 \times 9 \times 6 \times 3}$

$= \sqrt{2916}$

= 54

Area of triangle is 54 sq.cm.

Question 3: Find the area of a triangle two sides of which are 18 cm and 10 cm and the perimeter is 42 cm.
Solution:
Given:
a = 18 cm, b = 10 cm, and perimeter = 42 cm
Let c be the third side of the triangle.

Step 1: Find third side of the triangle, that is c

We know, perimeter = 2s,
2s = 42
s = 21
Again, s = (a+b+c)/2

Put the value of s, we get

21 = (18+10+c)/2

42 = 28 + c

c = 14 cm

Step 2: Find area of triangle

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

$= \sqrt{21(21-18)(21-10)(21-14)}$

$= \sqrt{21 \times 3 \times 11 \times 7}$

$= \sqrt{4851}$

$= 21\sqrt{11}$

Area = $21\sqrt{11}$ square cm.

Question 4: In a triangle ABC, AB = 15cm, BC = 13cm and AC = 14cm. Find the area of triangle ABC and hence its altitude on AC.

Solution:

Let the sides of the given triangle be AB = a, BC = b, AC = c respectively.

Here, a = 15 cm

b = 13 cm

c = 14 cm

From Heron's Formula;

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

Semi Perimeter, s = $\frac{(a+b+c)}{2}$

Where, a, b and c are sides of a triangle

s = (15+13+14)/2 = 21

Area = $\sqrt{21(21-13)(21-14)(21-15)}$

= $\sqrt{21 \times 8 \times 7 \times 6}$

= $\sqrt{7056}$

= 84
Area = 84 cm^2
Let, BE is a perpendicular on AC
Now, area of triangle = ½ x Base x Height
½ × BE × AC = 84
BE = 12cm
Hence, altitude is 12 cm.

Question 5: The perimeter of a triangular field is 540 m and its sides are in the ratio 25:17:12. Find the area of the triangle.

Solution:

Let the sides of a given triangle be a = 25x, b = 17x, c = 12x respectively,

Given, Perimeter of triangle = 540 cm

2s = a + b + c

a + b + c = 540 cm

25x + 17x + 12x = 540 cm

54x = 540 cm

x = 10 cm

So, the sides of a triangle are

a = 250 cm

b = 170 cm

c = 120 cm

Semi perimeter, s = (a+b+c)/2

= 540/2

= 270

s = 270 cm

From Heron's Formula;

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

$= \sqrt{270(270-250)(270-170)(270-120)}$

$= \sqrt{270 \times 20 \times 100 \times 150}$

$= \sqrt{81000000}$

= 9000

Hence, the area of the triangle is 9000 cm^2.