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NCERT Class 9 Solutions: Heron's Formula (Chapter 12) Exercise 12.2 Part 2

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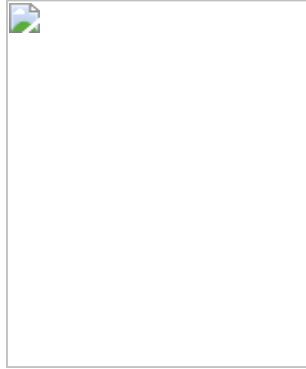
Q-3 Radha made a picture of an airplane with colored paper as shown in figure. Find the total area of the paper used.



Solution:

We can divide the airplane into the separate quadrilaterals and triangles. let's find each of their areas

For triangle (i)

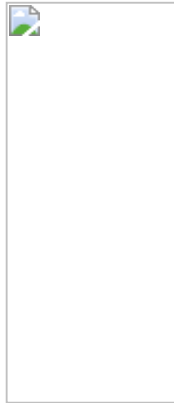


This triangle is an isosceles triangle, therefore its perimeter $= (5 + 5 + 1) \text{ cm} = 11 \text{ cm}$ and semi-perimeter $s = \frac{11 \text{ cm}}{2} = 5.5 \text{ cm}$

By using heron's formula, area of the triangle

- $= \sqrt{s(s-a)(s-b)(s-c)}$
- $= \sqrt{5.5(5.5-5)(5.5-5)(5.5-1)} \text{ cm}^2$
- $= \sqrt{(5.5)(0.5)(0.5)(4.5)} \text{ cm}^2$
- $= \sqrt{6.1875}$
- $= 0.75\sqrt{11} \text{ cm}^2$
- $= 0.75 \times 3.317 \text{ cm}^2$
- $= 2.488 \text{ cm}^2$ (approx.)

For quadrilateral (ii)



$$\text{Area of Rectangle} = l \times b = (6.5 \times 1) \text{ cm}^2 = 6.5 \text{ cm}^2$$

For quadrilateral (iii)



This quadrilateral is a trapezium. To find the area we need to first find its height. =

$$\left(\sqrt{1^2 - (0.5)^2} \right) \text{ cm}$$

- Perpendicular height of parallelogram
 - $(\sqrt{0.75}) \text{ cm}$
 - 0.866 cm
- Area = area of parallelogram + area of equilateral triangle
 - $b \times h + \frac{\sqrt{3}}{4} a^2$
 - $(0.866) \times 1 + \frac{\sqrt{3}}{4} (1)^2$
 - $(0.866) + 0.433 = 1.299 \text{ cm}^2$

For triangle (IV) = triangle (v)

$$\text{We know area of triangle} = \frac{1}{2} h \times b$$

- $\frac{1}{2} \times 1.5\text{cm} \times 6\text{cm}$
- $2 \times 4.5\text{cm}^2$ (2 triangle)
- 9cm^2

Therefore, total area of the paper used

- $(2.488 + 6.5 + 1.299 + 9)\text{cm}^2$
- 19.28cm^2