



CHAPTER 9 AREA

NOTES

- **Area:** Any closed curve encloses an amount of surface. That amount of the surface is called the area enclosed by the closed curve.
- **Polygonal Region:** A polygonal region is the region consisting of a polygon and its interior.
 - **Interior of a Triangle:** It is the part of the plane enclosed by the triangle.
 - **Triangular Region:** It is the region consisting of a triangle and its interior.
- **Axioms of Area:** The axioms of area for polygonal regions are given below:
 1. Every polygonal region has an area. The area of a polygonal region in square units is a positive real number.
 2. **Congruent Area Axiom:** If R_1 and R_2 are two polygonal regions such that $R_1 \cong R_2$, then area of $R_1 =$ area of R_2 .
 3. **Area Monotone Axiom:** If R_1 and R_2 are two polygonal regions such that R_1 is contained in R_2 , then area of $R_1 <$ area of R_2 .
 4. **Area Addition Axiom:** If R_1 and R_2 are two polygonal regions with only a finite number of points or line segments in common and they together form a region R , then area of $R =$ area of $R_1 +$ area of R_2 .
 5. **Rectangular Area Axiom:** For a rectangle ABCD, given that $AB = a$ units and $AD = b$ units, then area of the rectangular region ABCD = ab sq. units.
- **Theorems**
 1. A diagonal of a parallelogram divides it into two triangles of equal area.
 2. Parallelograms on the same base and between the same parallels are equal in area.
 3. The area of a parallelogram is the product of any of its sides and the corresponding altitude.

Corollary: Parallelograms on equal bases and between the same parallels are equal in area.

 4. Triangles on the same base and between the same parallels are equal in area.

Corollary:

 - The area of a triangle is half the product of any of its sides and the corresponding altitude.
 - A median of a triangle divides it into two triangles of equal area.
 5. Converse of Theorem 4: Two triangles having equal areas and standing on the same base and on the same side of it lie between the same parallels.
