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ABSTRACT

15. A Comparison between Geometric Constructions as Described in ‘Baudhāyana Śulbasūtra’ and the Elements by Sindhurani P.J., Cochin University of Science and Technology, Cochin

The difference between Indian mathematics and Greek mathematics is not only in the methods employed by them and the purpose of study, but also in their definitions propositions and proofs. But the geometric concepts in both the cultures are almost similar. Euclid’s ‘Elements’ begins with the definition of ‘undefined terms’(axioms) like point, line, and plane; whereas ‘Baudhāyana Śulbasūtra’ never defines them. Since Śulba geometry was practical and for rituals, there is an absence of proofs, unlike Euclidean geometry which is proof-centered. ‘Śulbasūtras’ are handbooks describing the constructions of yāgaśālas and cits.

The present paper discusses a comparison between geometric constructions in ‘Baudhāyana Śulbasūtra’ (800 BC) and Euclid’s ‘Elements’ (300 BC). There are three types of constructions in both the treatises. First type is the construction of plane figures like squares, rectangles, parallelograms, rhombuses, triangles, trapeziums and circle. Constructions of rhombuses, rectangles and trapeziums and complicated figures like falcon, tortoise, trough and rathacakra are found only in ‘Śulba’, not in ‘Elements’. The methods of construction in both ‘Śulba’ and ‘Elements’ are extremely different.

Second type is the construction of a geometric figures by transformation of another geometric figure without changing area. All geometric figures in ‘Śulba’ are transformed to square and vice versa. But in ‘Elements’ there are methods to transform geometric figures into parallelogram and square, but not vice versa. Third type is the constructions of similar figures. In ‘Śulba’ similar figures are constructed by division of a given figure, using the hypotenuse of the figure or by changing the scale. In ‘Elements’ similar figures are constructed by using the diagonals of the figure, using similarity theorems or by converting figures into parallelograms. construction of complicated similar figures are also in ‘Śulba’. Comparing these methods we see that the geometric constructions found in ‘Śulba’ are more practical, simple and advanced than those described in ‘Elements’..