

HERON'S FORMULA

Heron was an ancient Greek mathematician. He found that if the three sides of a triangle are known as a, b and c, then the area of the triangle can be found using the formula:

$$A = \sqrt{s(s-a)(s-b)(s-c)} \quad \text{where} \quad s = \frac{a+b+c}{2}$$

1. Try the formula with a 3,4,5 right angled triangle and an equilateral triangle of sides 10,10,10. Validate your answers using other formulae.
2. Construct three triangles of your own choice and find their areas using **HERON'S FORMULAE**.
3. Suppose a triangle has sides 4,6 and 10cm. Find its area and explain your results.
4. **BRAHMAGUPTA** was a 7th Century Hindu mathematician. He found an equivalent formula for the area of cyclic quadrilaterals.

$$A = \sqrt{(s-a)(s-b)(s-c)(s-d)} \quad \text{where} \quad s = \frac{a+b+c+d}{2}$$

- (i) State a geometry **REASON** why ALL Squares, Rectangles and Isosceles Trapeziums are **CYCLIC**.
- (ii) Use **BRAHMAGUPTA'S FORMULA** to find the area of:
 - (a) a **SQUARE** of side 5cm.
 - (b) a **RECTANGLE**, Length 8 cm, breadth 4 cm.
 - (c) an **ISOSCELES TRAPEZIUM** with sides 5cm, 5cm, 16cm and 10cm.
- (iii) Construct 4 circles and place in them a cyclic **SQUARE**, a cyclic **RECTANGLE**, a cyclic **ISOSCELES TRAPEZIUM** and finally an irregular shaped cyclic quadrilateral. Accurately measure the side and calculate the areas of each figure using **BRAHMAGUPTA'S FORMULA**.
- (iv) Validate your answers using other formulae.