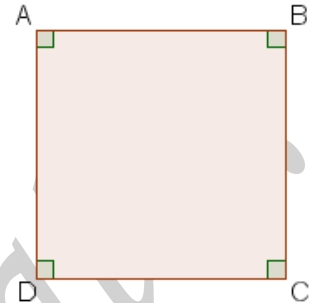




**Definition:** A square is a quadrilateral whose angles are right and sides are equal.

Definition of a square

Observe the adjacent figure then complete:



- a.  $\hat{DAB} = \dots$   $\hat{ABC} = \dots$   $\hat{BCD} = \dots$   $\hat{CDA} = \dots$
- b. Hence,  $\hat{A} = \dots = \dots = \dots = \dots^\circ$
- c.  $AB = \dots$   $BC = \dots$   $CD = \dots$   $AD = \dots$
- d. Hence,  $AB = \dots = \dots = \dots = \dots \text{cm}$ .

⇒ **Conclusion:** A square has four ..... angles and ..... equal sides.

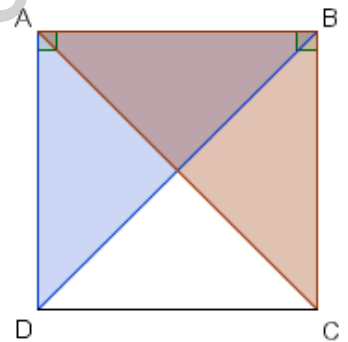
Properties of a square

I- Squares and parallelograms:

Consider the square ABCD.

a. Prove that  $\Delta$ 's ABC & BAD are congruent.

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....



b. List homologous elements:

.....  
 .....  
 .....  
 .....

c. Hence, diagonals ..... are .....

⇒ **Conclusion:** In a square diagonals are .....

Other properties of a square:

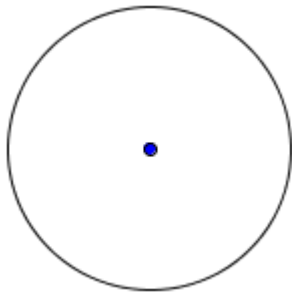
- 1- In a square, the four angles are right.
- 2- In a square, the adjacent sides are perpendicular and the opposite sides are parallel.
- 3- In a square, the diagonals are equal and perpendicular.
- 4- In a square, the diagonals bisect each other at a right angle and bisect the angles of the square.
- 5- In a square, the **diagonals** and the **perpendicular bisectors** of the sides are **axes of symmetry**.
- 6- In a square, **the intersection point** of the **diagonals** is the **center of symmetry**.

 How to prove a quadrilateral is a square?

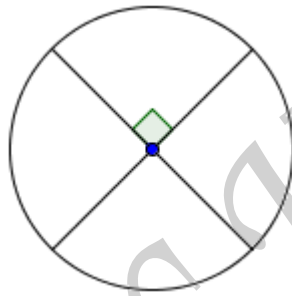
To prove a quadrilateral to be a square it is sufficient to prove one of the following properties:

- i- Starting from the definition: Four equal sides and one right angle.
- ii- Starting from diagonals: Diagonals are perpendicular, equal and bisect each other.
- iii- Starting from diagonals and angles: Diagonals are equal and bisect the angle of the quadrilateral.

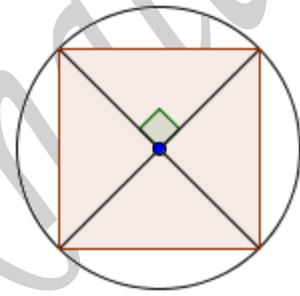
 How to construct a square?



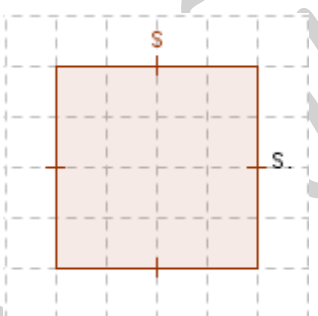
Draw a circle



Draw two perpendicular diameters



Join the four extremities of the diameters

	<i>Area is: <math>A = s \times s.</math></i>
	<i>Perimeter is: <math>P = \text{sum of all sides.}</math> <math>= 4s.</math></i>

### Note that

- ↪ Axis of Symmetry is a line that divides the figure into two symmetrical parts in such a way that the figure on one side is the mirror image of the figure on the other side.
- ↪ There can be drawn four such lines that would divide the figure into two symmetrical parts, as shown.

