

# Activity 13

## OBJECTIVE

To verify experimentally that if two lines intersect, then

- (i) the vertically opposite angles are equal
- (ii) the sum of two adjacent angles is  $180^\circ$
- (iii) the sum of all the four angles is  $360^\circ$ .

## MATERIAL REQUIRED

Two transparent strips marked as AB and CD, a full protractor, a nail, cardboard, white paper, etc.

## METHOD OF CONSTRUCTION

1. Take a cardboard of a convenient size and paste a white paper on it.
2. Paste a full protractor ( $0^\circ$  to  $360^\circ$ ) on the cardboard, as shown in Fig. 1.
3. Mark the centre of the protractor as O.
4. Make a hole in the middle of each transparent strip containing two intersecting lines.
5. Now fix both the strips at O by putting a nail as shown in Fig. 1.

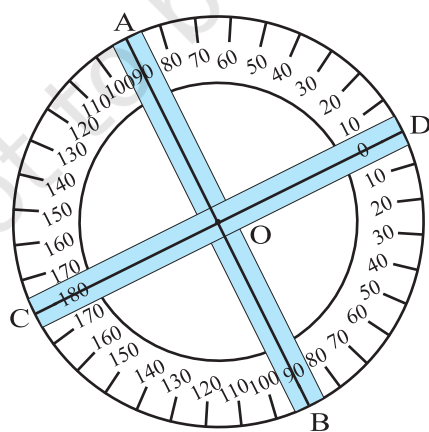


Fig. 1

### DEMONSTRATION

1. Observe the adjacent angles and the vertically opposite angles formed in different positions of the strips.
2. Compare vertically opposite angles formed by the two lines in the strips in different positions.
3. Check the relationship between the vertically opposite angles.
4. Check that the vertically opposite angles  $\angle AOD$ ,  $\angle COB$ ,  $\angle COA$  and  $\angle BOD$  are equal.
5. Compare the pairs of adjacent angles and check that  $\angle COA + \angle DOA = 180^\circ$ , etc.
6. Find the sum of all the four angles formed at the point O and see that the sum is equal to  $360^\circ$ .

### OBSERVATION

On actual measurement of angles in one position of the strips :

1.  $\angle AOD = \dots\dots\dots$ ,  $\angle AOC = \dots\dots\dots$   
 $\angle COB = \dots\dots\dots$ ,  $\angle BOD = \dots\dots\dots$

Therefore,  $\angle AOD = \angle COB$  and  $\angle AOC = \dots\dots\dots$  (vertically opposite angles).

2.  $\angle AOC + \angle AOD = \dots\dots\dots$ ,  $\angle AOC + \angle BOC = \dots\dots\dots$ ,  
 $\angle COB + \angle BOD = \dots\dots\dots$   
 $\angle AOD + \angle BOD = \dots\dots\dots$  (Linear pairs).

3.  $\angle AOD + \angle AOC + \angle COB + \angle BOD = \dots\dots\dots$  (angles formed at a point).

### APPLICATION

These properties are used in solving many geometrical problems.