Activity 7

Objective

To verify the relation between the degree measure and the radian measure of an angle.

Material Required

Bangle, geometry box, protractor, thread, marker, cardboard, white paper.

Method of Construction

1. Take a cardboard of a convenient size and paste a white paper on it.
2. Draw a circle using a bangle on the white paper.
3. Take a set square and place it in two different positions to find diameters PQ and RS of the circle as shown in the Fig.7.1 and 7.2

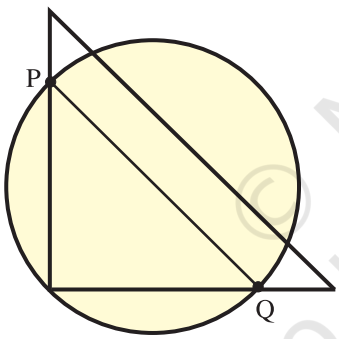

Fig. 7.1

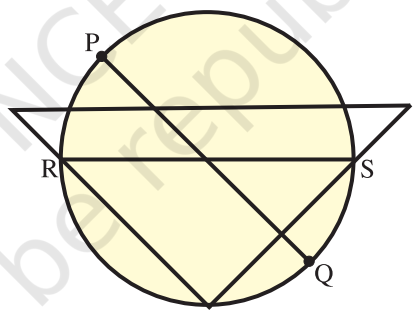

Fig. 7.2

4. Let PQ and RS intersect at C. The point C will be the centre of the circle (Fig. 7.3).
5. Clearly CP = CR = CS = CQ = radius.

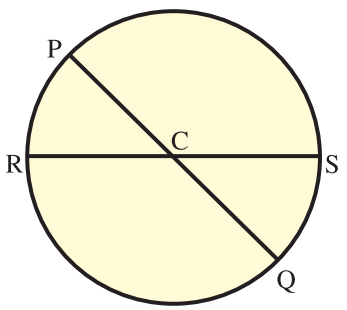

Fig. 7.3

DEMONSTRATION

1. Let the radius of the circle be r and l be an arc subtending an angle θ at the centre C, as shown in Fig. 7.4. $\theta = \frac{l}{r}$ radians.

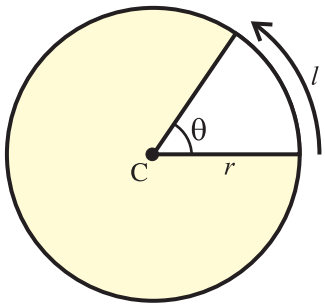

Fig. 7.4

2. If Degree measure of $\theta = \frac{l}{2\pi r} \times 360$ degrees

   Then $\frac{l}{r}$ radians $= \frac{l}{2\pi r} \times 360$ degrees

   or 1 radian $= \frac{180}{\pi}$ degrees = 57.27 degrees.

OBSERVATION

Using thread, measure arc lengths RP, PS, RQ, QS and record them in the table given below :

S.No	Arc	length of arc (l)	radius of circle (r)	Radian measure
1.	$\overset{\frown}{RP}$	--------	--------	$\angle RCP = \frac{\overset{\frown}{RP}}{r} =$ __
2.	$\overset{\frown}{PS}$	--------	--------	$\angle PCS = \frac{\overset{\frown}{PS}}{r} =$ __
3.	$\overset{\frown}{SQ}$	--------	--------	$\angle SCQ = \frac{\overset{\frown}{SQ}}{r} =$ __
4.	$\overset{\frown}{QR}$	--------	--------	$\angle QCR = \frac{\overset{\frown}{QR}}{r} =$ __

2. Using protractor, measure the angle in degrees and complete the table.

Angle	Degree measure	Radian Measure	Ratio = $\frac{\textit{Degree measure}}{\textit{Radian measure}}$
$\angle$ RCP	--------	--------	--------
$\angle$ PCS	--------	--------	--------
$\angle$ QCS	--------	--------	--------
$\angle$ QCR	--------	--------	--------

3. The value of one radian is equal to _____ degrees.

APPLICATION

This result is useful in the study of trigonometric functions.