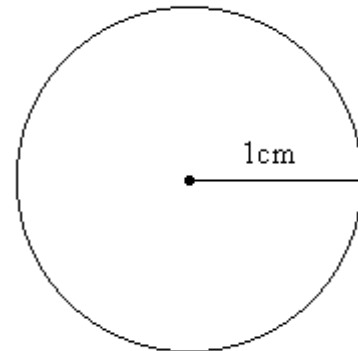


INVESTIGATION # 16

ARC LENGTH

1. Using a circle of radius 1cm calculate the arc lengths for the following angles:
 $10^\circ, 20^\circ, 30^\circ, 40^\circ, 50^\circ, 60^\circ, 70^\circ, 80^\circ, 90^\circ, 120^\circ, 135^\circ, 150^\circ, 180^\circ, 270^\circ, 360^\circ$
2. Make a table and record the arc lengths to two decimal places.
3. Using a circle of radius 1cm calculate the angle size that gives the following arc lengths: 1cm, 2cm, 3cm, π cm, 4cm, 5cm, 6cm.
4. Make a table and record the angles to one decimal place.
5. Repeat steps 1 to 4 for a circle of radius 2cm.
6. What do you need to divide each answer by to get the same results as the 1cm circle?
7. Repeat steps 1 to 4 for a circle of radius 5m.
8. What do you need to divide each answer by to get the same results as the 1cm circle?
9. Repeat steps 1 to 4 for a circle of radius r cm.
10. What do you need to divide each answer by to get the same results as the 1cm circle?



ASSESSMENT TASK

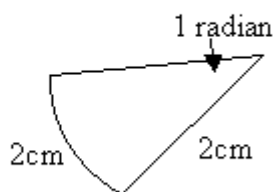
1. Calculate the length of an arc of a circle of radius 1cm formed by an angle of 60° .
2. Calculate the angle that would give an arc of length 3cm in a circle of radius 1cm.

READ THE FOLLOWING CAREFULLY THEN ANSWERS THE QUESTIONS ON THE NEXT PAGE:

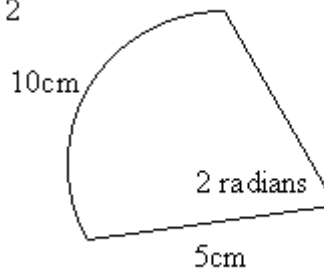
Angles can be measured in degrees or radians. Radian measurement is based on the length of the arc formed by an angle.

One radian is defined as one unit of arc length per unit of radius as shown in the examples below.

Example 1

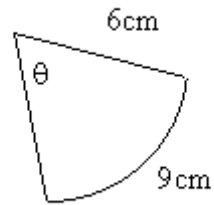


Example 2



$$\begin{aligned} \text{In example 1: radian angle} &= \frac{\text{arclength}}{\text{radius}} & \text{In example 2: radian angle} &= \frac{\text{arclength}}{\text{radius}} \\ &= \frac{2\text{cm}}{2\text{cm}} & &= \frac{10\text{cm}}{5\text{cm}} \\ &= 1 \text{ Radian} & &= 2 \text{ Radians} \end{aligned}$$

3. How many radians is angle θ shown here?



4. Draw a diagram that shows an angle of 3 radians. You must show the arc length and radius.
5. How many degrees does one radian equal?
6. How many radians does 180° equal?
7. How many radians are there in a full circle?