# Measuring Radians

In the past, you have used degrees to measure angles. When angles are used in periodic functions, they are often measured in larger units called radians.

1. Measure the diameter of a cylinder and calculate its radius. On a piece of string, mark off a "number line" with each unit equal to the radius. Mark at least seven units.

2. Wrap the string around the cylinder. How many radius units are needed to go around the cylinder one time?

3. Use the end of the cylinder to draw a circle on a sheet of paper. Keep the cylinder in place and wrap the string around it on the paper. Mark an arc of the circle equal to one radius unit of length.

4. Remove the cylinder and string. Use paper folding to locate the center of the circle. (Fold the circle onto itself and crease the paper along a diameter. Repeat to get a second diameter.) Draw a central angle that intercepts one radius unit of arc.
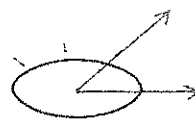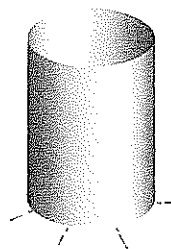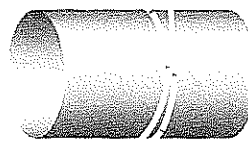
The measure of the angle you drew in Question 4 is 1 radian.

5. Use a protractor to measure the angle from Question 4 in degrees.

6. **Critical Thinking** The formula $C = 2\pi r$ relates the circumference of a circle C to its radius r. *Exactly* how many radians are in a 360° angle? Explain.

The diagram at the right shows that a rotation of 180° is equivalent to π radians.

7. Find the number of degrees in one radian by dividing 180 by π. How does your answer compare to the measurement you made in Question 5?

π radians $= 180°$