**Discovering Pi and Circumference Activity**

Students should remain in groups or form pairs for this activity. Hand out the following supplies to each group: one index card, one flat circular object, 2 rulers, and a piece of string for each student. Have each pair or group measure the radius, diameter, and circumference of their circle and record the measurements on the index card. Let them discover how the string can be used to wrap around or across the circle and stretched out to be measured. Assist groups that are having difficulty. While students work, place the Calculating Pi transparency on the overhead or draw the table on the board or chart paper (see M-7-6-1\_Calculating Pi in the Resources folder).

Say, **“Now that you have completed your measurements I want each pair** (or group) **to divide your circumference measure by your diameter measure. Write the quotient on your index card. Send one student to the front to record the three measurements and the quotient into the table. While you wait for all of the groups to record their data, begin making observations on the data we are accumulating about our circles.”**

**Think-Pair-Share:** When all groups have recorded their data and students have had at least 2-3 minutes to make observations, have them share their observations with a partner. Call on several students to share their observations with the class. The following observations should be made:

* each diameter length is about twice the corresponding radius length.
* each radius is about half the length of the corresponding diameter.
* the circumference measures are all about 3 times the length of the corresponding diameters, but about 6 times that of the corresponding radius.
* all quotients are slightly higher than 3.

Any of these points that are not suggested by students should be introduced by you. The significance of each observation should be discussed to introduce the relationship between radius and diameter, circumference and diameter, including the concept of pi.

**“The fact that the circumference was found to consistently be about three times the diameter provides us a good way to estimate the circumference of a circle. Likewise, if we are given a circumference dividing by 3 can give us an estimate of the diameter.”** Give some examples of these estimates.

**“We noted that the quotients of circumference and diameter were all slightly over 3. Let’s find the mean of these quotients to get a better idea of this value.”** At this point, calculate the mean with the class, or have students do so individually. Make note of the fact that it should be around 3.14. Help students understand that the accuracy of their measurements affects how close the mean value will be to 3.14. Use the symbol, π freely and encourage students to do the same. Explain that pi is an irrational number whose decimal never terminates or repeats. Make clear that using and understanding pi is fundamental for circle calculations, and for most practical purposes using 3.14 is an acceptable approximation.

Conclude by formalizing the idea that the circumference is about 3 times larger than the diameter: **“The value 3.14 is used in calculating circumference. Earlier we estimated circumference by multiplying 3 times the diameter. The formula for circumference uses pi, *C* = π • *d*. When we need an actual calculation rather than an estimate, this is what we use.”** Repeat the examples used in the estimates, replacing 3 with 3.14.