Discovering Pi

This is a wonderful way to allow your students to discover the relationship between the diameter and circumference of a circle without confusing them with difficult to learn words and concepts.

Materials Needed

list of round objects (mug, trash can, saucer, flower pot, mirror, table, dish, etc.), enough for each student or pair of students to have at least one to work with.

paper cups

ball of string, pair of scissors, Post-It Notes®, and tape for each pair of students

chalk board or marker board and different colors of chalk or markers

small poster boards or graph paper

crayons, markers, or colored pencils

pencils

rulers

Basic Math Skill Level

long division

multiplication

fractions

decimals

ability to work with simple equations

Activities

1. Have the student pairs all work with paper cups in the classroom to brainstorm ways to find the widest distance across the cup. Then they are sent out to cut a diameter string and a circumference string for each object on their list. This is the time to walk around and watch them to make sure each fully understands that s/he is to cut one string for the circumference and one for the diameter.
2. After practicing finding the longest distance across the paper cup, each student or pair goes out to cut a string that fits exactly around a circular object and another string that fits exactly across the middle of the same object. They tape the strings together and use the Post-It Notes® to label the string set. (It might help to put a time limit on this activity.) When finished, they return to their seats.
3. Each set of strings should be taped to the wall, chalk, or marker board with a straight line to keep the ends aligned. (See chart) This will form a sort of line chart. Use a colored marker or chalk to broaden each line, keeping a unique color for each item. (See chart)

4. Name and label the strings. Writing the word Diameter above each diameter string and the word Circumference above each circumference string.

   Use cognates - words that the student knows and that sound like the new words.

   Explain that dia<u></u>meter is like dia<u></u>gonal, it goes across. Because it goes across the middle of a circle, it is called a diameter.

   Circ<u></u>umference is related to the word circ<u></u>le, it is the line that goes around the outside of the circle.

   Relate these words to things the student already knows such as a diagonal street or measurement of a TV screen and a circumference highway or the circumference of a softball.

5. Ask the students to look carefully at the assembled strings and brainstorm ways to describe what they see. Take notes by putting the words they use on the board.

   Ask them to tell how the lines are different and how they are the same. This should help them to eventually see that there is a similarity between the pairs of strings in that each pair has the same relationship in length between the circumference and diameter that all the other pairs have.

6. Name the relationship: pi and write the symbol on the board. Tell them that they can use 3.14 or 22/7 for pi.

7. Have each pair of students measure their strings and mark the lengths on the board.

8. Have each student create a bar graph to show the relationship between the strings on graph paper or small poster boards. Put the graphs on the walls.

9. Demonstrate how to use Pi by multiplying the diameter by 3.14 and have them practice with their own dimensions. This may not result in a perfect match to the measurement of the circumference string due to inaccuracy in measurement equipment and techniques, but it should be close.

10. Demonstrate how to use Pi by dividing the circumference by 3.14 and have them practice with their own dimensions. This may not result in a perfect match to the measurement of the circumference string due to inaccuracy in measurement equipment and techniques, but it should be close.

11. Write the formula $C = \pi D$ on the board and manipulate the equation to find $D = C \div \pi$. Hand out practice sheets.

12. Follow up

I always ask my students to write about each lesson. They can use the list of words on the board to help them.

The writing can take any form the student chooses. One may choose to describe the process from beginning to end, another may just focus on the fun of learning new words, etc..

Sometimes I ask them to write a description of π for others to use. I collect these from each lesson and put them together into a new textbook that the students have created.

If I have a digital camera, I add their pictures to the lessons they have written.

It is my gift to them at the end of each section.

Flower pot - 6" across, 18.84" around

coffee mug - 3" across, 9.42" around

small dish - 4" across, 12.56" around

Fun with Pi.

March 14 (03.14) is a fun time to either introduce or review pi. March 14th is know as Pi Day and one can find Pi Day cards on the Internet.

This link will allow students to put in their birthdays and find them in Pi.

Pi, the concept not the word, is mentioned in the Bible.

A History of Pi http://www-gap.dcs.st-and.ac.uk/~history/HistTopics/Pi_through_the_ages.html

The Pi Pages http://www.cecm.sfu.ca/pi/pi.html

http://www.joyofpi.com/

Is My Birthday in Pi? http://www.facade.com/legacy/amiinpi/

My birthday is at 92447 starting at this location in PI: 19235

National Pi Day at the Exploratorium and the Ridiculously Enhanced Pi Pages
http://www.exploratorium.edu/learning_studio/pi/