Pi Worksheet

Description: In this activity, students will measure and record the diameter and circumference of circles. They will compute the ratio of the circumference to the diameter, thus "discovering" pi. They will explore information about pi and Buffon's needle at internet addresses and record the information they discover.

Purpose/Goals: Students will be able to
- Use appropriate tools to measure the circumference and diameter of circles
- Compute the ratio of the circumference to the diameter of circles
- Use the internet to research information

Oregon Math Standards addressed by this activity:
- Measurement: Determine appropriate units and tools to measure to the degree of accuracy required in particular situations.
- Statistics and Probability: Plan and conduct experiments and simulations to make predictions or support arguments.
- Statistics and Probability: Create, interpret, and analyze charts, tables and graphs to display data, draw conclusions, and solve problems.
- Algebraic Relationships: Recognize, create, describe, and analyze patterns and sequences.
- Geometry: Students will identify, measure, and visualize geometric figures and their component parts, including: . . .features of circles.

Time Estimate: one class period of about 45 minutes

Materials:
- Centimeter rulers
- String
- Circular objects of various sizes and shapes as the top of a wastebasket, nickel, etc.
- Photocopy: Copies of the worksheet, 1 per student
- Optional: Calculators to computer the ratio of the circumference to the diameter.

Grade Level: 6-10

Extension: You may wish to have students create a graph with the information from the table. In this case, students will need graph paper.

Tips: Student may need instruction in how to measure the distance around an object using string and how to measure the diameter. While the use of a calculator is optional, it is recommended in this activity as the focus is on discovering the relationship of the circumference to the diameter, not on learning how to divide.

A Special Pattern

Please measure at least 5 round objects that you have selected using a cm tape measure or ruler and string. Record the measurements in the table. You may use a calculator to divide the circumference by the diameter.

Be sure to measure very carefully to the nearest 10th of a centimeter. It is important to get the measurements just right!

Here is a sketch to help you get started. The blue circle represents the circumference.

The red line represents the Diameter. It should be a line through the center of the circle. It also is the longest line across the circle.
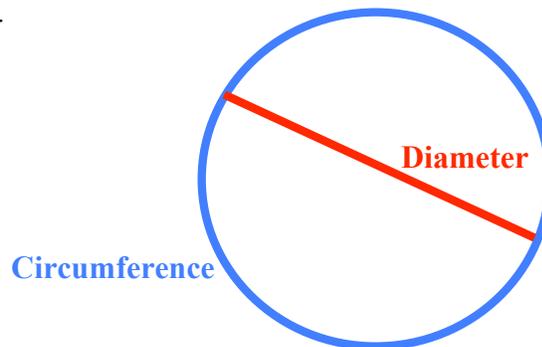
The first row of the table given below has been done for you as an example. You are to do 5 more objects.

Hint: When you use your calculator to do the division, notice that the circumference is put in the calculator first, then press the division key and enter the diameter. Many times we get the wrong number entered first and the answer doesn't come out right.

Name of Object	Circumference	Diameter	Circumference Divided by Diameter rounded to 100^{ths}.
1. coaster	30.6 cm	9.8 cm	$\dfrac{30.6}{9.8} = 3.12$
2.			
3.			
4.			
5.			
6.			

The results you get when you divide the Circumference by the diameter should all be very close to the same number. (*Tip: If you are not happy with your results, you might want to try some more measurements.*) Please enter that number here.

_____

Part 2

You have just found a number that should be a fairly close estimate of pi. You may have used pi in calculations, such as finding the area of a circle or the volume of a cylinder. You may have also used it to find the circumference of a circle when you know the diameter.

Patterns like pi can be very useful when we are solving different kinds of problems. Let's see what else we can find out about this useful number.

Please go to the SHODOR website, http://mathforum.org/dr.math/faq/faq.pi.html to read about pi, where it came from, how many digits it has to the right of the decimal point, and many other interesting things.

Then come back here and make a list of at least five things you found out about pi that you didn't know before. Type your answers right in the table.

1.
2.
3.
4.
5.

Part 3

Let's check out Buffon's Needle. Go to http://www.mste.uiuc.edu/reese/buffon/buffon.html and follow the directions to find out what Buffon's Needle is and try out the simulation.
Now please describe the activity and what its results are. Were you surprised to find this method of estimating a familiar number? What number is it?

Please write at least three good sentences about Buffon's Needle that you could share with someone else. Type your answer right in the table.