

# Circumference of Bubbles

**Grade level:** 6<sup>th</sup> - 9<sup>th</sup> grade

**Goal of the lesson:** Students will deepen their understanding of the relationship of the diameter and circumference of circles and discover that the ratio is always pi. Students will blow bubbles on their desk/table top and after they pop they will measure the circumference and the diameter of the bubble ring left behind, in centimeters to the nearest tenth. They will then record this data in a chart, graph the data and find the relationship between the diameter of a circle and its circumference and have a lot of fun doing it! □ The activity is very fun, but care should be taken with any bubble solution that spills on tile flooring. Newspaper is great for placing quickly on the spill. The bubble solution doesn't harm carpet and is much safer with regards to spills.

**Materials needed:** Each pair of students will need a plastic cup containing bubble solution (see recipe below), ruler, meter stick, string for measuring the circumference of the bubble rings, and a calculator. Each student will need a straw and the *Circumference of Bubbles* handout. For the whole class you will need one 5 gallon bucket of bubble solution, large chart graph paper, marking pens, and the book *Sir Cumference and the Dragon of Pi* by Cindy Neuschwander.

**Bubble Solution Recipe:** 4 gallons of soft or distilled water (hard water does not make the greatest bubbles), 4 cups Dawn dishwashing liquid (Dawn works best, but Joy will do in a pinch), 1 cup Glycerin (available at most pharmacies). Fill the 5 gallon bucket with the 4 gallons of water FIRST to avoid creating foam. Slowly pour in the soap and glycerin and mix very gently. For best results make the solution at least 24 hours before using.

## **Engage**

Review or introduce the students to the vocabulary needed for the lesson. (Circle, Diameter and Circumference) Tell the students they will be blowing bubbles on their table top and then measuring the length of the diameter and circumference to the nearest tenth of a centimeter of the bubble ring after the bubble has popped. Demonstrate this process and record your results in the class chart and graph.

## **Explore**

Divide students into pairs. Have the pairs work together alternating blowing the bubbles and assisting each other in measuring.

1. Each student should blow at least 3 bubbles and then measure, as accurately as possible, (to the nearest tenth of a cm), the circumference (perimeter--distance around the outside) and the diameter (distance across the center point) of each circle ring left on the table top.
2. Have them record the data in the table provided on the handout.
3. Then have the students use a calculator to calculate the data for the last column.
4. Finally, have the students record the data from columns 2 and 3 for each circle from their table into a graph.
5. Then have the students transfer their data to a class chart and graph or into desmos.com

## **Explain**

Ask the students to analyze the results from the class data. Record any observations and / or patterns. Ask them to answer the question, "What can you say about the C/D ratio?" Finally, read "*Sir Cumference and the Dragon of Pi*" by Cindy Neuschwander and compare methods others have used for finding pi.

## **Evaluate**

Students should be able to:

- Describe pi as the ratio of the circumference of a circle to its diameter.
- Use their graph to predict the circumference of a circle given its diameter or diameter given its circumference.
- Write the equation that relates the circumference of a circle to its diameter.  $C = \pi \cdot d$

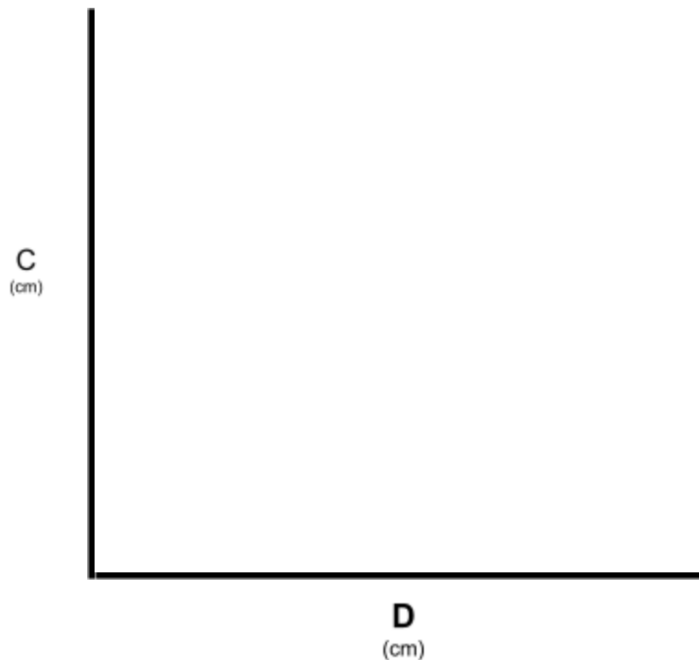


# Circumference of Bubbles

1. Each pair of students should alternate blowing bubbles on the table top and then assist each other in measuring as accurately as possible (to the nearest tenth of a cm), the circumference (perimeter--distance around the outside) and the diameter (distance across the center point) of each circle. Record the data in the table below. Use a calculator to calculate the data for the last column.

Bubble blown by...	Circumference (cm) (C)	Diameter (cm) (D)	C/D Round to hundredths
Student Name			
Student Name			
Student Name			
Student Name			
Student Name			
Student Name			

2. Record the data from columns 2 and 3 for each circle from the table above into the graph below or into desmos.com.



3. Analyze the results from the data. Record any observations and / or patterns. What can you say about the C/D ratio?