Have Your Pi and Eat It Too

Throw a Pi Party around March 14th to celebrate everyone's favourite math symbol. Pi (π) is the symbol used to represent the ratio of the circumference of a circle to its diameter - which is a constant with the approximate value of 3.14159. Pi has been calculated to over one trillion digits beyond its decimal point.

Circumference Search with Licorice Laces

This activity is a tactile and enjoyable investigation of Pi. Eating the licorice is an added bonus for your Pi Party!

You will need:
Shoestring licorice laces
Scissors
Food items with a circular or cylindrical shape:
marshmallows, donuts, cookies,
2 bite-brownies

What to do:
1. Give each student several pieces of shoestring licorice and a series of circular or cylindrical items of different sizes. Items can include: marshmallows, cookies, donuts, two-bite brownies.
2. Students will use their licorice as a measuring tool. Starting at one end of the licorice, have them wrap their licorice around the outside of the marshmallow.
3. They should then cut it carefully so that they have a piece of licorice that is the same size as the circumference of the circle.
4. Have them lay this "circumference-sized" piece across the top of the marshmallow and carefully cut a piece of licorice the same size as the diameter of the circle.
5. Repeat step 4 until they have cut as many diameters from their "circumference-sized" piece as they can. Then have them lay the diameter-sized pieces of licorice side by side along with the small leftover piece.
6. Students should then repeat this process with their other cylindrical shapes (donut, cookie etc.) and lay their cut pieces of licorice in groups beside each cylindrical object. What do they notice?
7. Using the small leftover piece, have older students estimate the fraction of the diameter that this piece represents.
8. Extend the learning by finding other circular or cylindrical shapes around the school/classroom and repeating the experiment. Do you always get the same number of pieces of licorice?

Note for Teachers:
Students will discover that regardless of the object chosen, they will be able to cut each circumference-sized piece into 3 diameter-sized pieces with a small piece left over. If they estimate the size of the small remaining piece, they should find that it is approximately one-seventh (0.14) of the diameter-sized pieces. Therefore, each circumference can be cut into 3.14 (π) diameter size pieces. This gives them an approximation of Pi, since the circumference of a circle (c) is related to its diameter (d) as follows: c = π X d

Popcorn Pi

Use popcorn and Pi to investigate the volume of two different cylinders made from paper of the same dimensions. Munching on the popcorn is optional but highly encouraged!

You will need:
Popcorn
2 sheets of construction or printer paper (8.5 X11 inches)
Paper plate
Marker, Tape
Calculator (optional)

What to do:
1. Starting with one sheet of paper in "landscape" orientation, prepare a tall skinny cylinder by rolling the paper and taping the sides together. Tape both the outside and the inside of the cylinder for best results. The cylinder will be bottomless and the sides should not overlap. Mark this cylinder as "A".
2. Starting with the second sheet of paper in "portrait" orientation, prepare a short squat cylinder by rolling the paper and taping the sides. This cylinder will also be bottomless and the sides should not overlap. Mark this cylinder as "B". Elastic bands placed around the outside of the paper tubes can help maintain a cylindrical shape.
3. Have students measure and record the height (h) and diameter (d) of each cylinder.
4. Place the short, squat cylinder (B) on the paper plate. Put the tall, skinny cylinder (A) inside cylinder B.
5. Carefully fill cylinder A with popcorn until it is full.
6. Have students guess what will happen if they lift cylinder A off of the plate and the popcorn flows into cylinder B. Will cylinder B be full, not full, or overflowing?
7. Once they've made their prediction, have them carefully lift cylinder A off of the plate so that the popcorn it was holding flows into cylinder B.
8. Have them make their observations and explain their findings!

Note to Teachers:
Depending on the age of the students, they can explain their results by calculating the volume (v) of their cylinders using the diameter (d) and height (h) of each cylinder: $v = \pi r^2 h$.

For an extension, have students explore whether their findings hold true for paper of other dimensions (postcard, legal, tabloid).

Here's Your Hat! (What's Your Hurry?)

Most students probably don't realize where hat sizes come from. Most adult hat sizes range from 6 to 8. Have students brainstorm how these numbers are generated. Then try this measuring activity and have fun ranking everyone's head size!

You will need:
A flexible cloth tape measure
Calculator
Hats with sizes listed inside

What to do:
1. Pass each group a hat and have them brainstorm where the "hat size" comes from.
2. Have everyone find a partner and measure their partner's head. They will need to think about where a hat sits on their head in order to measure the correct circumference.
3. Have students use their calculators to try and figure out how the hat size is obtained. (Note: if they need a hint, ask them to re-measure each other's head using "inches".)
4. Once they've solved the mystery, have students calculate their own hat size.
5. For an extra math extension, create a bar graph of hat sizes for the entire class.

Note:
The circumference of an adult's head usually measures between 21 and 25 inches. If you divide the circumference of someone's head by π, you will determine that person's hat size. So what does the hat size represent?