

Discovering π

Lesson Plan

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Teacher Mentor: Jessica Bacca

Goal: The goal is for students to realize that π is the ratio of circumference to diameter and to understand the formulae for circumference and area of a circle.

Grade and Course: 8th grade Math

KY Standards: MA-08-3.1.2: Students will identify and compare properties of two-dimensional figures and will apply these properties and figures to solve real-world and mathematical problems.

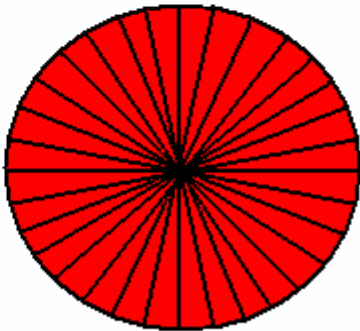
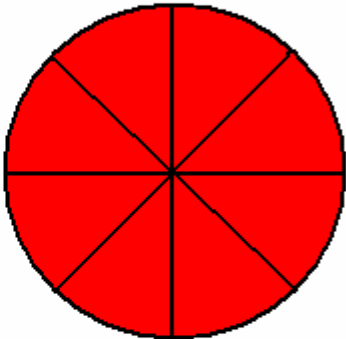
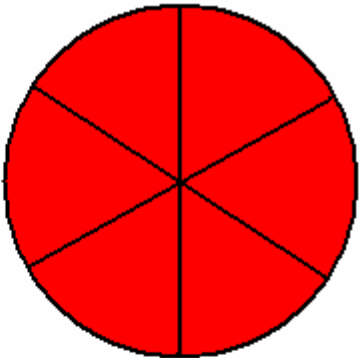
Objectives:

- 1) Students will understand how π is defined.
- 2) Students will be able to compute circumference and area given the radius.
- 4) Students will understand the formulae for circumference and area.
- 3) Students will no longer believe that π is a magical button on their calculators.

Resources/materials needed:

- 1) Various circles (coffee, yogurt, peanut butter, jelly, etc... all of these things have different sized lids that will work wonderfully)
- 2) A handout containing two or three circles of the same size divided up into different numbers of slices so that students can cut up the circles and reassemble them. See handout 1
- 3) Paper, scissors, glue, crayons

Handout 1



Description of Plan:

Part 1

Begin by asking the question, “What is the circumference of a circle?” Go over the necessary vocabulary, perhaps review perimeter of polygons.

Divide students into groups of three. Groups will measure the circumference and diameter of various circles, recording their data in a table. Then they will compute circumference divided by diameter for each circle, recording this as well.

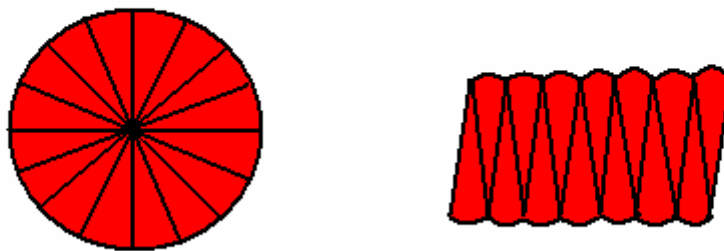
Once everyone is finished the instructor goes over the results and tries to get the students to understand that the ratio of circumference to diameter is the same for every circle. Relating this concept to comparing corresponding parts on similar triangles may be useful. At some point the instructor should say “Hey does anything look familiar here?” Perhaps a student will have recognized π . The instructor should then explain that this is how we define π . It is my opinion that a significant amount of time should be spent answering the question “What does it mean to define π ?” even if the question isn’t explicitly asked.

Now that we have defined π discuss how one could find the circumference given the diameter. Go over some examples finding the circumference for various circles.

Part 2

Begin by asking the question “What is the area of a circle?” Review area of simple polygons. Discuss some ideas on how one might approximate the area of a circle. Discuss what happens if we divide a given shape into pieces and reassemble them to form a new shape. “Does the new shape have the same area?”

Pass out the handout 1, construction paper, crayons, glue, scissors. Have each student cut out one of the circles and reassemble them in the following manner.



Point out that the two figures have the same area. Ask what would happen if we cut the circle into 1 million pieces and reassembled them in the same manner. Lead the students to realizing that we are approximating a rectangle with the height equal the radius of the circle and base equal to half the circumference. Perform the algebraic manipulations showing that the area of the rectangle equals π times radius squared.

Point out that the area of every circle can be found in this way. Go over examples finding the area of various circles.

Lesson Source: Jessica Bacca provided the idea of rearranging circles in the manner described, the rest of the lesson and the organization provided by Andrew Kirby.

Instructional Mode: Lecture/Discussion/Group work.

<u>Date Given:</u>	Part 1 10/12/06	Presented by Andrew Kirby
	Part 2 10/23/06	Presented by Jessica Bacca

Estimated Time: Two 45 minute periods or one 90 minute block.

Date Submitted to Algebra³: 12/4/06