Approximating π

Lesson Plan

Cube Fellow: James Grogan **Teacher Mentor**: Pam Callahan

Goal: Help students to see πin a less abstract way.

Grade and Course: 10-12, Geometry

KY Standards: MA-HS-3.1.6

Objectives: The students should understand how to approximate π using the described method, giving both an upper and lower bound for the constant. Students should also be able to agree on some of the factors that change the accuracy of their results.

Resources/materials needed: Worksheet, compasses and different sizes of graph paper.

Description of Plan: Briefly review what students think of when they see π, and review the formulas that they remember that involve π. Students will break into groups of two, in order to check on each others work. It will be recommended that the partners use graph paper with different size squares. After students arrive at an initial approximation, they should discuss what factors affect the accuracy and to go through the steps again trying to achieve a more accurate result.

Lesson Source: Original lesson.

Instructional Mode: Worksheet and discussion with class.

Date Given: 04/15/2008 **Estimated Time**: One class period

Date Submitted to *Algebra*^{3}**:** 04/16/2008

Approximating π

1. What is π?

2. Can you think of any formulas that involve π?

3. How do you calculate π?

4. Use a compass to draw a circle on your graph paper. You can draw the circle as large or as small as you want.

5. Count all of the squares that are completely inside of your square. How many are there? Count the number of squares within your partner's circle too, and compare to make sure that they are the same.

6. What does the number of squares represent approximately?

7. Remember, the formula for area of a circle is given by $A = \pi r^2$. In the space below, solve for π in this formula.

8. So, $\pi = \frac{A}{r^2}$. The number of squares inside the circle approximately represented the area of the circle, so use that value for A. What was your radius? $r =$_____, so $r^2 =$_____. So using these values $pi \approx$ ———.

9. Is this value bigger or smaller than π? Why do you think that is?

10. Can you think of a way to get a better approximation?

11. Go through the same steps as above, but instead of counting only the squares that are entirely inside of the circle, also count the squares that are only partially contained.

12. Does this give you an approximate value of π that is larger or smaller than the actual value?