

## Putting the “pi” in Pumpkin Pie

### Overview:

Students will develop spatial relationships through the application of geometric formulas as they attempt to portion out a favorite holiday treat. Adapt the mathematics in this lesson to students' abilities. The math described is a component of the SAT examination and will serve as a good review for older students.

- Measure a circle to solve mathematical problems involving perimeter, circumference and area of circles and triangles.
- Explain relationships among segments and inscribed angles through geometric formulas.
- Test the Pythagorean theorem to determine missing length of a right triangle
- Compare angle and side relationships for a special right triangle
- Summarize the experience in a reflective essay describing the problem-solving and ethical decision-making process of dividing the dish equitably as situations change.

### Materials:

- Pumpkin pie worksheet
- Ruler
- Pen
- Paper

### Handouts:

- [Pumpkin Pie Worksheet](#)

### Procedure:

1. Explain to students they will be preparing for an upcoming Halloween party using some favorite geometric formulas. Distribute the pumpkin pie handouts.
2. Describe the following scenario:  
*Your family has a beloved pumpkin pie recipe. This year you are having a Halloween party and plan to serve your famous pie.*
3. Review the equations for the area and circumference of a circle, as well as the total number of degrees in a circle. Have students record these formulas in the appropriate box on their worksheets.

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4. Say to the class: *You invited six guests to your party. You promised one of your friends, who loves the pie, one fourth of it and planned to divide the rest equally.*

Ask students to divide the pie on their worksheets to reflect this scenario. Have students measure the diagram to determine, in inches, the radius (3”) and diameter (6”) of the pie. Then ask students to find out exactly how many total inches of pie they plan to serve.

5. Have students use these formulas to find the size of the largest piece of pie using the formula for the area of a sector.

6. Continue the scenario by saying:

*As guests arrive, the friend who was promised a quarter of the pie tells you she is trying to eat healthy so she can be in shape for basketball. Butter is a key ingredient in the crust. If you cut off the majority of the crust, how long is the line, or hypotenuse, you draw?*

Students will use the Pythagorean Theorem to solve this problem and record the formula. Use this opportunity to review the formulas for the area and perimeter of a triangle, as well as the rules of 45-45-90 and 30-60-90 special right triangles.

7. Using the formula for the length of an arc, have students find the length of the piece of crust that will be discarded. Encourage students to record these formulas on their worksheets.
8. *Ask: After this piece is handed out, how much pie will you have left for your other guests?*

Students can subtract the area of the sector from the total area to find this solution.

9. Using their writing journals, have students reflect upon their reasoning process by describing how they arrived at the solution.
10. Then say: *Wait! Just when you’re about to slice the pie, a friend shows up with a few extra guests, leaving less of the pie for everyone. In the few moments you have to decide how to feed these extra people, what factors will you consider to ensure the fairest outcome?*

Allow time for students to write about the mental reasoning process they would follow. Encourage students to consider the stakeholders and follow the ethical decision-making model [<http://www.josephsoninstitute.org/MED/MED-4sevensteppath.htm>].

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11. Mold a class discussion to determine the most equitable way to have divided the pie at each juncture in the scenario. Point out that character is shaped by the many little decisions we make every day.
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### McREL standards

#### Mathematics

**Standard 2.** Understands and applies basic and advanced properties of the concepts of numbers

**Level I Benchmark 5.** Understands the concept of a unit and its subdivision into equal parts (e.g., one object, such as a candy bar, and its division into equal parts to be shared among four people)

<http://www.mcrel.org/standards-benchmarks/>

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Pumpkin Pi Handout: (Note: cannot find the handout for this, this link just goes right back to the lesson plan: <http://charactercounts.org/lesson-plans/character-education-lesson.php?id=107>)