

```html

# Lesson Plan: The Pizza Pi Party - A Delicious Dive into Circles

## Materials Needed:

- Several circular objects of different sizes (e.g., a pizza pan, a dinner plate, a can of soup, a cookie)
- A flexible measuring tape or a piece of string and a ruler
- Calculator
- Pencil and paper (or a whiteboard and marker)
- (Optional) A real pizza or a paper cutout of one for the main activity
- (Optional) Art supplies (graph paper, colored pencils, compass) for the creative project

---

**Subject:** Math (Geometry)

**Student:** Nate (Age 14)

**Topic:** Area and Circumference of a Circle

**Time Allotment:** 60-75 minutes

## 1. Learning Objectives

By the end of this lesson, Nate will be able to:

- **Define** and identify the radius, diameter, circumference, and area of a circle.
- **Calculate** the circumference of a circle using the formula  $C = \pi d$ .
- **Calculate** the area of a circle using the formula  $A = \pi r^2$ .
- **Apply** these formulas to solve a real-world problem comparing value.
- **Create** a project that demonstrates the practical application of area and circumference.

## 2. Alignment with Standards

This lesson aligns with Common Core State Standards for Mathematics:

- **CCSS.MATH.CONTENT.7.G.B.4:** Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

## 3. Lesson Procedure

### Part 1: The Hook - A Real-World Puzzle (10 minutes)

Begin with an engaging question that requires mathematical reasoning.

**Teacher:** "Nate, imagine we're ordering pizza. The pizza place has two deals: a large 14-inch pizza for \$15 or two small 8-inch pizzas for \$16. At first glance, which seems like the better deal for getting the most pizza? Don't calculate anything yet—just give me your gut reaction."

Discuss his initial thoughts. Then, explain that by the end of our lesson, he'll be able to prove mathematically which deal is better. This frames the lesson around solving a practical problem he

might actually encounter.

## Part 2: Discovering Pi (15 minutes)

This activity allows Nate to discover the concept of Pi for himself, rather than just being told about it.

1. **Measure Circumference:** Take the various circular objects (plate, can, etc.). For each one, have Nate use the string to wrap around the outer edge. Then, lay the string flat and measure its length with the ruler. This length is the **circumference** (the distance around the circle). Record this measurement.
2. **Measure Diameter:** Next, have him measure the **diameter** of each object (the distance straight across the center). Record this measurement.
3. **Find the Ratio:** For each object, have Nate use a calculator to divide the circumference by the diameter ( $C \div d$ ).
4. **The "Aha!" Moment:** As he calculates this for each object, he will see that the answer is always very close to 3.14.

**Teacher:** "Isn't that amazing? For any circle in the universe, from a tiny coin to a giant planet, the distance around it is always about 3.14 times the distance across it. We call this special number **Pi** ( $\pi$ ). This gives us our first magic formula: **Circumference** =  $\pi \times \text{diameter}$ , or  **$C = \pi d$** ."

Briefly introduce the concept of **radius** (half the diameter) and the second circumference formula:  **$C = 2\pi r$** . Then, introduce the area formula: **Area** =  $\pi \times \text{radius}^2$ , or  **$A = \pi r^2$** . Explain that area measures the flat space \*inside\* the circle.

## Part 3: Guided Application - Solving the Pizza Problem (15 minutes)

Now, let's return to the hook question and solve it together.

- **The Large Pizza (14-inch):**
  - Diameter = 14 inches
  - Radius (half of the diameter) = 7 inches
  - Area =  $\pi r^2 = 3.14 \times (7 \text{ inches})^2 = 3.14 \times 49 = \mathbf{153.86 \text{ square inches}}$  of pizza.
- **The Two Small Pizzas (8-inch):**
  - Diameter = 8 inches
  - Radius = 4 inches
  - Area of one pizza =  $\pi r^2 = 3.14 \times (4 \text{ inches})^2 = 3.14 \times 16 = \mathbf{50.24 \text{ square inches}}$ .
  - Area of two pizzas =  $50.24 \times 2 = \mathbf{100.48 \text{ square inches}}$  of pizza.

**Teacher:** "So, the single 14-inch pizza gives you over 50 more square inches of pizza for less money! We just used geometry to make a smart consumer choice."

## Part 4: Creative Project - Your Choice! (20 minutes)

To solidify his understanding, let Nate choose one of the following projects to work on. This promotes creativity and ownership of the learning.

- **Option A: Design a Dream Park.** Sketch a blueprint for a circular park or playground. It must include at least three circular features (e.g., a fountain, a merry-go-round, a running track). Label the radius or diameter of each. Then, calculate the circumference of the running track (to see how far a lap is) and the area of the fountain (to see how much ground it covers).
- **Option B: The Athletic Trainer.** Imagine you are designing a training circuit for an athlete. You need to create three circular running paths. Path 1 needs to be approximately 100 meters around. Path 2 needs to be 200 meters, and Path 3 needs to be 400 meters. Your job is to calculate the **radius** and **diameter** you would need to build for each of these tracks.
- **Option C: The Cost-Conscious Baker.** Find two different-sized circular pans at home.

Imagine you're selling pies made in these pans. A pie's price is determined by its area (say, \$0.15 per square inch). Calculate the area of each pan, and then determine the fair selling price for a pie made in each one.

### Part 5: Closure and Reflection (5 minutes)

Have Nate present his project and explain his calculations. End with a brief discussion.

**Teacher:** "Great work! Can you explain to me in your own words the difference between circumference and area? When might you need to know the circumference of something? And when would you need to know its area?"

## 4. Assessment

The primary assessment will be the completion and explanation of the **Creative Project**. I will evaluate it based on:

- **Correct Application (5 pts):** Were the formulas for area and circumference used correctly for the chosen project?
- **Accurate Calculations (5 pts):** Were the mathematical calculations accurate?
- **Clarity of Explanation (5 pts):** Could Nate clearly explain his project, his process, and why the calculations were relevant?

## 5. Differentiation and Extension

- **For additional support:** If Nate is struggling, we can spend more time on the hands-on "Discovering Pi" activity with more objects, reinforcing the relationship between C and d before moving to formulas.
- **For an advanced challenge:** Ask a follow-up question like, "For the pizza problem, what is the cost per square inch for each deal?" or "Imagine you have 40 feet of fence to build a circular dog run. What is the maximum area your dog will have to play in?" This requires working backward from circumference to find the area.

...