

# Madisyn's Pi Day Adventure: Beyond 3.14

## Lesson Overview

In this lesson, Madisyn will explore the mathematical constant  $\pi$  (Pi). Instead of just memorizing 3.14, she will discover where this number comes from through hands-on measurement, creative writing, and real-world application. This lesson is designed to be interactive, tactile, and fun.

## Learning Objectives

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

- Define  $\pi$  as the ratio of a circle's circumference to its diameter.
- Experimentally calculate  $\pi$  by measuring various circular objects.
- Apply  $\pi$  to solve a real-world geometry problem.
- Create a "Pi-ku" (poem) to demonstrate the relationship between digits and language.

## Materials Needed

- At least 5 different circular objects (e.g., a jar lid, a frisbee, a roll of tape, a plate, a bicycle wheel)
- Flexible measuring tape or a piece of non-stretchy string and a ruler
- Scientific calculator
- Paper and colored pens/pencils
- A circular snack (like a literal pie, a cookie, or a tortilla)
- Success Criteria Checklist (provided in this plan)

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## 1. Introduction (The Hook)

**The Mystery of the Infinite:** Did you know that if you printed out the first billion digits of  $\pi$  in an average font, the paper would stretch from New York City to Kansas? Even more wild: because the digits never end and never repeat, your birthday, your phone number, and even your social security number are hidden somewhere in that sequence of numbers!

**The Goal:** Today, we aren't just celebrating a number; we are going to prove why this number exists and why it's the same for every single circle in the entire universe.

## 2. Body: Content & Practice

### Part A: The "I Do" - The Concept

#### Talking Points:

- Every circle has a **Circumference (C)**—the distance all the way around the edge.
- Every circle has a **Diameter (d)**—the distance across the center from one side to the other.

- Thousands of years ago, people noticed that no matter how big or small a circle was, the Circumference was always about 3 times bigger than the Diameter. This "magic ratio" is what we call  $\pi$ .
- **The Formula:**  $\pi = C / d$

## Part B: The "We Do" - Guided Discovery

Let's test this theory together using one object.

1. Pick the largest circular object you have.
2. **Measure the Circumference:** Wrap the string around the edge, mark where it meets, and then measure that string against a ruler. Record the number.
3. **Measure the Diameter:** Measure across the widest part of the circle. Record the number.
4. **The Calculation:** Use the calculator to divide the Circumference by the Diameter.
5. **The Reveal:** How close did we get to 3.14? (Discuss why measurement errors like "string stretching" might make it 3.12 or 3.16).

## Part C: The "You Do" - The Pi Hunt & Creation

### Activity 1: The Lab Report

Madisyn will now measure the remaining 4 objects independently. She should create a simple table:

Object	Circumference (C)	Diameter (d)	$C \div d$ ( $\pi$ Value)
Example: Lid	31.4 cm	10 cm	3.14
...	...	...	...

### Activity 2: Pi-ku (Pi Poetry)

A "Pi-ku" is like a Haiku, but the number of syllables in each line follows the digits of  $\pi$  (3, 1, 4).

- Line 1: 3 Syllables (e.g., "Round and round")
- Line 2: 1 Syllable (e.g., "Edge")
- Line 3: 4 Syllables (e.g., "Never ending")

*Task: Write three different Pi-kus about circles, space, or math.*

### Activity 3: The "Pizza" Problem (Real-World Application)

If you have a pizza with a 14-inch diameter, use the formula ( $C = \pi \times d$ ) to find out how much crust you're eating! (Answer:  $14 \times 3.14 = 43.96$  inches).

## 3. Conclusion (Closure & Recap)

- **Summary:**  $\pi$  is the "DNA" of a circle. It describes the relationship between the distance across and the distance around. It doesn't matter if it's a penny or a planet—the ratio is always  $\pi$ .
- **Madisyn's Recap:** Ask Madisyn: "If you found a giant alien spaceship that was a perfect circle, and you measured its diameter, how would you find its circumference without walking around it?"
- **Final Treat:** Eat the circular snack! (But first, measure it).

## Assessment & Success Criteria

**Formative Assessment:** Check the " $C \div d$ " column in her table. If the results are between 3.0 and 3.3, she has successfully mastered the measurement and calculation concept.

**Summative Assessment:** Madisyn will present her favorite "Pi-ku" and explain how she used a string to "prove"  $\pi$  exists.

**Success Criteria:**

- Can explain what  $\pi$  represents in her own words.
- Corrected at least 4 objects and calculated the ratio.
- Successfully used the formula  $C = \pi d$  to solve the "Pizza Problem."
- Created a Pi-ku that follows the 3-1-4 syllable structure.

## Adaptability & Differentiation

- **Scaffolding (If struggling):** Focus on just one large object to reduce the physical frustration of measuring small circles. Use a calculator for all division.
- **Extension (For advanced challenge):** Explore the Area of a circle ( $A = \pi r^2$ ). Have Madisyn calculate how many square inches of pizza she is eating, not just the crust length. Search for her birthday in the first million digits of  $\pi$  using an online "Pi Search" tool.