Lesson Starters

Pi Is a Ratio

Grade Level: 6–8

Subject: Mathematics

Content Collection: Pi Day

Instructional Strategy: 3 Truths…1 Lie

Possible Learning Objectives

- Identify Pi Day as a day set aside for the celebration of the mathematical symbol \(\pi\) (pi).
- Describe \(\pi\) (pi) as the ratio of the circumference of a circle to its diameter.
- Discuss the importance of \(\pi\) to the understanding and use of circles in mathematics and everyday life.
- Explain some of the uses of \(\pi\) at the National Institute of Standards and Technology (NIST).
- Define and use key terms such as circle, circumference, constant, decimal, diameter, pi, ratio, and symbol.

For Starters…

Ideas from DE to Kickstart Learning

PREVIEW Pi: 3 Truths…1 Lie

Preview the encyclopedia article “Pi” from Discovery Education Streaming. Create three true statements and one false statement based on the content of the article (examples include: Pi is a ratio (true), Pi is used to calculate the area of a circle (true), Pi is an irrational number (true), Pi first became popular in ancient Greece (false). Display all four statements to students. Ask students to tell a partner which statement they believe is the false one and why. Explain to students that they will be reading an article that will reveal the truth. They will need to support their responses to the statements with evidence from the selection. Provide students with copies of the article and instruct them to read and take notes. When they are done reading, have students work in small groups to discuss which statements were true and which was false. Remind students to provide supporting evidence from the article for each response. Have students share the highlights of their discussion with the class.

20 Questions

Draw circles of different sizes and post them around the classroom. For each circle, develop a higher-order inquiry question that will encourage students to ask more questions as they attempt to answer the provided question. For example, you might pose the question, "How is this circle similar to and different from all of the other circles here?" or "Does the term perimeter apply to a circle? Why or why not?" Play the video segment "Circles" from Standard Deviants Teaching Systems: Fundamental Math: Module 04: Angles, Polygons, and Circles for students. Afterward, explain to students that they will view some circles around the class. Have the students move around the room and take a moment at each circle to think of questions they may have about the question that you asked. Ask students to write their questions in a notebook. Continue until all of the students have had a chance to see each circle and its related question. Come together as a group and have the students share the questions they
created. Have students post their collective questions around the classroom, or share on a website so that your class will be able to refer to the ideas throughout the unit.

**Pi and NIST**

After students have viewed one or more video segments focused on the National Institute of Standards and Technology (such as “Standard Kilogram” or “3-D Data”), ask them to answer the following questions: What is the National Institute of Standards and Technology? What is some of the work it does? How does the mathematical constant \( \pi \) (pi) figure into the work? How does the work that it does impact our everyday lives? Discuss the answers together as a class. Then, invite students to work in pairs to complete further research about NIST. Encourage students to narrow their focus—they may wish to find out more about NIST history, its mission and programs, its organization and locations, or its role in standards for weights and measures. Then have pairs work in Board Builder to create a print ad for NIST. Instruct students to choose several facts they have learned about NIST to create a visually interesting and informative advertisement for the laboratory. Challenge them to refer to pi somewhere in their ad. After their work is complete, have students share and explain their advertisements with the group.

**Target Vocabulary**

- **circle** – a perfectly round shape
- **circumference** – the perimeter of a circle
- **constant** – staying the same, not changing; a quantity or number whose value does not change
- **decimal** – based on the number 10
- **diameter** – a straight line from one side of something (such as a circle) to the other side that passes through the center point
- **pi** – the symbol \( \pi \) denoting the ratio of the circumference of a circle to its diameter
- **ratio** – the relationship that exists between the size, number, or amount of two things and that is often represented by two numbers
- **symbol** – a letter, group of letters, character, or picture that is used instead of a word or group of words