

Pi Tacular

Lesson 1: In this lesson plan, students will use data on the circumference and diameter of various objects to calculate π . The exciting aspect of this lesson is that no matter the size or nature of the circular objects measured, the ratio of the circumference to the diameter will come out the same: π !

Objective:

Students will:

- Measure the circumference and diameter of variety of circular objects
- Organize the data in a table or chart
- Calculate π - the ratio of circumference to diameter

North Carolina Standard Course of Study

6th grade

1.07 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators and or paper and pencil.

2.02 Solve problems involving perimeter/circumference and area of plane figures.

3.03 Identify the radius, diameter, chord, center and circumference of a circle; determine the relationships among them

7th

1.03 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators and or paper and pencil.

8th

1.02 Develop flexibility in solving problems by selecting strategies and using mental computation, estimation, calculators and or paper and pencil.

Materials

- Measuring Tape
- A variety of circular objects around the ship
- Calculators
- Worksheet

Engage:

The day before this lesson remind or teach students how to measure using a measuring tape. Students can measure different objects around the room and compare their answers.

If you would like some reading in this lesson Sir Cumference and the Isle of Immeter (diameter of a circle) by Cindy Neuschwander is a great introduction.

Explore:

Ask the students what circumference and diameter are. Have a class discussion and have students draw pictures or identify circumference and diameter.

Explain:

Explain to students that while on the tour they are to find the listed 5 items and pick other circular objects and measure the circumference and their diameter and record the data in the chart.

*One of the challenges is estimating the center of the circle when measuring so you might need to demonstrate this.

Object Name	Circumference	Diameter	Mystery Ratio Circumference/ Diameter
Mess Hall Seat			
Mixing Bowel in Galley			
Hatch Wheel			
Ships Wheel			
Port Hole			
**Bonus Speaker in sick bay			

**Bonus examples just extend the table.

Extend: Have the students answer these in groups of four (two pairs).

*The "Aha!" moment is usually more potent in the small groups because more potent in the small groups because more kids can come to it at different times.

Use the data you collected and calculated to answer the following questions.

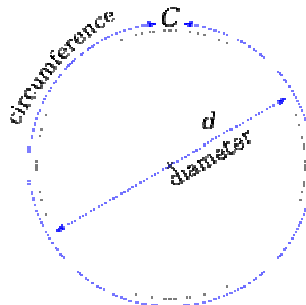
1. What do you notice about the Mystery Ratio for each object?
2. What whole number is this ratio near?
3. The mystery ratio has a special name: *pi*. Based on the activity you did create a mathematical definition for *pi*.
Pi is:
4. Look at the mystery ratios on your worksheet. How close do your ratios come to 3.14?
5. Why might your ratios be a bit different?

Evaluate:

Once each group is finished has a whole class discussion on the questions to clear up any misconceptions.

You can have each group explain one of their examples from the ship. Then do a quick wrap-up explaining

$$\pi = \frac{C}{d}$$



You should have noticed that the ratios for all the circles are very close. The value that you should have gotten should be very close to 3.14.

If you would like to do some reading at the end of the lesson Sir Cumference and Dragon of Pi by Cindy Neuschwander is a nice way to end the lesson

* Information for the teacher.

Answer sheet

Answer may vary due to measurement error.

Object Name	Circumference	Diameter	Mystery Ratio Circumference/ Diameter
Mess Hall Seat	$38 \frac{1}{8} = 38.125$	$12 \frac{1}{8} = 12.125$	$38.125 \text{ divide by } 12.125 = 3.14432$
Mixing Bowel in Galley	$105 \frac{1}{8} = 105.125$	$33 \frac{1}{2} = 33.5$	$105.125 \text{ divide by } 33.5 = 3.13805$
Hatch Wheel	$56 \frac{1}{2} = 56.5$	18	$56.5 \text{ divide by } 18 = 3.13888$
Ships Wheel	76	$24 \frac{2}{8} = 24.25$	$76 \text{ divide by } 24.25 = 3.13402$
Port Hole	$55 \frac{3}{4} = 55.75$	$17 \frac{1}{2} = 17.5$	$55.75 \text{ divide by } 17.5 = 3.16228$
**Bonus Speaker in sick bay	14.5	$4 \frac{5}{8} = 4.625$	$14.5 \text{ divide by } 4.625 = 3.13513$
			All answers should be close to 3.1415926535897932...

**Bonus examples just extend the table.

Use the data you collected and calculated to answer the following questions.

1. What do you notice about the Mystery Ratio for each object?

It is between 3 and 3.25

2. What whole number is this ratio near?

3

3. The mystery ratio has a special name: *pi*. Based on the activity you did create a mathematical definition for *pi*.

Pi is:

Pi is an irrational number. That means it has a decimal component that never repeats and never ends. Think about that for a second! It goes on forever and ever with no pattern. In order to make it easier use *pi*, mathematicians often use the 3.141.

4. Look at the mystery ratios on your worksheet. How close do your ratios come to 3.14?

How close are you from 3.1415926535897932...

5. Why might your ratios be a bit different?

Good time to talk about why some measurements might not be close to 3.14. Did you measure right?

Names _____

Object Name	Circumference	Diameter	Mystery Ratio Circumference/ Diameter
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Mixing Bowel in Galley			
Hatch Wheel			
Ships Wheel			
Port Hole			
**Bonus Speaker in sick bay			

Use the data you collected and calculated to answer the following questions.

1. What do you notice about the Mystery Ratio for each object?
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Pi is:
4. Look at the mystery ratios on your worksheet. How close do your ratios come to 3.14?
5. Why might your ratios be a bit different?
** ATTACH THE MAP OF THE SHIP