

A "Pi"ous Experiment

Experiment Express

STEM Field of Study

Math

Engineering

Specific STEM Area

Algebra

Age Group

All

Cost

\$0 - \$5

Time

1 hour

Materials

Logbook, Pen, Calculator, Long String (at least 4ft), Measuring tape, Scissors, Garden Flag Stand, Small Hand Trowel

Safety

Adult Supervision Necessary

IEP Goals

Academic

Motor

Question:

What can "pi" teach us about God's love for us?

Hypothesis:

Before you start your experiment, can you predict the answer to the question above? Make sure to write down your hypothesis in your logbook.

Instructions

1. Gather your materials together.

2. Review all Safety

3. This is an outdoor activity, so find a large area that you can safely and easily use.

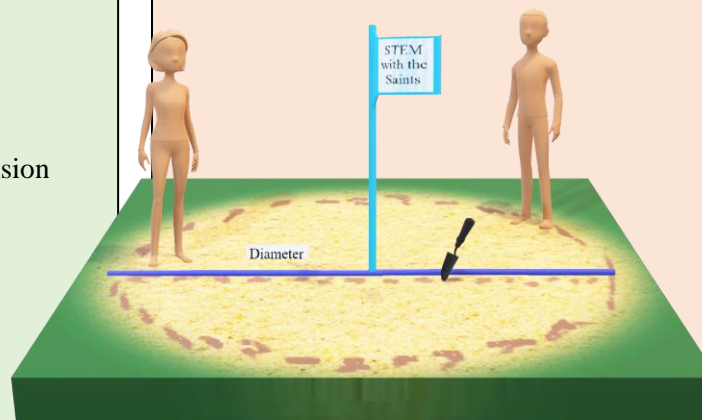
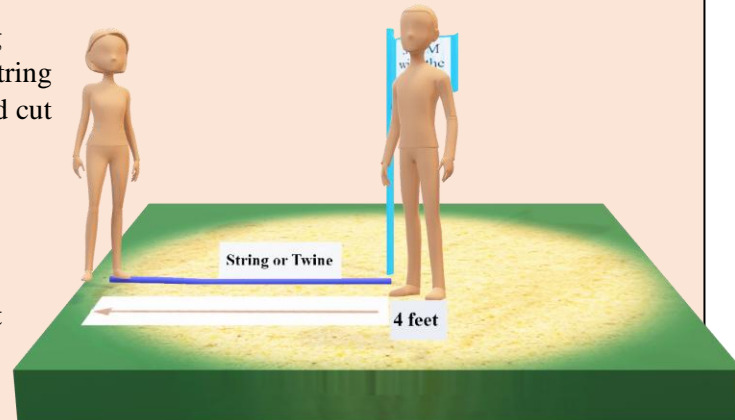
4. Gather your materials and head outside. Place your garden stake in the ground.

5. Next, take your string and tie one end around the stake. Make sure it is loose enough so it moves freely around the stake. You don't want the string to wind around the stake, you want it to move easily.

6. Using your measuring tape, measure 4 feet of string from the stake center and cut the string.

7. Hold the untied end of your string and hold on to it. Make sure it's tight and creates a straight line. The string can't be loose or wavy. Set the string aside for now and get the measuring tape.

8. Now you must draw the diameter. Using the measuring tape, you are going to draw an 8-foot line from one side of the circle to the other with the trowel. The garden flag stand must be at the 4-foot mark and the line you're digging must go through the center where the garden flag stand is located. These aren't big holes, just small "scratches" in the dirt. However, make sure when you scratch the 8-foot line you can see the line clearly. **This is the diameter.**



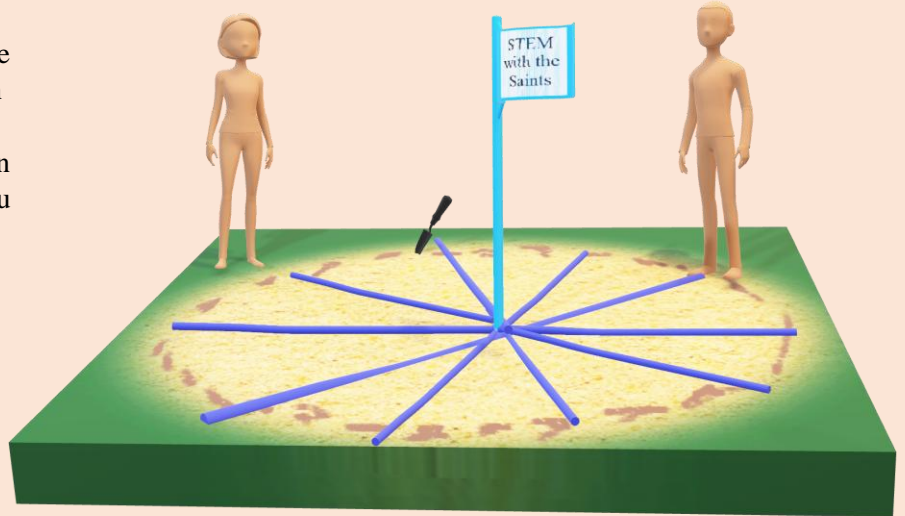
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7. Time to mark the circumference. While holding the string tight, you are going to move around the garden stake flag while holding on to the string. At the end of the string that you are holding you are going to make scratches in the dirt until you make a complete circle. You must mark the circle with your trowel as you move. Make sure you can see the marks you made clearly. **This is the circumference.**

8. Place all materials aside and stand at one end of the diameter and walk on the line go from heel to toe and count how many steps you take to get to the other side of the diameter. Record this number in your logbook. Remember, its import to be as accurate as possible. If you measure 11 ¼ feet, write that down.

Tip... It's better to do this in bare feet if possible.

10. Using a calculator, divide the circumference step number by the diameter step number and record this in your logbook. **Repeat the measuring four more times and record your footsteps for the diameter, circumference, and calculations each time.** You may not get 3.14 exactly – that's okay. This is an approximation. For example, the first time we did this experiment we go 3.02.



9. Now stand on the circumference and walk on the circumference line going from heel to toe and don't stop until you complete a full circle. While you're walking on the circumference line, make sure to count the number of steps you take to complete one full circle. Record that number in your logbook.

Tip... Make sure you go back to the exact point that you started.



You can also do this experiment on asphalt with chalk. Just have a person stand in the center and act as the "flag" for the center point. Don't forget to have Fun!

What is Pi (π)?

Pi is a ratio. What is a ratio? A ratio is a part of a larger item. For example, when you order a pizza that has 8 slices, and you eat one of the 8 slices – you have just had 1/8 or 1 out of 8 slices of the whole pizza. The number 1/8 is a ratio. Pi is the same thing. It is a constant measurement that always exists and basically shows that the length of the diameter is only a part of the length of the circumference. You would need 3.14 diameters to equal one circumference.

Think about it! Did you know that the number Pi is considered an irrational number? What that means is that it never repeats, there is no pattern and it never ends!

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Post Experiment Questions for Adults to ask:

1. Based on the experiment, what do you think is longer, the circumference or the diameter?
2. Why?
3. How much longer is the circumference than the diameter?
4. Can the length of diameter of a circle ever equal the length of a circumference of a circle?
5. Does the size of the circle make a difference?

Discussion of Results / Post Experiment Answers:

1. The circumference is longer than the diameter.
2. The diameter goes straight through the center of circle; the circumference goes around the center of the circle.
3. The circumference is 3.14 times longer than the diameter. This means for the length of the diameter to equal the length of the circumference – the diameter would have to be 3.14 times longer.
4. No. The circumference of a circle will always be 3.14 times longer than the diameter of a circle.
5. No, the size of the circle doesn't make a difference. The circumference of circle will always be 3.14 times larger than it's diameter. That's why pi is called a "constant" because it is doesn't change.

Let's
Talk!

Draw your own conclusion:

What other geometrical shapes do you think we can analyze using pi? Did you know you have pi in your body - can you take a guess as to where?! Think of pi as a tool to understand what you see around you. Pi can help us learn about virtually anything, from cars to art to space exploration. Explore your surroundings and try to find as many examples as possible where pi can be used!

Expansion Experiments:

Did you know that you can use pi to help you calculate the volume of a cylinder? A cylinder is the shape of a can of soda or a soup can and volume is the amount of liquid a cylinder can hold. Look around your home and see if you can find a cylinder. Use the tape measure you used in the above experiment above or a ruler and measure the diameter then the height of the cylinder and write both down. Now, you can divide the diameter by two to find the radius. Finally, you can calculate the volume of your cylinder by multiplying pi, the height, and the radius and the radius again. So, your equation for volume is: $V = \pi * (\text{height}) * (\text{radius} * \text{radius})$. Your answer will be in a unit called inches cubed which can be converted into ounces by dividing your answer by 1.8. You can now compare your answer to the volume listed on the can.

Why is this a "Pi"ous Experiment?

This is such a fun math experiment because it unites the infinite love that God has for us with the infinite number that we know as Pi. Just as the number Pi goes on and on and on with out end, so does God's love for us – He never stops loving us – NEVER! So, we did have a little fun with the naming of this experiment, but the truth is – God loves us – forever.

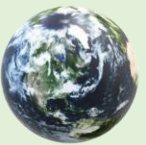
Log your work:

Yes, you must log your work. Make sure to use pen, not pencil. Don't worry if you make a mistake, just cross it out and rewrite what you need to say correctly.



Real World Application:

Engineering, Physics,
Construction / Building
Architecture, Astrophysics,
Geology



Additional

Resources:

Book: Sir Cumference and the First Round Table by Cindy Neuschwander and Wayne Geehan

Online:

Mathcurious

<https://edit.mathcurious.com/2025/03/12/why-pi-matters-the-infinite-mystery-of-a-simple-number/>

