BLUEBIRD MATH CIRCLE
Alliance of Indigenous Math Circles

Issue 23: Around π and Pies!

Share your problems, solutions, models, stories, and art:
https://aimathcircles.org/Bluebird

You have noticed that everything an Indian does is in a circle, and that is because the power of the world always works in circles, and everything tries to be round.

—Black Elk,
Holy Man of the Oglala Sioux

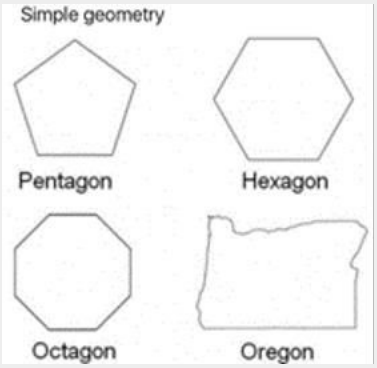
NEWSFLASH

Join LIVE Bluebird Math Circle to work on these activities together with friends and family.

Monday March 14, 5-6 PM MDT online.

Sign up at **https://aimathcircles.org/Bluebird**

MATH JOKE



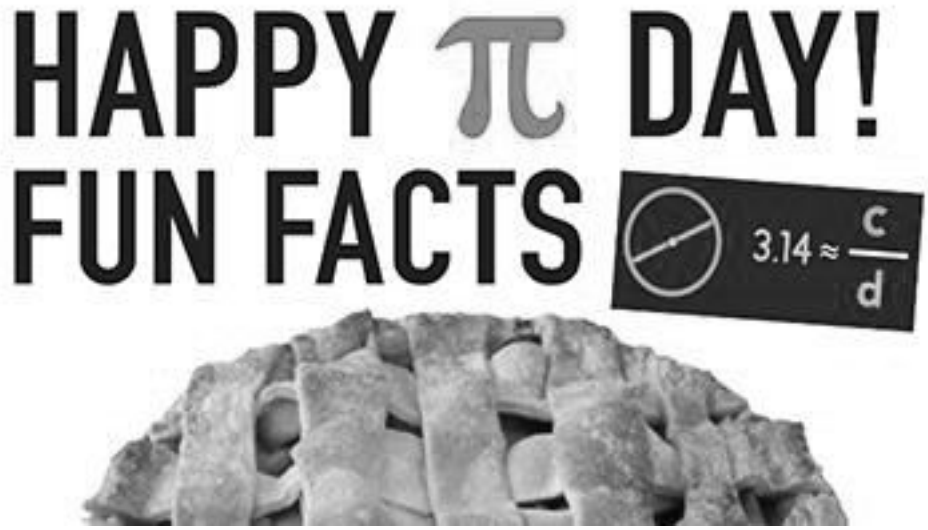


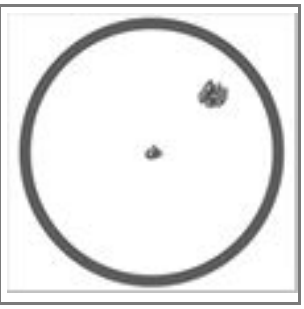
Image by Anthony Persico of MashUp Math

The number π (spelled out as "pi") is the ratio of a circle's circumference to its diameter. The earliest known use of the Greek letter π to denote this number was by the Welsh mathematician William Jones in 1706. It is thought that he chose π either because it is the first letter of the word for periphery (περιφέρεια) or because it is the first letter of the word for perimeter (περίμετρος). Or because of both.

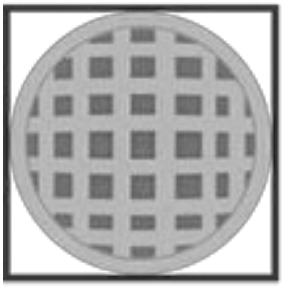
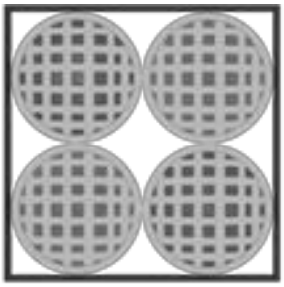
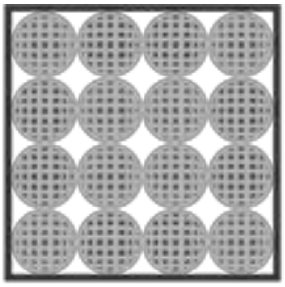
The symbol π was popularized in 1737 by the Swiss mathematician Leonhard Euler (1707–83), but it wasn't until as late as 1934 that the symbol was adopted universally. Surprisingly, the number π appears in many formulas not only in geometry, but in all areas of mathematics and physics.

Yummy Warm-Ups

1. A circular cake is decorated with a sugar paste rose as shown in the picture. The center of the circle is marked by a sugar paste dot. Can you cut the cake into three pieces so that by rearranging the pieces you create a circular cake again, but this time the rose is in the center? Can you cut the cake into just two pieces which can be rearranged into a circular cake with the rose in the center? (Note: you can't just remove and replace the rose since it would destroy the icing on the cake.)



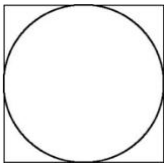
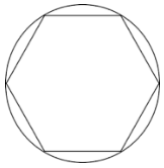
2. Pictured below are three identical boxes packed with pies. You can assume that all pies are exactly the same height. Which box contains the most pie?

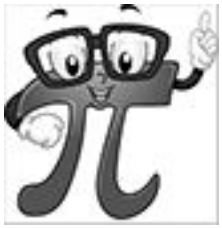




Family Circle: Pi and Around

1. What do the two pictures on the right tell us about the value of π? (*On the left a circle is inscribed in a square; on the right, a regular hexagon is inscribed in the circle.*)

Do you want to impress your friends? Just remember the fraction 355/113. What's so special about it?



2. What is the largest number of pieces you can get if you cut a round pancake using 5 straight cuts?

3. A ladder standing next to a wall starts sliding down and eventually falls. What is the trajectory of a kitten sitting in the middle of the ladder? (Assume the kitten is very calm and brave and does not jump when the ladder starts moving).

Ask Bluebird

QUESTION— *Is Pi a rational or irrational number?* - from Chris K.
BLUEBIRD SAYS— *Number π is irrational – it cannot be expressed as a common fraction (or, equivalently, its decimal representation never ends and never settles into a permanently repeating pattern). Mathematicians suspected that from early on, but the very first proof was only found in the 1760s and it required calculus. Currently, a staggering* ***62.8 trillion*** *digits of π have been calculated. You can see up to 1,000,000 decimal digits of π at http://newton.ex.ac.uk/research/qsystems/collabs/pi/.*

FUN FACT OF THE FORTNIGHT We expect that any finite sequence of digits you could name could be found in π. For example, at position 768 in the π digits there are six 9s in succession. This block of nines is famously called the "Feynman Point" after the Nobel Prize-winner Richard Feynman. He once jokingly claimed that if he had to recite π digits he would name them up to this point and then say "and so on."

Other interesting sequences of digits have also been found. At position 17,387,594,880 you find the sequence 0123456789, and surprisingly earlier at position 60 you find these ten digits in a scrambled order.

Another example is recent years. We find that among the first 10,000 digits of π, 2018 appears one time, 2019 appears six times, 2020 occurs two times, 2021 one time. Yet the first time the string 2022 occurs is only much later, at position 17,952.

Pi-hunters search for dates of birth and other significant personal numbers in π, asking the question: "Where do I occur in the π digits?" If you want to test to see where your own special numbers are in π, then you can do so by using the free online software called **Pi birthdays**.