# BLUEBIRD MATH CIRCLE
## Alliance of Indigenous Math Circles
## Issue 33:
## Three Old and One New Problem

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

**NEWSFLASH**

Join LIVE Bluebird Math Circle to work on these activities together with friends and family. Wednesday August 24, 5-6 PM MDT online.

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

**MATH JOKE**

Q: Why can't a nose be 12 inches long?

A: Because then it would be a foot.

## Inspiration

Bluebird enjoyed his short summer vacation. He flew around making new friends. He visited the Pomo of California at a Youth Big Time and the Zuni Pueblo of New Mexico. Hopefully, they will join our math circle!



*Photos from left to right: 1. Bluebird visiting Pomo Youth Big Time event. 2. Pomo social dance. 3. View at the Zuni Village*

Now Bluebird is ready to bring more fun math activities to you. What did you do this summer?

## Family Circle: Three Old Problems
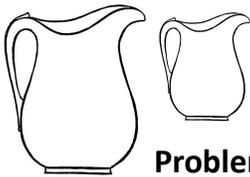
### Pitcher Perfect!

You are visiting your grandmother and notice that she has two pitchers.

**Problem 1:** Your grandmother remembers that one of the pitchers holds 5 cups of water, and the second holds either 3 or 4 cups, but she's not sure which. By just using the two pitchers, how could you determine how much the second pitcher holds?

**Problem 2:** Suppose instead that one of the pitchers holds 5 cups of water and the other holds 12 cups. Your grandmother asks you to measure one cup of water for her. Can you do that? Could you measure one cup of water if instead one pitcher holds 4 cups and the other holds 12 cups?

### Problem 3: Crafty Math

You find some red and yellow beads around your house and decide to make a gift for each of your friends by stringing the beads together into a necklace. You have more red beads than yellow so you decide to make each necklace with three red beads and two yellow. You also want each of your friends to have their own special necklace that is not like any of the others. How many different necklaces can you make like this?



Oops. With three red and two yellow beads, you can't make enough different necklaces for all of your friends. What if you make them instead with four red and two yellow? Or five red and two yellow?

## New Problem: Prequel to the Issue to Come

Your grandma has a stack of pots which she needs to be moved to another place. Can you help her? You need to move one pot at a time and you can't place a large pot on top of a smaller one. Also, since the bottoms of the pots are rounded, you can only place the stack at special holding places as shown:
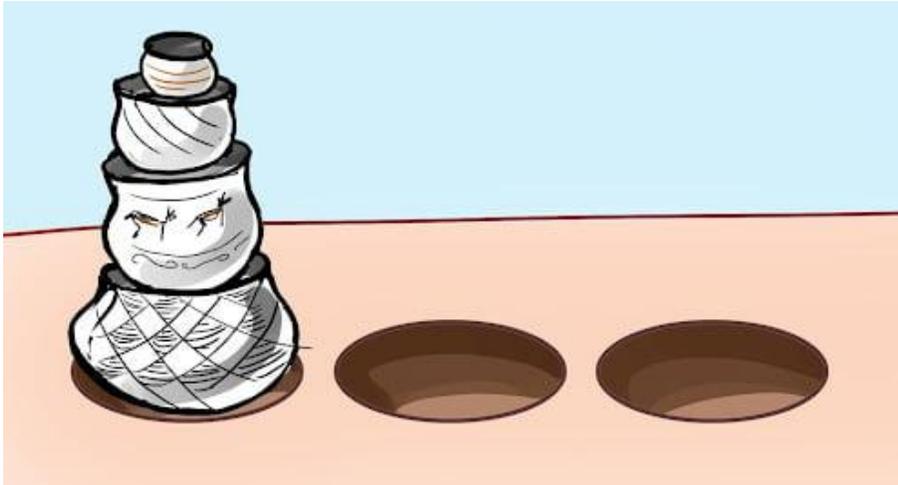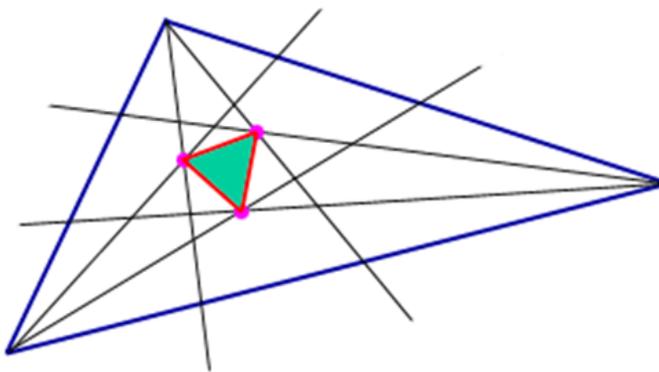


## Ask Bluebird

**QUESTION**— *How is math used to create signals for our cell phones and computers?*–from Beth Cammarata

**BLUEBIRD SAYS**—There are many parts of the process, and each involves math. When you place a cell phone call, the phone must send out an electronic signal which carries a digitized version of your speech – the actual waveform of the speech is converted into a series of zeros and ones. Mathematics and physics of the underlying processes need to be understood, modeled and finally controlled. For performing these tasks, a number of math fields are used: *trigonometric functions*, *complex numbers*, *complex analysis*, *linear algebra*, and *statistical methods*. Another part of the process is assigning a frequency to each caller so that there is no interference with other callers. This problem is solved with the help of *graph theory*, another math field. Yet another important part of the transmission is an ability to detect and correct errors. One of the methods used for this purpose is known as *Gray Codes*. Bluebird is happy to anticipate the discussion of these codes in the next newsletter issues – watch out for them and participate in the subsequent live meetings!



**FUN FACT OF THE FORTNIGHT**

*Morley's Theorem*

Take any triangle. Mark the 3 points which are the intersections of adjacent angle trisectors. No matter what triangle you start with, these 3 points will form an equilateral triangle!