BLUEBIRD MATH CIRCLE
Alliance of Indigenous Math Circles

Issue 38 (revised from #4)

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

You have to look deeper, way below the anger, the hurt, the hate, the jealousy, the self-pity, way down deeper where the dreams lie, son. Find your dream. It's the pursuit of the dream that heals you.

—Billy Mills (father), Oglala Lakota (1938-)

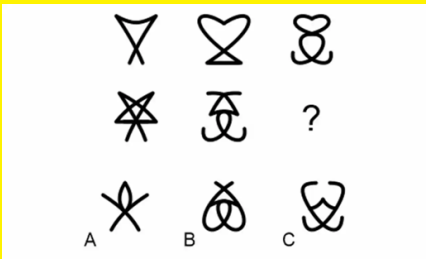
NEWSFLASH

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

Wednesday, November 2, Noon-1 PM MDT online.

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

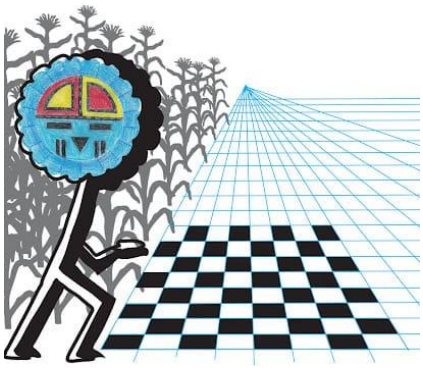
MATH Puzzle



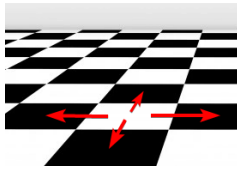
Which of the signs in the bottom row should replace the question mark?

Family Circle: Chessboard and Tiling Mathematics

TAWA STORY Planting season was in the spring, and LaVerne and Jordyn Lomakema (Hopi Junior/Senior High School) thought it fitting to tell the following story.



A rectangular cornfield is painted black and white in a checkerboard pattern, so that it looks like a 100-by-85 chessboard. Tawa (Sun) is standing with a large sack of corn kernels in one corner of the field, and at this point, the field is empty.

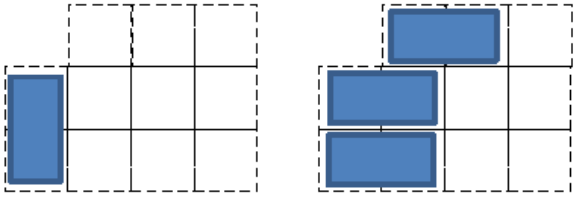


He can take a step from any one of the squares to one of the adjacent squares (up, down, left, or right, but not diagonally). When he moves to a new empty square, he puts a kernel down on it. But if the new square already has a kernel, Tawa removes the kernel.

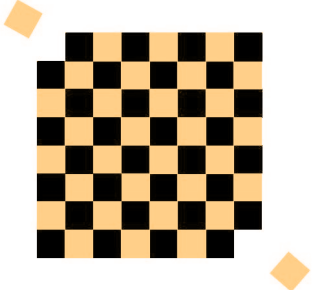
Is it possible for Tawa to walk around the field in such a way that in the end there is exactly one kernel lying in each of the black squares and no kernels lying in the white squares?

Tawa illlustrations by Jordyn L.

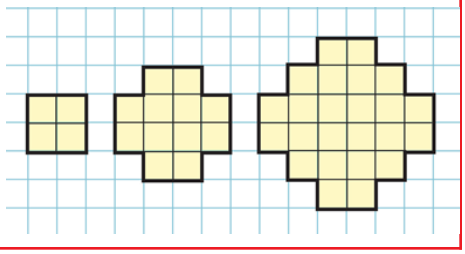
MISSING SQUARES Your old 8-by-8 chessboard is missing two squares at opposite corners. You have 31 dominos, and you want to tile what's left of the chessboard with these dominos. A domino is a 2-by-1 tile and so it covers exactly two squares of the chessboard, for example:



Could you do this?



SPEAKING OF DOMINO TILING Here is an interesting game: count the number of possible ways to tile the following shapes with 2-by-1 dominos. How many ways to tile shape #1? #2? #3? Can you guess what the next shape would be like, and how many ways are there to tile it?



These shapes can be found in much indigenous art. The motif is shared between many nations. Do you recognize it?

Ask Bluebird

QUESTION—*I wonder what is the longest migration pattern of animals? And how do they know where to go?* - from Donna Fernandez

BLUEBIRD SAYS— Both questions are great! I will answer the first one today and will save the second one for the future.

Migration is observed in species across the animal kingdom. Every year, millions of animals set out on a journey in search of food, shelter, and mating opportunities. The longest migration is believed to be done by *Arctic terns* - small birds weighing between 3.2-4.2 ounces with a wing span 25.2-29.9 inches. Flying from pole to pole, Arctic terns spend most of their year at sea chasing a perpetual summer. They are believed to migrate around 25,000 miles a year, but some recent studies indicate that they might fly double that distance.

Arctic tern. Image source: https://www.allaboutbirds.org/guide/Arctic_Tern/photo-gallery/308404421

FUN FACT OF THE FORTNIGHT

Let's place 100 red dots and 100 blue dots on paper. We are allowed to do it in whatever way we want, as long as no three dots lie on the same straight line. It turns out, that whatever configuration of dots we obtain, it is always possible to connect them in pairs, red with blue, with straight line segments that never cross. (And 100 isn't special – the same is true for 1000 red and 1000 blue dots, or any other number of your choice.) The pictures (due to Alon Amit) illustrate the fact with a smaller number of dots.