



Mini BLUEBIRD MATH CIRCLE

Issue 1: Playing With Triangles

Faculty of Mathematics
and Information Science
WARSAW UNIVERSITY OF TECHNOLOGY

Share your problems, solutions,
models, stories, and art:

<https://akademia.mini.pw.edu.pl/pl/ukraina>

When our people made baskets 2 or 3 women would sit and weave together, it was a social thing. They laughed and talked to each other. They would joke with each other. It was a peaceful and relaxing time. I remember watching my grandma Lena weave baskets. She would tell us it was time to gather the sticks as a family we would help get the willow sticks. The kids were involved in stripping the bark or filling the tub to soak the sticks. The baskets were nice, they were proud of their baskets. The thing that was so interesting was the patience our people had, you can't rush a basket.

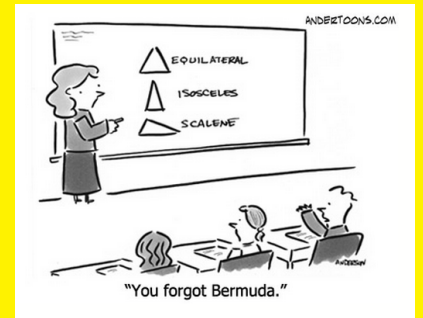
—Richard Steward (Southeastern Pomo - Elem Indian Colony), grandson of Lena Leon, basket weaver.

NEWSFLASH Join LIVE the Mini Bluebird Math Circle to work on these activities together with friends and family. The math circle is in English and Ukrainian with live translation.

Monday July 18th, 18:30-20:00 Warsaw, Poland time, online.

Sign up at <https://akademia.mini.pw.edu.pl/pl/ukraina>

MATH JOKE



Inspiration: Native American Art

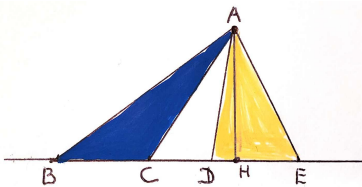
Pomo baskets are uniquely beautiful and significantly useful in life; they are considered the best. Pomo are indigenous to Northern California, there are many bands of Pomo from the coast to the inland valleys and lakes. Pomo basket weavers know how to care for the land, plants and animals so they can continue to have materials.



What do you notice about the baskets? Do you see a common shape?

Image credit: California State Parks collection. The sources of the first two baskets are unknown, and the source of the third is Mrs. A. M. MacCallum

Warm-Up: Dissect a square



1. Which of the two triangles - blue or yellow - has a larger area? Notice that bases BC and DE have equal length.

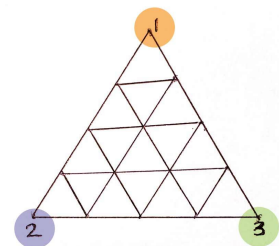
You may also notice that the triangles share vertex A, and that they also share the height AH.)

2. Dissect a square into a number of triangles of the same area:

- A. 2 triangles
- B. 3 triangles
- C. 4 triangles
- D. 6 triangles
- E. 10 triangles

Family Circle: The Triangle Game

The Triangle Game is played on an equilateral triangle board. Vertices of the triangle are labeled anticlockwise by three colors which we denote by 1, 2, and 3 for convenience. Also, parallel to each side, three equally spaced lines are drawn across the triangle, thus creating 16 small triangles. The game board is shown on the right.



The game is for two players, who take turns to label the unlabeled vertices of the figure, in accordance with the following rules:

- a vertex on edge {1,2} may be labeled either 1 or 2, but not 3
- a vertex on edge {2,3} may be labeled either 2 or 3, but not 1
- a vertex on edge {3,1} may be labeled either 3 or 1, but not 2
- a vertex inside the big triangle may be labeled 1 or 2 or 3.

When all the vertices have been labeled, the scores of the two players are calculated as follows:

The score of Player 1 is the number of small triangles which are labeled {1,2,3} **anticlockwise**.

The score of Player 2 is the number of small triangles which are labeled {1,2,3} **clockwise**.

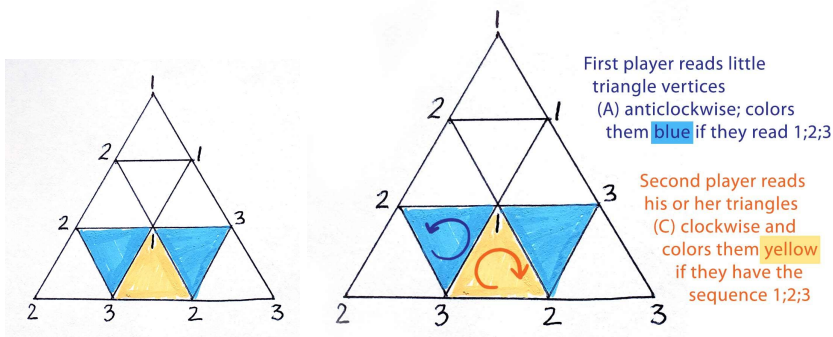
The winner is the player with the higher score.

Play the game! Then try to answer some questions:

1. Can you work out a winning strategy?
2. Is it better to play first or second?
3. Is a draw possible?

Here is an example of two games played on a smaller board. In each game we colored all small {1,2,3} triangles either blue (anticlockwise ones) or yellow (clockwise ones) so that they are easy to see.

Game 1

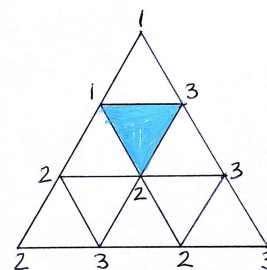


Number of anticlockwise small triangles: 2

Number of clockwise small triangles: 1

The first player's score is 2, and the second player's score is 1.

Game 2



Number of anticlockwise small triangles: 1

Number of clockwise small triangles: 0

The first player's score is 1, and the second player's score is 0.

Ask Bluebird

QUESTION—What is the only even prime number? - from Chris K.

BLUEBIRD SAYS—Let's recall that a prime number is a positive integer which has exactly two divisors – 1 and the number itself. The only even prime number is 2, all other prime numbers are odd! The reason is that any even number is divisible by 2, so it is of the form $2n$, 2 multiplied by some other integer, and hence it is divisible by that integer n , too. Therefore, it's a prime if that other integer $n = 1$, so the number is 2. This might sound astonishing until we realize that no prime number is divisible by 3 except 3 itself, no prime number is divisible by 5 except 5, etc. In fact, this observation is the basis of an ancient algorithm for finding all prime numbers up to a certain limit called the *Sieve of Eratosthenes*. You can learn about this method at https://en.wikipedia.org/wiki/Sieve_of_Eratosthenes



FUN FACT OF THE FORTNIGHT

Pour yourself a cup of coffee. Stir it gently for a few seconds, then wait for it to settle. Inevitably, there will be at least one molecule somewhere in the drink that ends up in exactly the same location it was before you started stirring! It might have moved in between, but it comes back to its original position in the end.



Originally developed for the Alliance of Indigenous Math Circles <https://aimathcircles.org/>