



BLUEBIRD MATH CIRCLE

Alliance of Indigenous Math Circles

Issue 24: Symmetry in Navajo Rugs

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

Note: This issue of our newsletter, and the next Bluebird session, was inspired by the talk by our honored guest Ilene Nagel, a master Navajo weaver, at our special Bluebird session 22 on February 28.

Together, the threads in a Navajo rug communicate more than function, warmth or beauty. They represent culture, geography and a way of life.

—Ron Garnanez,
weaver and artist

NEWSFLASH

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

Monday March 28, 5-6 PM MST online.

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

MATH PUZZLE

Can you guess what the missing figures are in the sequence of figures below?



Finding Symmetry in Navajo Rugs

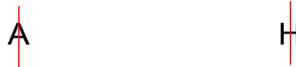
Below are five Navajo rugs. Each has some sort of symmetry. See if you can describe the symmetries before reading on. (A symmetry is a way in which one part of a figure looks like another part of the same figure.)



- #1 Burntwater rug by Louise Yazzie
- #2 Changing Woman (Asdza'a' na'dleehe') rug, unknown artist, circa 1920
- #3 Tree of Life rug by Marie Begay
- #4 Revival rug by Rean Begay
- #5 Pictorial rug by Master Weaver G.H.

Three Kinds of Symmetry

We will be talking about three kinds of symmetry. The first is vertical line symmetry. The letters A and H have these symmetries: the left half of each letter looks like it's right half:



1. Can you find other letters with vertical line symmetry?

The letters B and C have horizontal line symmetry:



2. What other letters have horizontal line symmetry?

The letter X has both horizontal and vertical line symmetry:



3. Which other letters have both horizontal and vertical line symmetry?
4. Some of the rugs above also have these symmetries. Can you tell which rugs have which symmetries?

The letter X also has another kind of symmetry. If you rotate ('spin') it around its center point by 180 degrees, it still looks the same.

The letter S has this kind of symmetry:



5. What other letters have this sort of rotational symmetry by 180 degrees?
6. Which rugs in the diagram above have this kind of rotational symmetry?
7. Can you find a letter, or a rug, or a design, which has both horizontal and vertical line symmetry, but does NOT have rotational symmetry by 180 degrees?
8. If you haven't solved the math puzzle in the yellow space above, go back and look again after reading this newsletter. See if you have any new ideas.

Ask Bluebird

QUESTION—How can the Fibonacci numbers be found in Pascal's Triangle?—from Tammy Jones

BLUEBIRD SAYS—They're right here, along certain diagonals.

