

Indigenous Math

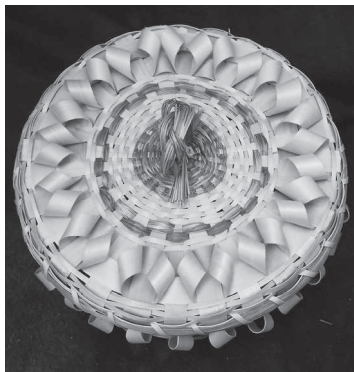
Judy Dow

BEFORE YOU READ: Learn or share what you already know about these words: archaic, winnowing basket, *makuk*, braiding.

Many Ways to Measure

I've been making baskets for over 50 years. Every time I teach a basket class, students ask why I never measure anything. However, I do measure. It's just that they don't notice. My thumb, knuckles, fingers, hands, and arm span are always measuring something. I'm often confused as to why they do not see it. Perhaps they are expecting a ruler, yardstick, or tape measure, and they think my method of measuring is archaic. But it works for me and most Indigenous basket makers.

When harvesting birch bark, for instance, I want the piece of bark I harvest to be big enough to hold a traditional one-piece container pattern, maybe even something large enough to make a winnowing basket or large *makuk*. To do this, I wrap my arms around the tree. If my fingers don't touch, I know I can get a piece big enough for the winnowing basket or *makuk* pattern to fit nicely. This is a form of traditional measuring and has been used forever. You don't need a ruler or a yard stick. What you need is something to measure with. In this case, it's my arms.



A basket made from ash and sweetgrass.

When I make the holes in this basket to sew on a rim, I use the width of my thumb to measure equal distance between each hole. This way, I have a constant width between stitches and a pattern can be formed with the stitches.



Judy Dow with some of her baskets.

Symmetry and Patterns

I look at symmetry to make sure my pattern tells just the right story of finding balance in life. Even and odd tells yet another story by forming columns in a twined basket. In a plaited basket, over-two/under-two forms a step-up pattern, which then brings diagonals into the bigger picture. Traditional mathematics can be found all throughout Indigenous art and games. Just look at pottery, beading, and weavings. Intricate patterns can show the extent of mathematical functions such as addition, subtraction, multiplication, and division. Using shapes shows an understanding of quadrilaterals, circles, and other shapes.

Beaded strands in necklaces, bracelets, and belts tell the story of patterns on the land, events in history, and treaties. Many of our traditional stories speak of patterns in nature that show up in baskets and beaded pieces. Beaded designs not only represent geometric patterns on the land,

symmetry, transformations, and other concepts, the colors also reflect local environments. For instance, many yellows, greens, oranges, and reds show up in eastern beaded designs – representing the fall colors found in leaves. Pinks, blues, and purples often appear in bead work from the plains as symbols of the beautiful sunsets they witness.

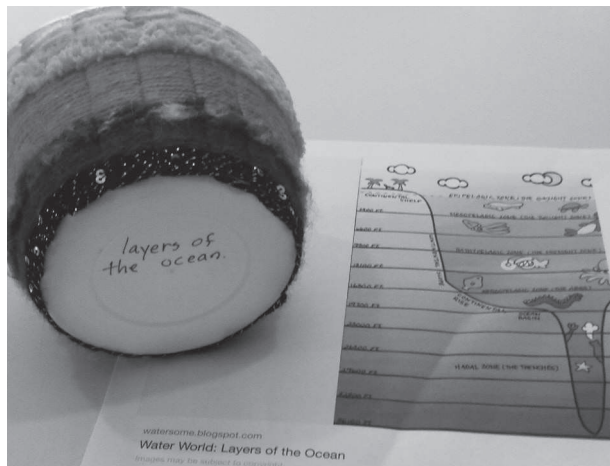
Braiding Knowledges Together

Mathematics is a huge part of Indigenous life. The first thing teachers need to understand is that it exists in the Indigenous world, and it is steeped in our culture. The second thing teachers need to learn is that they should start at the point of intersection between western and Indigenous ways of learning. At the point of intersection, the teacher should braid the two ways of learning mathematics together, always being consistent to include both forms of knowing.

Explore the Outdoors, Make Art

Going outside is a great way to explore geometry. When my children were young, we would spend hours on the beach sorting rocks by different attributes – first by color, then by size, then by shape. We would take hours looking for different rocks to fill all the attributes we could think of. We would look for every perfect shape we could find – triangles, circles, hearts, squares, and rectangles. They were all there; we just had to look. When we got home, we took the rock shapes and used them to create art projects. These beautiful rocks gave us many hours of learning.

My children and I would also take long walks through the forest looking for fallen trees that formed perfect triangles, pairs of plants and trees, and circles and ovals from the birds that chipped holes in the trees and the animal holes along the trail. Our daily walks became a lesson to identify plants, and then we worked on one-to-one correspondence as we learned to count the plants in both English and French. As the kids got older, we created maps showing what part of the forest contained medicinal plants like elderberries and



From a project Judy Dow did with school children: a basket modeled on the layers of the ocean.

golden thread, and plants to be harvested for basket making, along with food plants like staghorn sumac, berries, and butternuts. All the while, we were working on key concepts, such as, over, under, on top of, what comes next, in a row, first, last, and so much more. The maps were simple drawings at first but then became more complex. We burned the maps into leather, and we cut plants out of felt and sewed them onto the trail map in order and for each season.

Today, I teach math to children who are learning English as a second language. I also want my students to develop the necessary language that allows them to take Algebra and Geometry as they prepare for high school and college. In the process, I'm helping students to understand that my ancestors were not simplistic crafts people from the past but true scientists, mathematicians, and historians.

Judy Dow is a nationally known activist, basket weaver, and teacher of traditional Abenaki culture and native practices. She teaches ethnobotany from kindergarten to college level. She has been widely recognized as an expert on Indian education and an influential guardian of Abenaki history and culture. She has lived all her life on Abenaki land in Vermont.

AFTER YOU READ: According to the author, what are Indigenous ways of learning compared to western ways of learning?