

When the Stars Came Home

Additional Resources

Seeing Patterns and Tessellations

Level K – 8, see specific activities for each grade level

Number of Students individual or small groups

Length 30 – 60 minutes

Brief Description: Ojig's quilt contains a series of repeated shapes and patterns in various colours. The floor of the First Nations University in Regina, Saskatchewan also contains such patterns. In this activity students will investigate the patterns found in both shapes and compare them. They will then create their own patterns using tangram tiles.

Materials: copy of the book, images of the floor pattern (see below), physical tessellation/tangram tiles or access to PolyPad or a similar online tessellation tool

Preamble: Ojig's blanket consisted of a series of shapes (mostly triangles) intricately woven together to form the star blanket. The main lobby of the First Nations University in Saskatchewan (FNU) also has a similar pattern. Both patterns make use of shapes and colours to make their designs. These patterns are called tessellations and you are going to make some of your own today.

Procedure

Grades K - 2: have students turn to the page in the book with the finished quilt and describe the shapes, colours and patterns they see. Then have them look at the FNU floor and describe what they see there. Are there similarities or differences between the two?

Next, using physical manipulatives or an online tool and have students make their own tessellation patterns (being careful to inform students that they are not making a star blanket but instead are making a pattern of significance to themselves). There are also pre-set tangram puzzles that students can use as well. Ask students to describe why they chose a specific pattern or shape.

Grades 3 - 5: same as K - 2 but have them measure the various shapes, identifying the different triangles used (are they equilateral, isosceles, scalene, right)? And then discussing how the shapes fit together. They can also count the number of tiles used in the FNU floor and make an estimate of how large the pattern must be in terms of area and perimeter/circumference. Ask also about the difference in the blanket (a square pattern) and the floor (a circular pattern) and what differences this makes in terms of the shapes that can be used.

Grades 6 - 8: same as 3 - 5 but have students now calculate the area of the various shapes and put them together to determine the area of the blanket and also of their own shapes they create. Students can also use graph paper to create their own patterns and describe the significance of what they have chosen. They can also calculate the amount of thread that would be required to create the star pattern by making an estimate of how big each shape is and how much string would be required to attach each piece to another.

Information: tessellations are abundant in mathematics, in nature, and in the world we as humans create. There are many different types of tessellations (and there are 17 tiling patterns, you can learn about each of them here: <https://www.math.utoronto.ca/~drorbn/Talks/Treehouse-1410/index.html>). The way that various shapes fit together and the patterns they create (and whether they fit snugly together or if there are gaps) are well studied in math. Shapes with straight edges can more easily be placed together snugly/tightly than those with rounded edges (and in fact there are only a handful of curved patterns that can be fit together with no gaps). Hexagons, or the shapes that make up bees' honeycombs, are a perfect example of a shape that fits together snugly with no gaps and optimizes the area of each part of the shape.

Additional Activities:

- You can discuss concepts of symmetry found in the various shapes and patterns (both the quilt/floor and in the student created designs)
- Students can discuss if there are any patterns or symbols of significance to them or their families or cultures.
- See if your students can find tessellations and patterns out 'in the wild'. They can often be found in bathroom tiles, mosaics, graffiti, building structures, and more. Students can take pictures of these patterns and bring them back to the class to discuss. They can also perform measurements on the patterns and look for how they relate to one another.



Indigenous Connections: as we saw from the book the star blanket holds a special place in Anishinabia and other indigenous cultures. The pattern and the individual shapes mean something to the creators and receivers. In this activity it is very important to recognize that the shapes we are analyzing have significance to indigenous culture and we need to be respectful of that. We also can't just create our own star blankets, but we can create something meaningful to ourselves and our family/culture. You can learn more about the significance of Indigenous blankets, including the star quilt here: <https://thediscoverblog.com/2019/03/19/first-nations-blanket-traditions-through-time/>

