

SNOWFLAKE MATH

Carolyn Llewellyn, 2016

Objective: Students will practice finding and measuring angles with protractors. They will use fine motor skills, and learn about symmetry. They will learn about the complexity and uniqueness of snowflakes.

Location/time: This is an indoor lesson which requires at least 30 minutes. 45 is better.

Materials:

- One pair of scissors per student. Bigger scissors are far superior to those made for small children.
- 2+ pieces of plain white paper per child. Thin paper is ideal, but standard copy paper is fine.
- One protractor per child.
- Books showing photographs of snowflakes, including those with photos by or about “Snowflake Bentley”.
- Small paper plates, ideally one per student, though they can share if necessary.
- Whiteboard (or chalkboard or smartboard)

Lesson:

Start with discussion. Ask the students what they know about snowflakes. They may know that each one is unique, or that they have 6 sides. You can discuss the different kinds of snow—powdery, good packing snow, “sugar” snow that comes at the end of winter during maple sugaring season, etc. It is said that the native Alaskans have 50 words for snow! Emphasize they symmetry of snowflakes, reviewing what that means, and that they have 6 identical sides.

On the whiteboard, draw a circle. Ask the students how many degrees are in a circle (360). Then ask them how many degrees are in each sixth of a snowflake's circle. Draw the long division program on the board, and let them answer (60).

Next, have each student trace a circle on their paper using the paper plate, and cut it out. Have them fold it in half. On the board, draw a half circle, with the straight line on the bottom. With your own cut-out circle, show students how to fold the half-circle in half again but NOT press down, just pinch the bottom to make a mark in the perfect center of the folded side of the paper, then return it to its half-circle state, now with a little mark in the perfect center of the fold. Draw the half-circle on the board, flat side down. Show how students can use a protractor to mark the 60 and 120 degree marks on their half-circles, starting from that center point at the bottom. They can just draw a little dot or line.

Here's the tricky part...show students how, holding the center of the folded side, they can fold the left side of the half-circle over to the 60 degree mark, and fold it down tight. Then they flip the whole thing over. Holding the bottom tight, they can then fold the remaining flat part over to meet the slanted folded edge. The result is a pizza-slice shaped piece of folded paper, a halved circle folded in 3 accordianed parts. If unfolded, the circle would look like a pizza cut in 6 equal parts. But don't unfold!

Instead, fold the entire “pizza-slice” in half from the point. That is so that each section, when cut, will end up symmetrical itself.

All folds should be pressed on hard. Finally, demonstrate to students how to cut while keeping the

snowflake whole. Students can cut off the point to make a whole in the snowflake's center. After that, though, no cuts can cross the entire wedge. Little and small triangles can be cut out to make a simple or complicated design. Students should be instructed to open their scissors wide and cut from further down, not the tip of the scissors (otherwise it is difficult to cut the so many layers of paper at once.)

Unfolding the paper should reveal a symmetrical, six-sided snowflake. Beautiful!

Teachers may want to hang the snowflakes on a clothesline to make a “blizzard.”