

# A Shape Quest Through Story

*Chantel Mulder and Gladys Sterenberg*

## Once upon a Time

The popularity of teaching with picture books in elementary mathematics classrooms is increasing as teachers make connections between literature and mathematics. Since picture books can be read in one sitting, they can offer a springboard into mathematical inquiry. Textbook series and teaching resources provide many pedagogical ideas for integrating picture books into mathematics classrooms and some teachers are introducing picture books into their classroom in an attempt to garner interest, increase motivation and improve mathematical sense-making. The visual nature of these books has aesthetic appeal for many students.

This article explores how students in a Grade 1 classroom interacted with the picture book *The Greedy Triangle*, written by Marilyn Burns (1994). As teachers, we were interested in how the story could be used to investigate different polygons, how the students would engage in the story and the colourful illustrations, and how related tasks could enhance mathematical understanding for students. Chantel developed a lesson plan and Gladys expanded on this work when she taught the lesson to a class of Grade 1 students as a visiting professor. What follows is a summary of the book, a description of the tasks offered to students and a reflection on the mathematical learning of the students as they engaged in the tasks.

## The Storyline

*The Greedy Triangle*, written by Marilyn Burns and illustrated by Gordon Silveria, is about a triangle that is unsatisfied with its shape and tired of having only three sides. Initially, the triangle goes to a shapeshifter to be changed into a quadrilateral. Then the triangle asks the local shapeshifter to add more sides and angles until it doesn't know which side is up. After many trips to the shapeshifter, the triangle learns that being a triangle is the best after all.

## Storytelling

We started by considering the general and specific outcomes listed in the Alberta Program of Studies.

The ones we chose to work on focused on exploring and classifying circles, triangles, and rectangles according to their properties. Since we wanted to emphasize process skills of communication and reasoning, we decided to design student tasks in relation to the book *The Greedy Triangle*.

Gladys began the lesson by playing a game. Students were asked to guess an answer to the statement, "I spy with my little eye something that is a triangle." This sparked a rich discussion on the attributes of classroom objects. The first suggestion was made by a student who tried to form a triangle with his fingers. I asked him to explain why he thought this shape was a triangle. Another pointed to designs on the carpet. Yet another identified the wings of a butterfly in a poster. At each suggestion, Gladys asked students to explain why they thought the shapes were triangles. When one student mentioned that the points on the maple leaf on the Canadian flag could make a triangle, other students were quick to dispute this conjecture. This led to much discussion about the characteristics of triangles. This initial task seemed to provide students with an opportunity to identify and describe triangles in their classroom environment.

During this game, Gladys was sitting with her hand on her hip, thus forming a triangle with her arm. None of the students guessed her answer and when she offered it to them, they recognized the shape, and many tried to form a triangle using their arms, legs, and fingers. This activity helped prepared them for the description in the book of the triangle's favourite thing to do. As a triangle, it could "slip into place when people put their hands on their hips."

After this game, Gladys read the story with the students. The illustrations were instrumental in fostering conversations about the shapes and their attributes. Students were asked to predict what shape the triangle might change into. Much discussion occurred when new terms were introduced. The students especially enjoyed the section on the quadrilateral's experiences and were quick to point out many examples of quadrilaterals around the classroom. Students remained motivated to interact with the story throughout the entire reading of it.

Following the story, students were given a sheet of paper with a triangle glued to it. These triangles were arranged in a variety of orientations. Chantel had noticed that many students thought about shapes in a particular way. For example, when asked to draw a triangle, students often crafted an equilateral triangle with a horizontal base. A misconception can occur when students see shapes “on their side” or “upside down” and believe that these shapes are somehow “wrong.” Chantel wanted the students to draw on their experiences of reading the book and realize that if they saw a triangle “upside down,” it was not incorrect and, indeed, it was the same object. Students were instructed to draw a picture incorporating the shape and use as many triangles, quadrilaterals, and other shapes as possible in their drawings.

## So the Story Goes

Students were quite engaged in this task and created interesting drawings. However, the most important part of this task was how students talked about their shapes. Gladys was able to ask students to classify their shapes and explain their thinking. Again, this fostered rich conversations and allowed Gladys to assess student understanding of the attributes of the shapes.

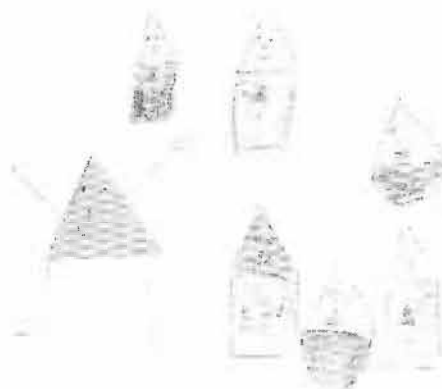
Jared was very articulate about his drawing:



He talked about where he saw triangles in places outside of the classroom and was particularly proud of showing Gladys that shapes can exist inside other shapes. He was able to tell her why the triangles that looked different were still called triangles. While Gladys missed it at the time, she could have asked him about the 3-D box in the centre of the picture. This might have extended his understanding about the difference between 2-D shapes and 3-D objects.

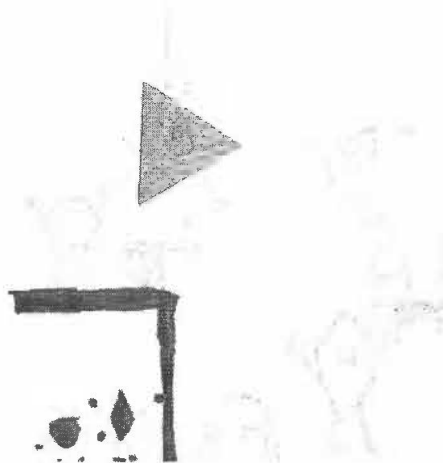
Shondra emphasized that she was drawing friends for her triangle. She wanted these friends to be

different so she made them with triangular faces but added quadrilaterals and “partial” circles to her shapes.



Gladys talked with her about semi-circles and squares and rectangles, and Shondra was beginning to make mathematical distinctions between these shapes.

Andrew wanted to include as many shapes as he could in his picture. He especially liked hexagons and enjoyed talking about how he was making the sides join together so that they were “even.” He described the L shape as a half a square, and we talked a bit about what he was seeing. His drawing showed his experimentation with drawing the shapes, but this was a mere artifact of a much richer conversation about shapes.

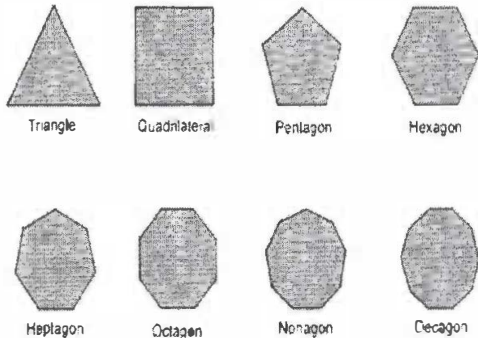


As students completed their drawings, they were offered an opportunity to choose another sheet with a shape and draw a picture using only this particular shape. Chantel wanted students to be able to identify hexagons, pentagons, and rectangles in their environment and distinguish these from triangles. This was quite effective.

This lesson was extremely successful in motivating students to talk and think like mathematicians. During a 45-minute period, these students remained captivated by the tasks and the story. Their excitement was contagious.

As we reflect on this lesson, we believe that follow-up lessons might be fruitful. These lessons could include

- using geoboards to experiment with different shapes,
- examining the different polygons presented in the book in three dimensions,
- making a collage of shapes found in magazines,
- identifying shapes at home by completing an activity with a parent (eg, have a worksheet with the following shapes on it and ask parents to help their child find the shapes in their home and draw them) or



- integrating the story with other content areas such as health (eg, extending this assignment to teach our students about self-acceptance and how important it is for students to accept themselves and others for their uniqueness).

For us, the most exciting parts of this lesson were the conversations that the students engaged in. *The Greedy Triangle* provided a context for students to see geometric shapes all around the world and to investigate the concept of angles and sides. The story was especially helpful in connecting geometric shapes to shapes found in the students' environment. The integration of literature encouraged students to share their understandings of mathematical concepts. Student engagement and learning were enhanced.

## References

Burns, M. 1994. *The Greedy Triangle*. New York: Scholastic.

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*Chantel Mulder is an education student at the University of Lethbridge. She has a passion for high school mathematics and will pursue a lifetime of learning through teaching mathematics.*

*Gladys Sterenberg is an assistant professor in the Faculty of Education at the University of Lethbridge and the editor of delta-K. She is interested in narrative ways of knowing mathematics and is currently researching Aboriginal stories of mathematics.*