

The Seven Stars of Matariki

Purpose:

The purpose of this activity is to engage students in solving a problem involving sorting polygons by their spatial features.

Achievement Objectives:

GM2-3: Sort objects by their spatial features, with justification.

Description of mathematics:

In readiness for this problem, the students should have familiarity with each of the following components of mathematics. The problem may be solved with different combinations of these components.

- 2D shapes
- regular and irregular polygons
- features of a polygon
- names of polygons (first ten)
- sorting polygons

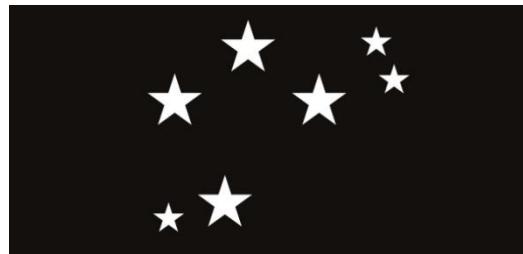
This activity may be carried out with guidance, or by allowing the student to follow their own method of solution. The approach should be chosen in sympathy with students' skills and depth of understanding.

Activity:

Stella's class is learning about polygons.

On the classroom wall is the flag design, the Seven Stars of Matariki.

Stella thought she might be able to make polygon pictures by drawing lines from one star to another.



If each star on the flag can be used for only one vertex (corner), but not all the stars need to be used, what are the different types of polygons that Stella could make?

The practical approach

The student is able to explore a problem by constructing polygons and forming a solution set.

Prompts from the teacher could be:

1. What is the simplest polygon Stella could draw on this flag?
It may be helpful to have this list:
triangle, quadrilateral, pentagon, hexagon, heptagon, octagon, nonagon, decagon
2. What other polygons could Stella draw on this flag?
3. What will be the most complex polygon Stella can form on this flag?
4. What are the different types of polygon that Stella may form?

T: What did you do here?
S: I made the triangles first. That's the 3.
Then I did not a square or a rectangle,
but another shape with four sides.

T: A quadrilateral?
S: Yeah, that. It's got four sides. Then I
tried all the stars and got seven sides.

T: How did you decide that you can also get 5 and 6-sided
polygons?
S: Well I could have just joined five or six stars and that's
how many sides I would get.

The conceptual approach

The student is able to recognise the constraints given in a problem and say how these will limit the range of polygons that may be formed.

Prompts from the teacher could be:

1. What types of polygons do you know about?
It may be helpful to have this list:
triangle, quadrilateral, pentagon, hexagon, heptagon, octagon, nonagon, decagon
2. What features does each type of polygon have (eg how do triangles differ from pentagons)?
3. What will be the most complex polygon you can form from this flag? Why?
4. What are the different types of polygon that Stella may form?

3 triangle

7 heptagon

T: You did a lot of thinking before you wrote this answer.
What were you thinking about?

S: I was making a triangle in my head. It had three sides
and also three corners. So I thought that that's how it is
for any shape – the number of sides is the same as the
number of corners. So I have seven stars and that
makes a shape with seven sides, and I looked that up
and it is called a heptagon.