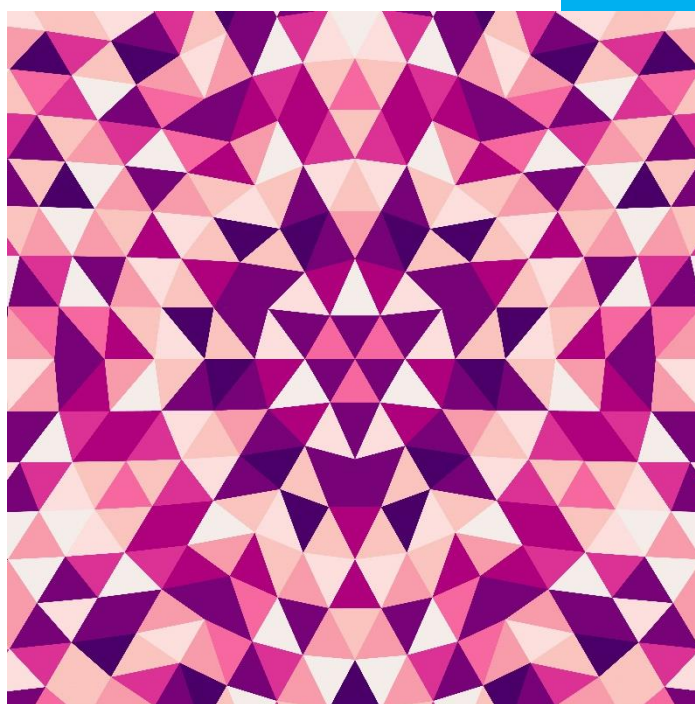




stem4math

# KALEIDOSCOPE



Name:

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Level/class:

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School:

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Date:

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## Engage

1- Read and analyse the information about the photography challenge that will take place in your class.

### **PHOTOGRAPHY CHALLENGE "MATHEMATICS IN NATURE"**

Did you know that mathematics is often present in nature?

If you observe closely what surrounds you, you'll discover maths in many things.

For this reason, all students are invited to participate, until the end of this month, in a photography challenge with the theme "Mathematics in Nature", which encourages to look around us for a connection between the geometric shapes found in nature, symmetries and others.

Each student can join with a family member or friend and present a maximum of 2 photographs, in colour or black and white. Each of the photographs must be delivered on paper and placed in the designated Padlet.



## Plan

2- In small groups, select a criterion to group the photos (you can use paper photos or Padlet).

List the criteria you have selected and explain the reasons that led you to select these criteria.

3- Organise photos according to the criteria selected by your group.

4- Now, group the figures in the photographs according to the number of reflection symmetry axes they have.

To do this, fill in the following table (or draw up a similar poster where you paste the photographs).

Table 1: Number of reflection symmetry axes in the figures

Number of reflection symmetry axes	Pictures/photos
0	
1	
2	
More than 2	

Note: You can use a mirror or sighting to help you draw conclusions about the number of symmetry axes in the figures in the photographs.



## Investigate

5- Rita continued to conduct investigations using mirrors in some images.

The following question arose:

**How many images of an object can be obtained with two flat mirrors in different positions (with different amplitudes of angles between them)?**

What are your thoughts on the subject? *Don't forget to present your arguments.*

6- To help you answer this question, you will complete an activity where you will proceed as follows.

- 1- Obtain a device with two flat mirrors so that they can be placed in different positions, forming different angles, and an object;
- 2- Draw angles of  $45^\circ$ ,  $90^\circ$ ,  $120^\circ$ ,  $180^\circ$ , etc. on a sheet;
- 3- Place the mirrors on the semi-straight lines that constitute the sides of each angle;
- 4- Always place the object in the same position and at the same distance from the vertex of the mirrors;
- 5- From a fixed point, observe (align the field of view with the object and the vertex of the mirrors);
- 6- Repeat these observations with the mirrors forming different angles ( $45^\circ$ ,  $90^\circ$ ,  $120^\circ$ ,  $180^\circ$ , etc.);
- 7- Record how many images are obtained from the object in Table 2 shown below.

Table 2: Number of images according to the angle formed by the mirrors

Angle formed by mirrors	Number of images
$45^\circ$	
$90^\circ$	
$120^\circ$	
$180^\circ$	
_____	

7- After doing this practical activity, record what you have verified and respond to Rita's question.

8- Rita continued her investigations ... now with three mirrors ...

And the following questions arose:

**What will happen if we put together three flat mirrors, forming a triangle, and place an object inside it?**

**And if we join four, forming a square?**

**And five, forming a pentagon?**

Investigate for yourself using mirrors.

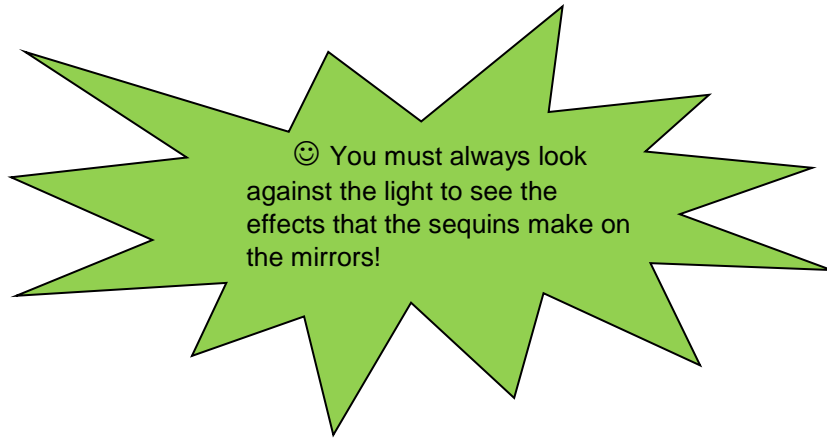
List your observations in the following place.

A large, empty rectangular box with a thin black border, intended for the student to write down their observations from the mirror experiment.



## Create

The previous activity made it possible to understand the principle of a kaleidoscope.  
You will now build your own kaleidoscope.



## Report

Now let's evaluate all the work done.

Let's report the positive aspects of this project and the less positive ones and the difficulties that were experienced during the process.