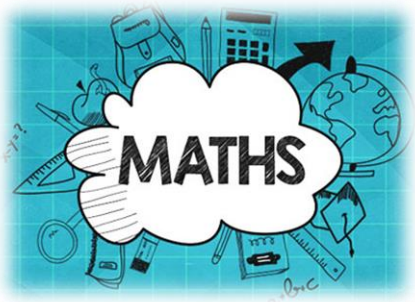
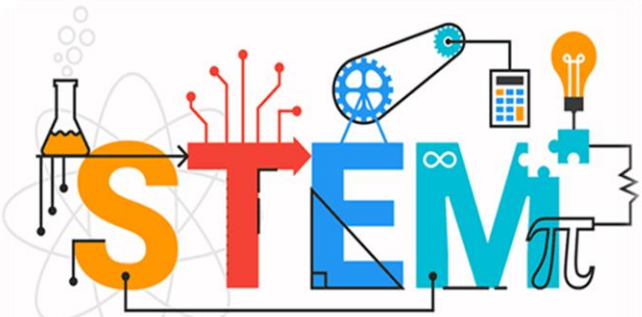




TWGHs Lo Kon Ting Memorial College
Mathematics
STEM Education

S1 Chapter 10

Symmetry and Transformation

Making a kaleidoscope

Name:_____

Class:_____ (_____)

Group:_____

Contents

Interesting Trivia: Mysterious patterns in field

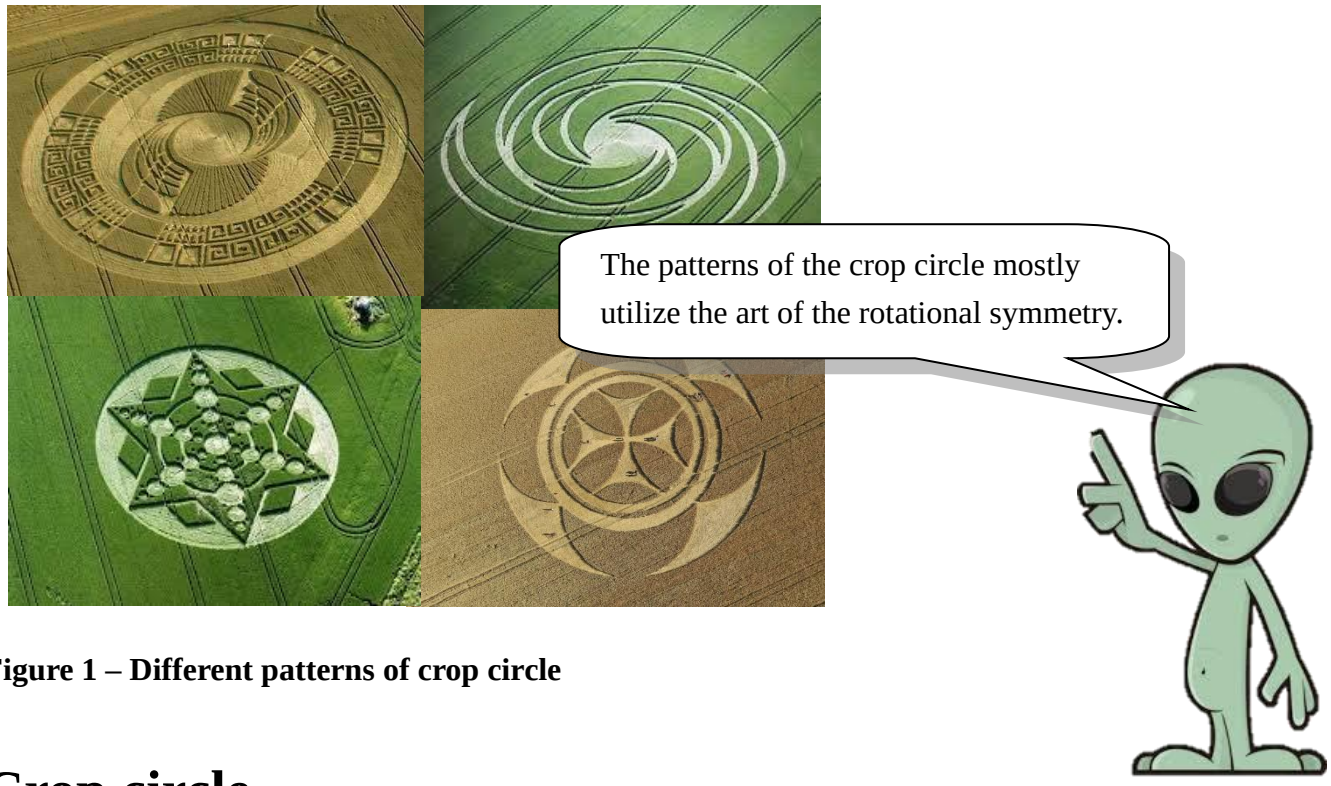
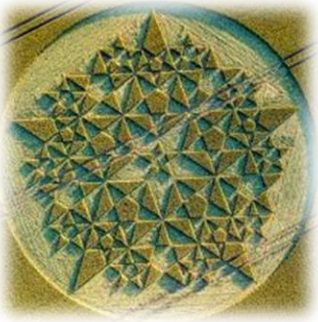


Figure 1 – Different patterns of crop circle

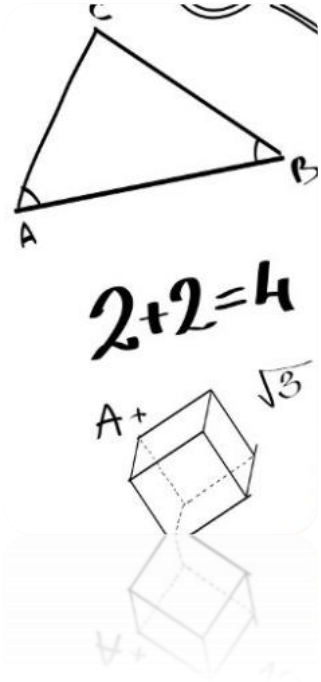
Crop circle

Crop circle is an area of standing crops which has been flatted in the form of a circle or more complex pattern. No general cause of crop circles has been identified although various natural and unorthodox (非正統的；非傳統的) explanations have been put forward.

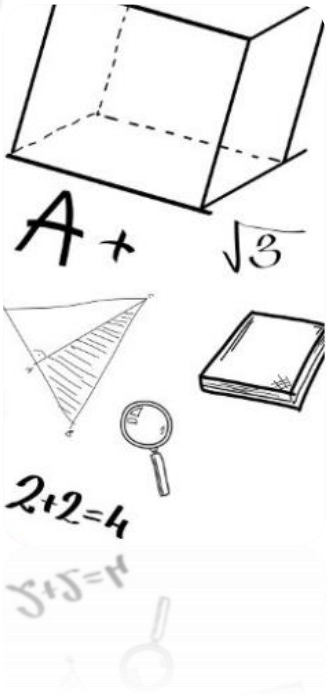
The concept of the crop circle began with the original late-1970s hoaxes (惡作劇). Some people were inspired by the Tully "saucer nest" case in Australia, where a farmer claimed to first have seen a UFO, then found a flatted circle of swamp reeds (沼澤蘆葦).



Thinking time



What is the next three figure?



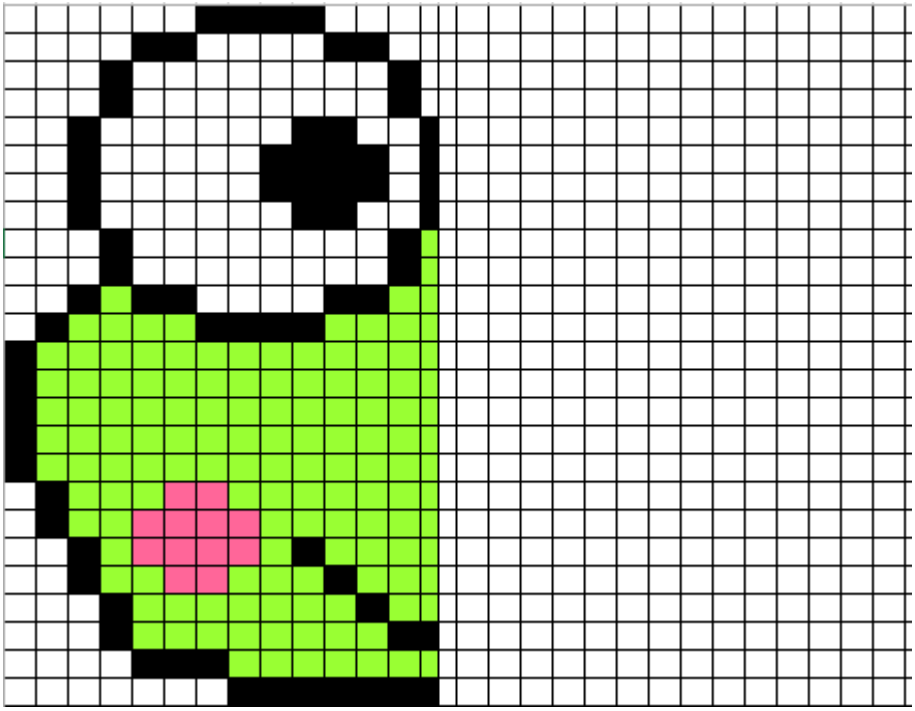
Write your answer on the box

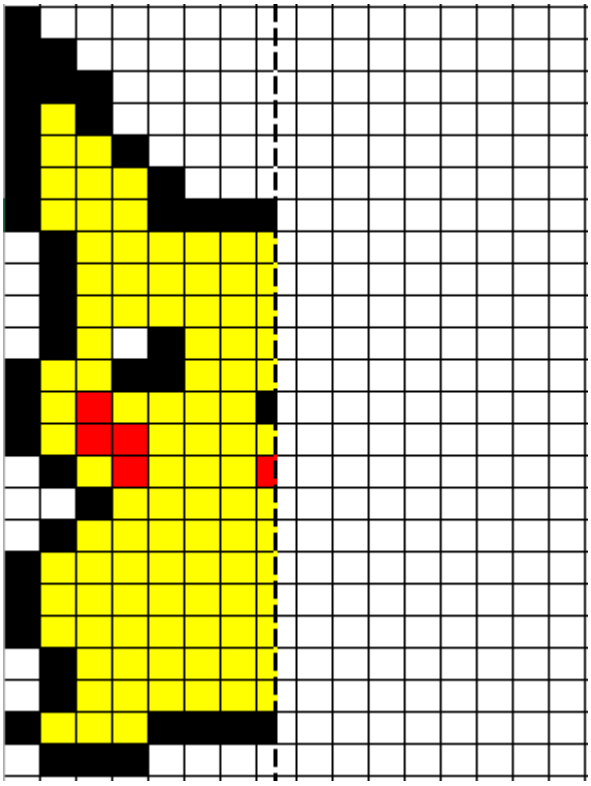
Reflection Symmetry

When folding a plane figure along a straight line and its two sides coincide, the figure has reflection symmetry, and the straight line is called the axis of symmetry.

Activity: use Excel to simulate reflection symmetry

Use Excel to make a symmetry graph. Finish the following graph by reflecting the left-hand side image to the right-hand side.





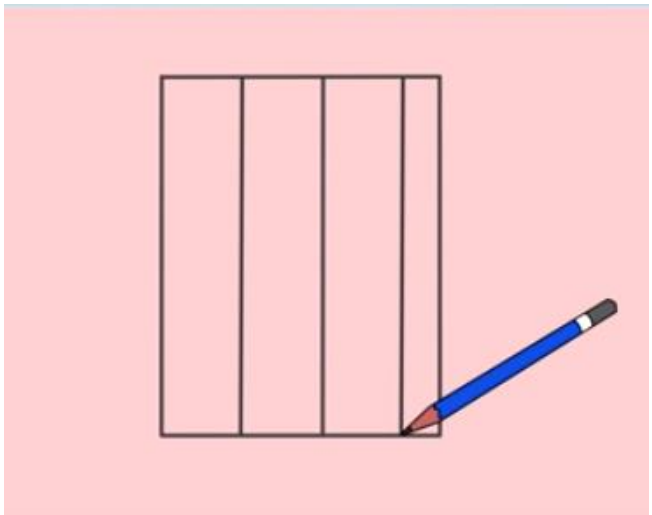
Rotational Symmetry

When rotating a plane figure about a fixed point for 1 turn and it coincides with the original figure n times (where $n \geq 2$), the plane figure has rotational symmetry (or n-fold rotational symmetry), and the fixed point is called the centre of rotation.

Activity: Making a kaleidoscope

Materials

	Item	Quantity
1.	Reflective paper	1
2.	Empty toilet paper roll	1
3.	Black paper	1
4.	Ruler	1
5.	Scissors	1
6.	Colourful beads（珠子）, sequins（閃光亮片）and confetti（五彩碎紙）	Vary
7.	Ruler	1
8.	Glue/Tape	1



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Step 1: Draw rectangles on a reflective paper and then cut it out by using scissors

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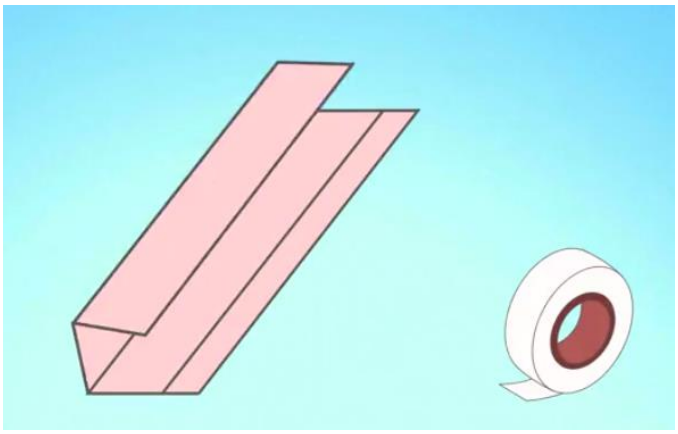

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Step 2: Fold the reflective paper into a triangular cylinder. Put it into an empty toilet paper roll. Tape the strip along the outside edge using tape, so the triangle hold its shape.

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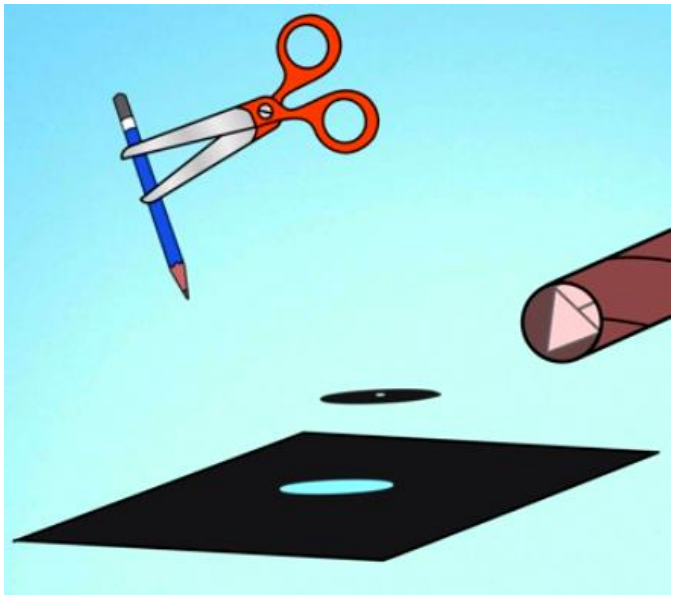

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Step 3: Cut a circle from a black paper and make a hole using scissors or a sharp pencil at the centre of it.

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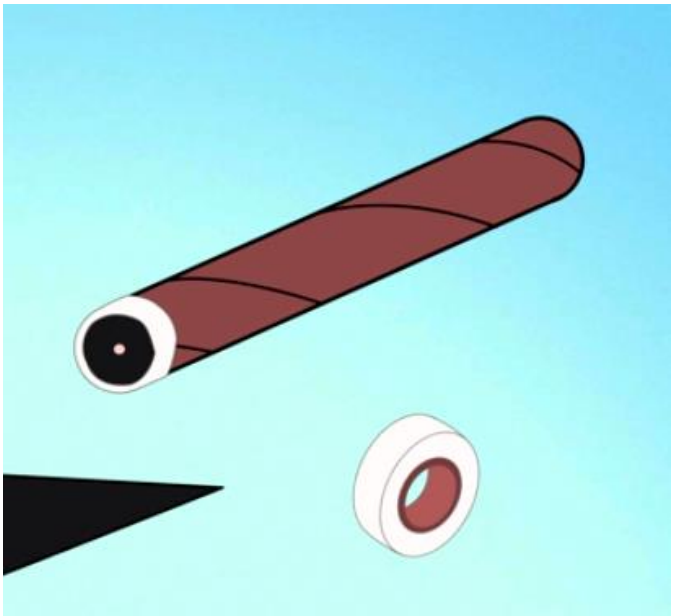

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Step 4: Stick the black paper across one end of the roll and use tape to hold it at its end.

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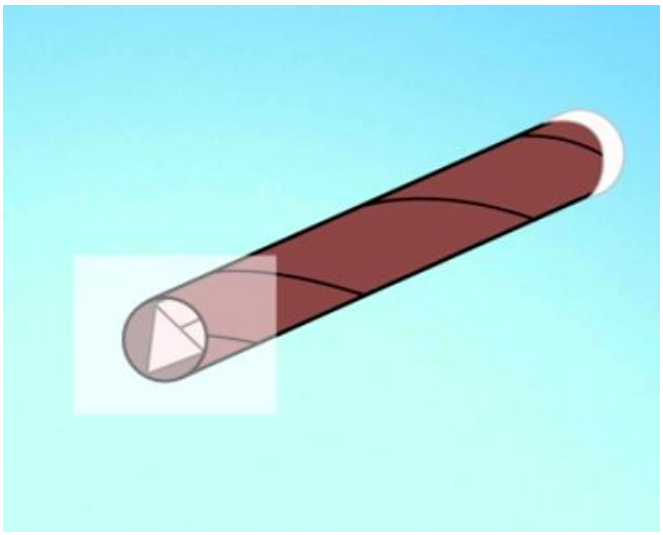

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Step 5: Put a circular transparent (透明的) film into the other end of the roll, just above the reflective paper. Use your finger to poke (戳) it down into the plastic triangle, until it forms a little pouch (小袋).

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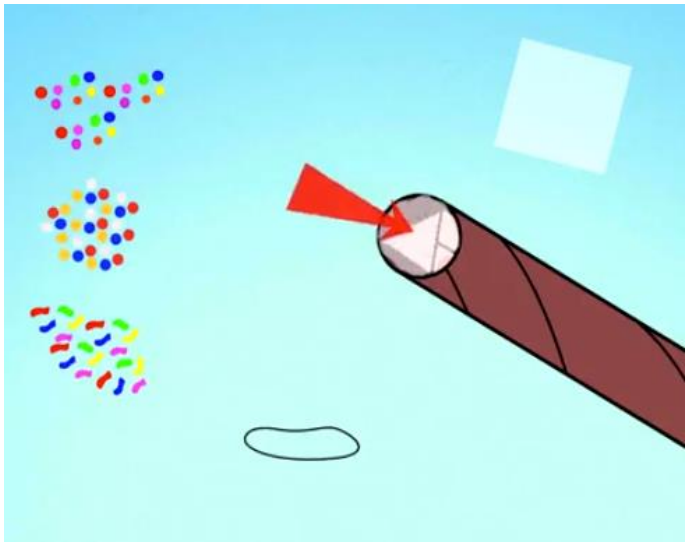

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Step 6: Put some colourful beads, sequins, and confetti over the film.

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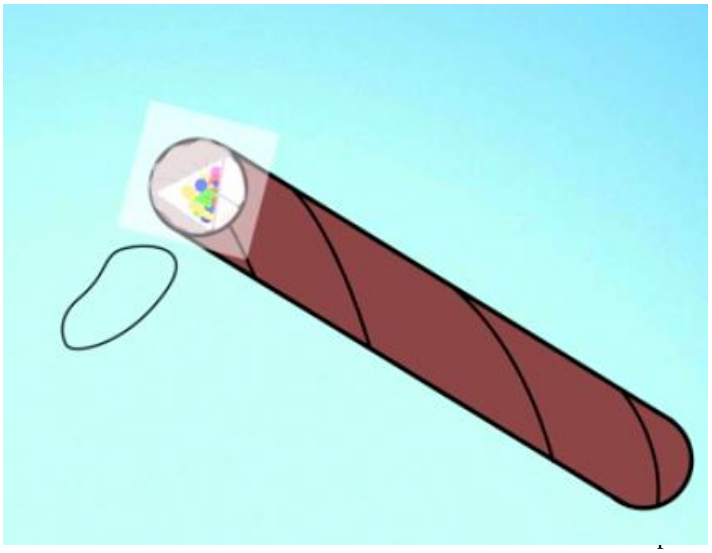

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Step 7: Stick another film across the end of the roll and use a tape to hold it.

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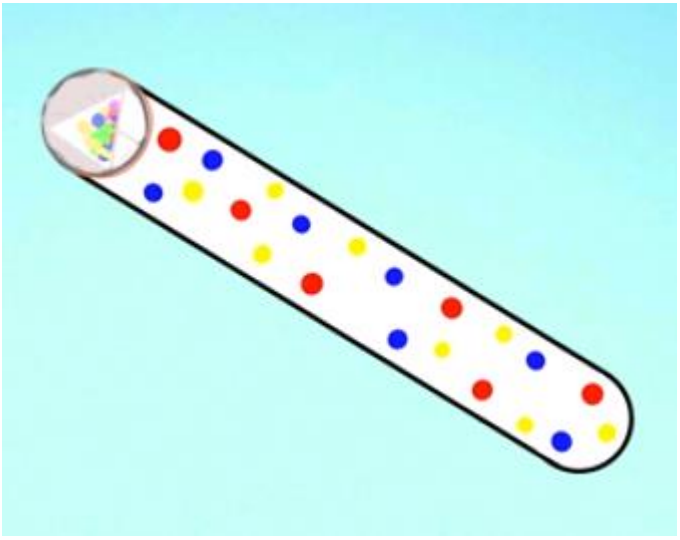

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Step 8: Decorate the outside of your kaleidoscope by using stickers, wrapping paper, contact paper or construction paper.

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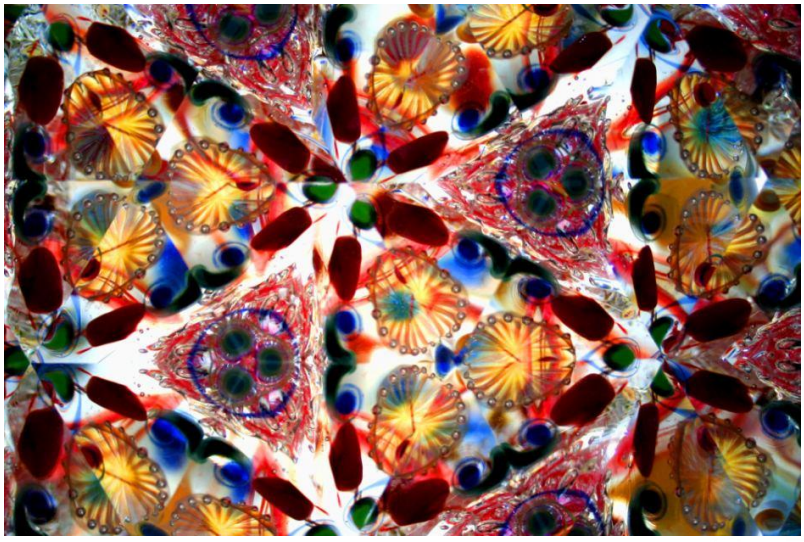

Enjoy your kaleidoscope!

Discussion

What symmetry method is used in the kaleidoscope? What is the working principal behind?