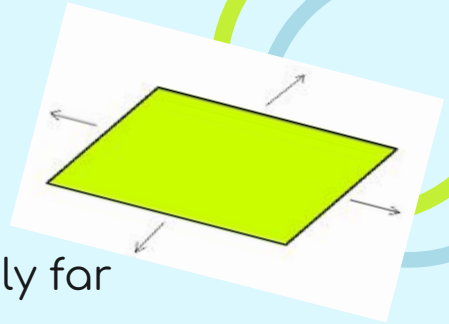
TESSELLATIONS

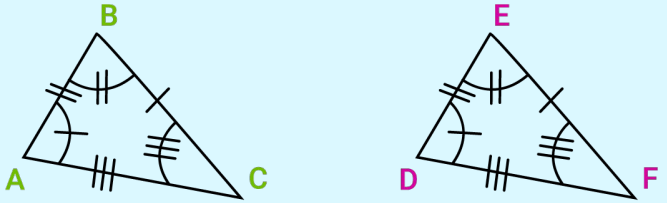
Infinity Math Club

Please Sign In!

DEFINITIONS



- **Plane:** a flat, two-dimensional surface that extends infinitely far
- **Congruent figures:** identical in shape and size
  - Same size —> congruent angles
  - Same length —> congruent sides
  - Allowed to slide, turn, or flip the figure



$\Delta ABC \cong \Delta DEF$

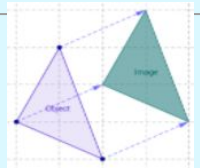
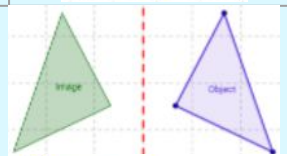
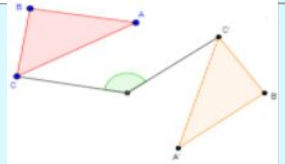
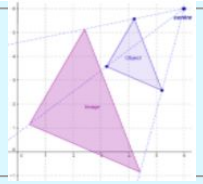
- **Transformation:** a process that manipulates a polygon or other two-dimensional object on a plane or coordinate system

TRANSFORMATIONS

Transformations

Definitions

- Plane - a flat, two dimensional surface that extends infinitely far
- Congruent figures - identical in shape & size
- Transformation - a process that manipulates a polygon or other 2-dim object on a plane

Type	Definition	Requires		Additional Notes
Translation	Moving every pt. of figure by same distance in given direction	Translation rule Ex. (x,y)→(x+2,y-3)		Before **transformation** = pre-image or object (ex. Point A) After transformation = Image (ex. Point A')
Reflection	Creating mirror image of figure on other side of given line	Mirror line Ex. y = 2		Every point is the same distance from the mirror line
Rotation	Circular movement of a figure around a center	Center pt + degree of rotation		**Order of rotational symmetry** - # of times geometric figure looks exactly the same as original figure during one full rotation
Dilation	A proportional stretch or shrink of a figure based on scale factor k	Center pt. & scale factor k **(k<1 shrink k>1 -stretch)**		Process: Multiplying the scalar factor (k) with coordinates - Shape & orientation preserved

CLASSIFYING TRANSFORMATIONS

RIGID TRANSFORMATIONS

translation

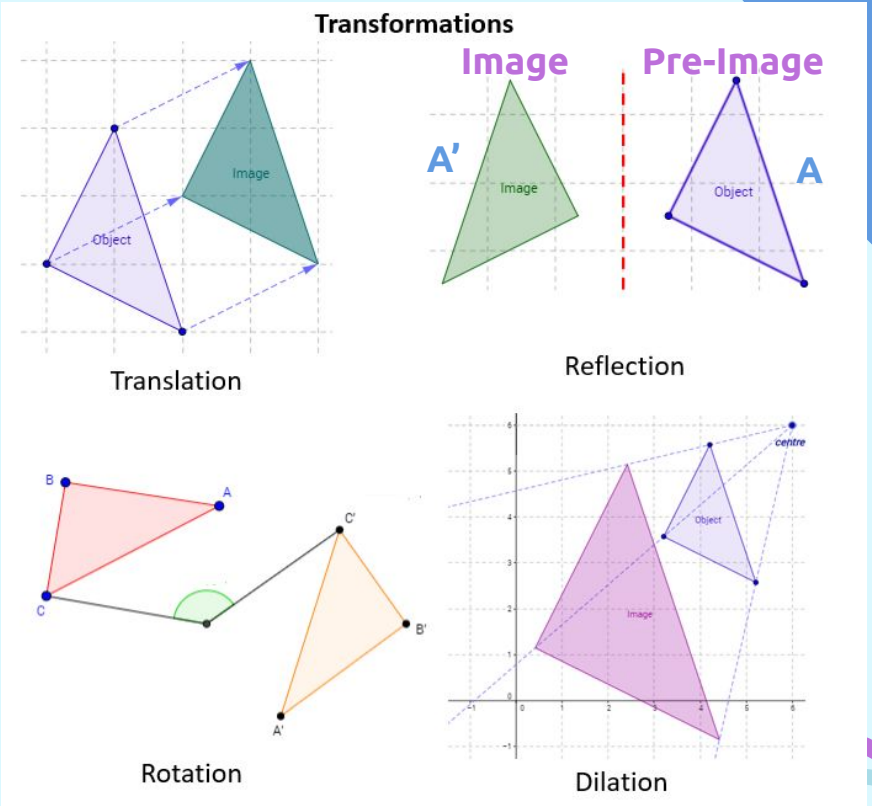
reflection

rotation

NON-RIGID TRANSFORMATION

dilation

Point A after a transformation is denoted as A'

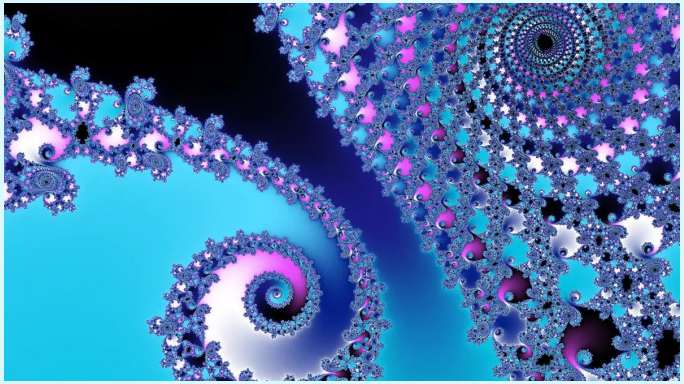


MATH AND ART

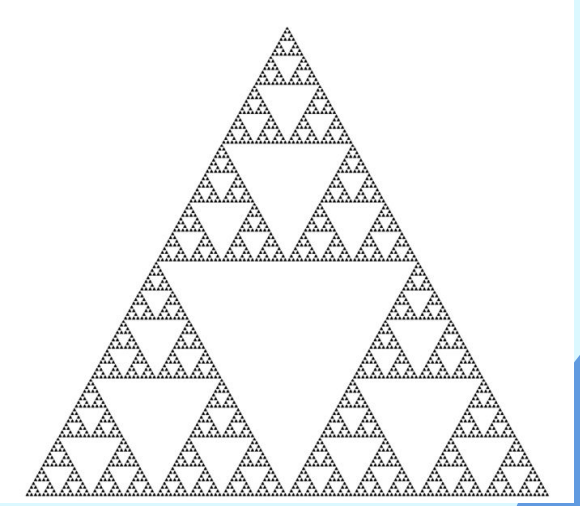
FRACTALS: NEVER ENDING PATTERNS

Fractals are fragmented geometric shapes that can be split into parts that are each a reduced-size copy of the whole.

- This means that fractals have a property called self-similarity



They are created by repeating a simple process over and over in an ongoing loop.



Sierpinski Triangle

FRACTALS: NEVER ENDING PATTERNS

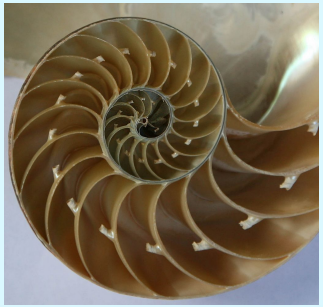
Fractals are helpful in **science** because they often describe the real world **better** than traditional mathematics and physics

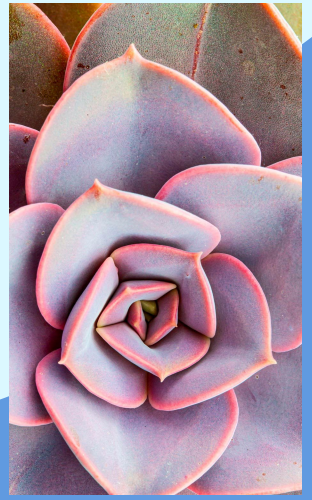
- A lot of objects in nature are composed of figures resembling fractals

BIOLOGICAL STUDIES

- can be used to capture images of these structures and predict or analyze various biological processes







FRACTALS: NEVER ENDING PATTERNS

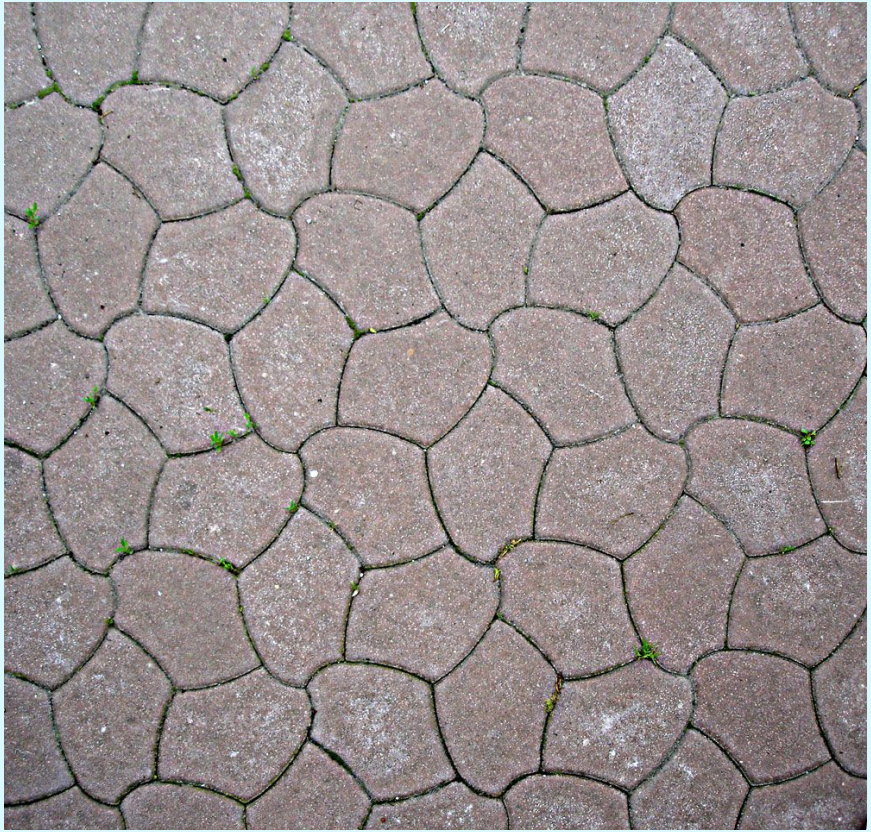
TESSELLATIONS

Tessellation:

covering of an infinite geometric plane without gaps or overlaps; uses one or a few types of congruent figures

BASIC ATTRIBUTES OF TESSELLATIONS

- are repeating patterns
- have no gaps or overlaps with all of the plane covered
- can go on indefinitely on a surface



CREATE YOUR OWN TESSELLATION

materials you will need for this activity:

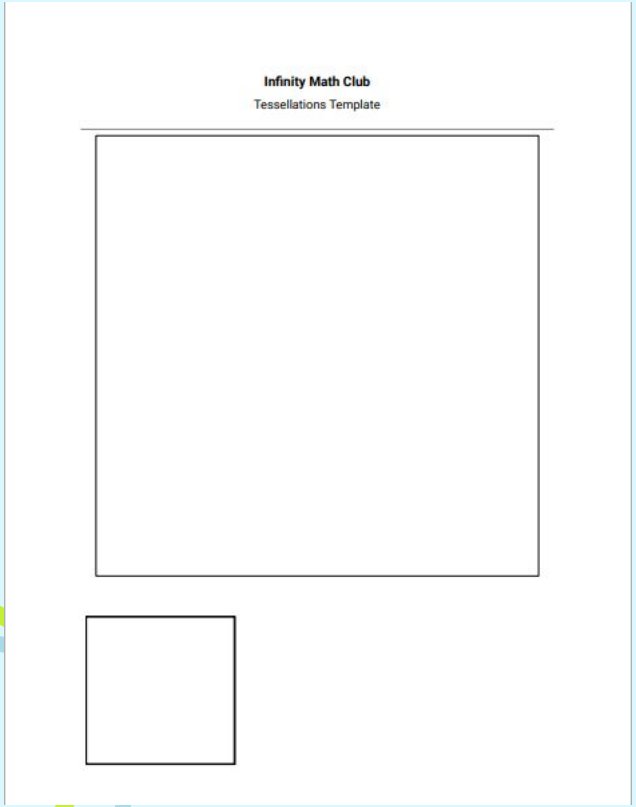
- Scissors
- Tape
- Pencil

CREATE YOUR OWN TESSELLATION

Step 1

Take your scissors and cut out the small square at the bottom left hand corner.

The large middle box is where your tessellation will be



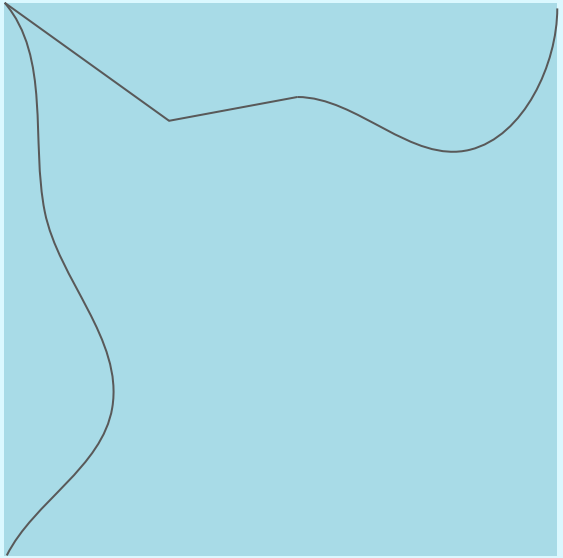
CREATE YOUR OWN TESSELLATION

Step 2

Now that you have your square, connect the top left and the bottom left corners with your pencil.

Then, do the same to the top left and the top right corners.

You can do that with straight lines, curves, anything you would like. Just make sure that the lines are not overlapping.

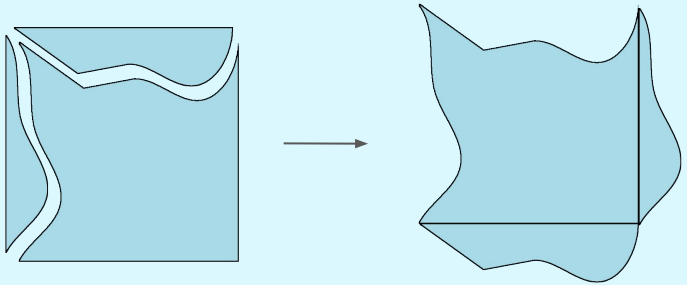


CREATE YOUR OWN TESSELLATION

Step 3

Cut along the lines you drew, and move the pieces you just cut out to the opposite sides of the square.

After arranging them like so, tape the pieces together.



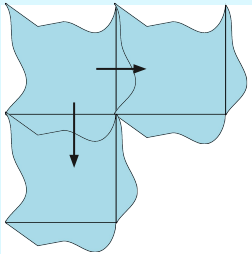
CREATE YOUR OWN TESSELLATION

Step 4

Trace the tessellation piece in the larger rectangle.

Translate the piece to the right and the bottom and trace those shapes. Repeat until the entire piece of paper is covered with the tessellation shape.

Make sure as you're tracing that the shapes are touching one another and there is no gap or overlaps!



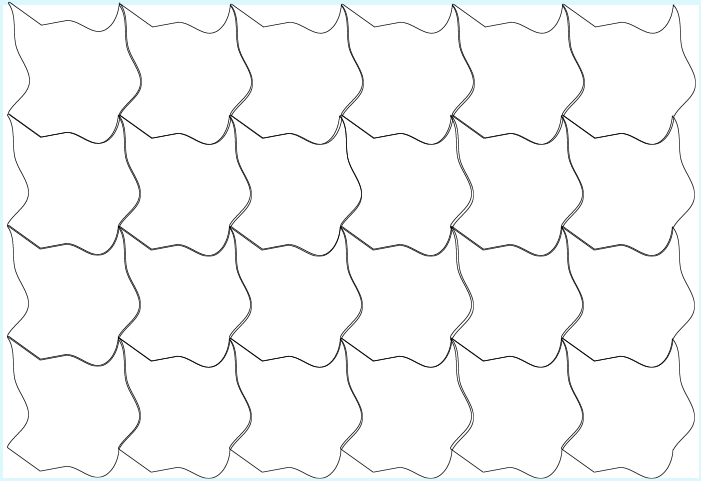
CREATE YOUR OWN TESSELLATION

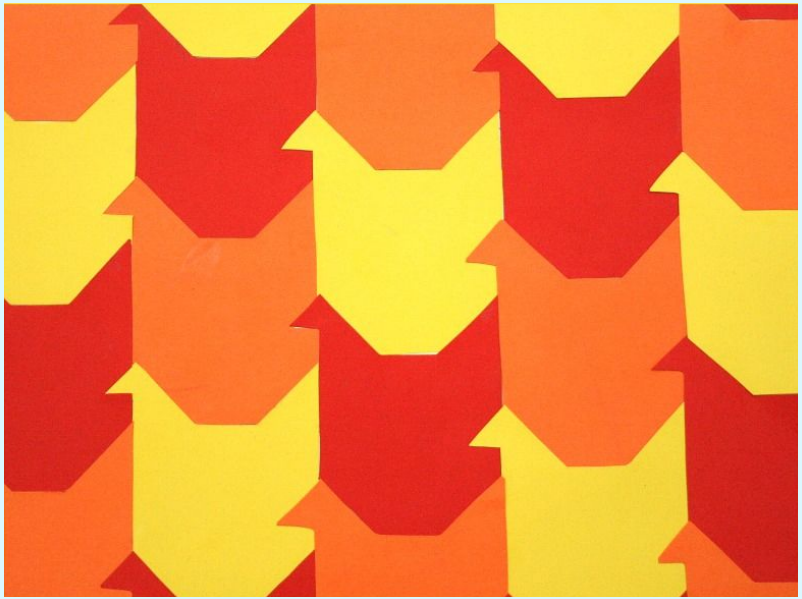
Step 5

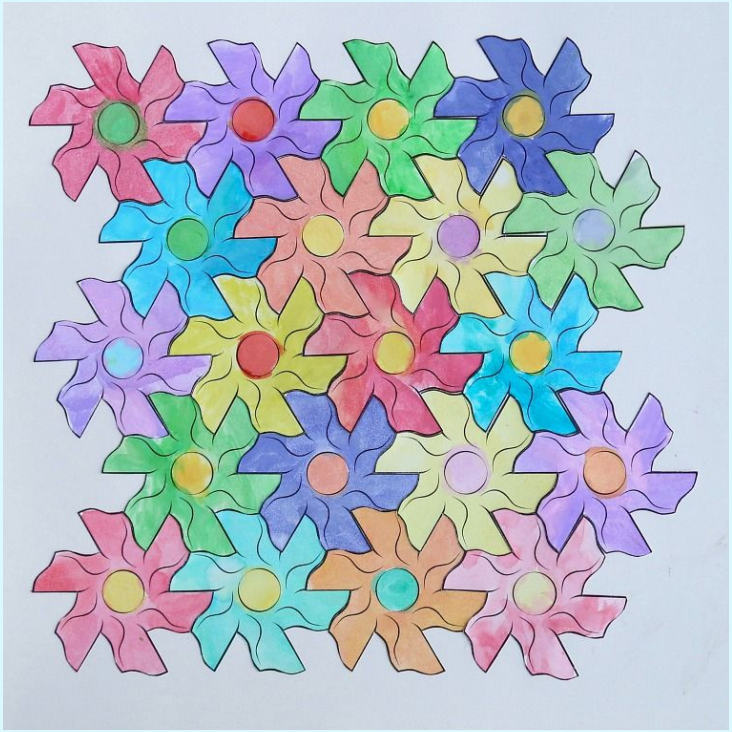
Essentially this is what you should end up with!

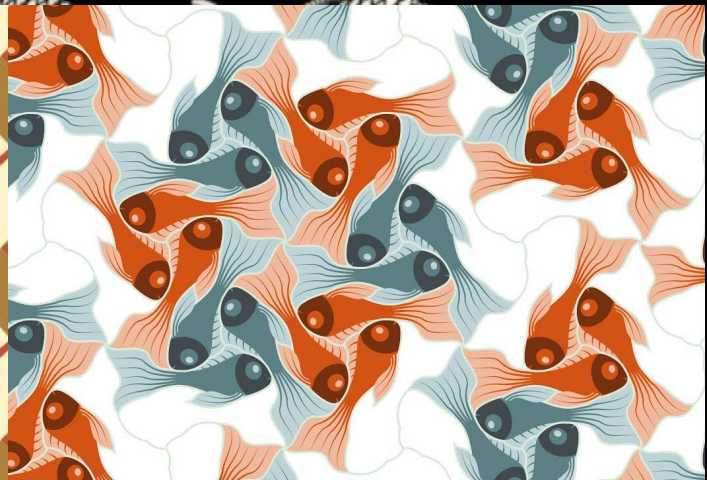
You can decorate this using colors, patterns, doodles, however you would like!

Here are some examples if you need an idea!









Thanks for coming!