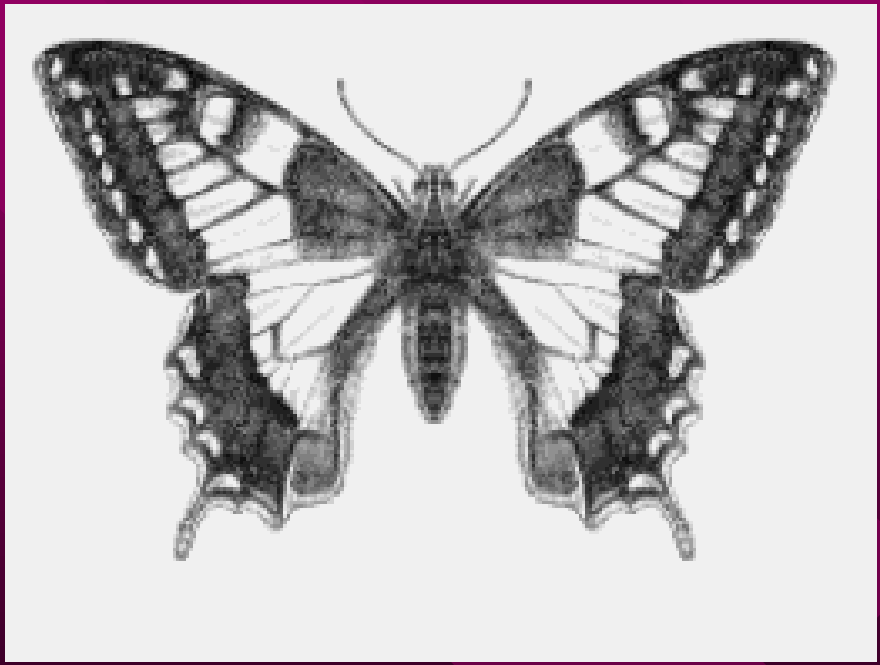
Symmetry:
A Visual Presentation

Line Symmetry

- Shape has line symmetry when one half of it is the mirror image of the other half.

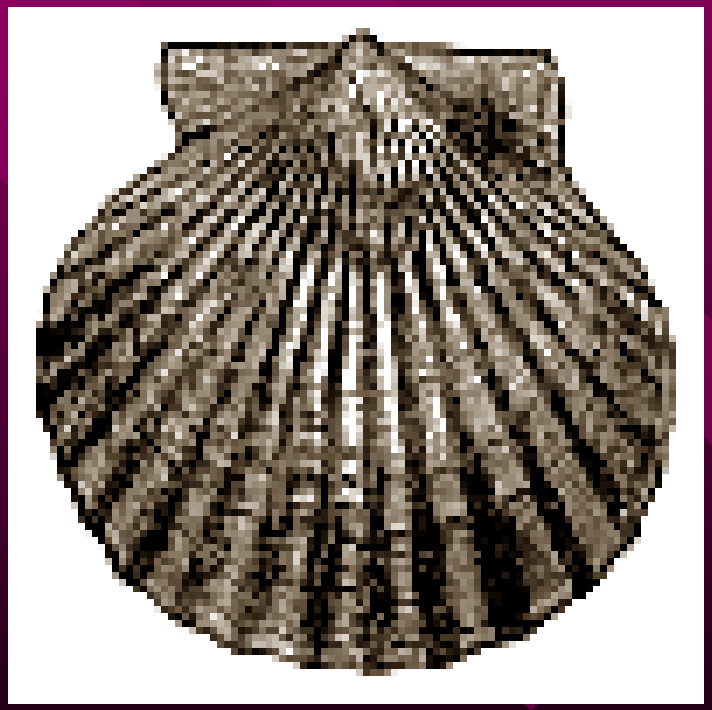
- Symmetry exists all around us and many people see it as being a thing of beauty.

Is a butterfly symmetrical?

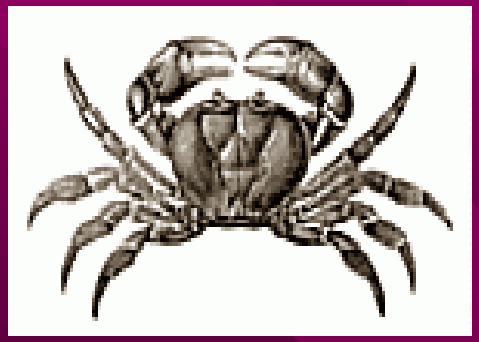


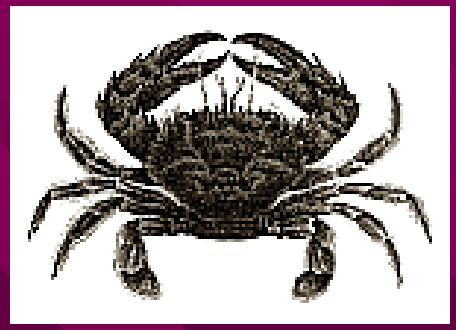
Line Symmetry exists in nature but you may not have noticed.

At the beach there are a variety of shells with line symmetry.

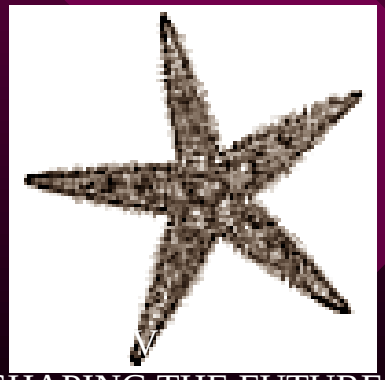


Under the sea there are also many symmetrical objects such as these crabs

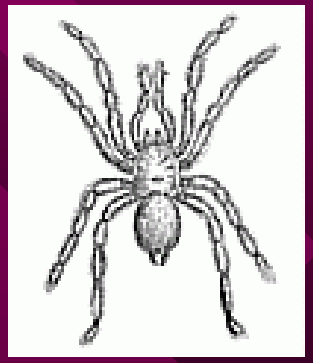




and this starfish.



Animals that have Line Symmetry



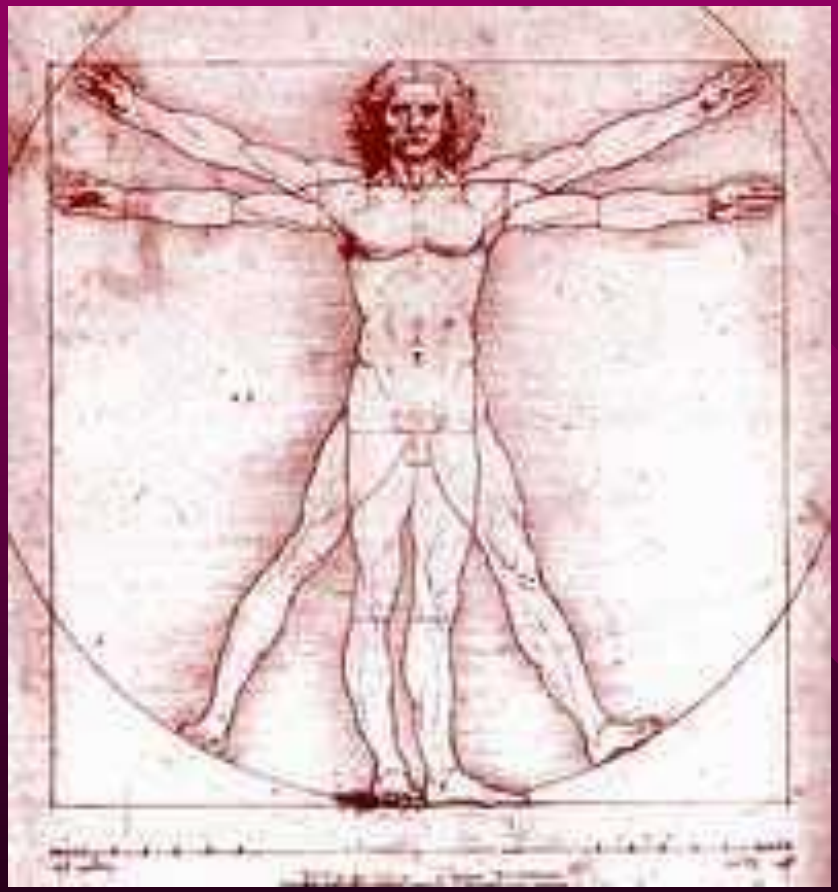
Here are a few more great examples of mirror image in the animal kingdom.

THESE MASKS HAVE SYMMETRY

These masks have a line of symmetry from the forehead to the chin.

The human face also has a line of symmetry in the same place.

Human Symmetry



The 'Proportions of Man' is a famous work of art by Leonardo da Vinci that shows the symmetry of the human form.

REFLECTION IN WATER

If an object is reflected in water it is considered to have line symmetry along the waterline.

The Taj Mahal

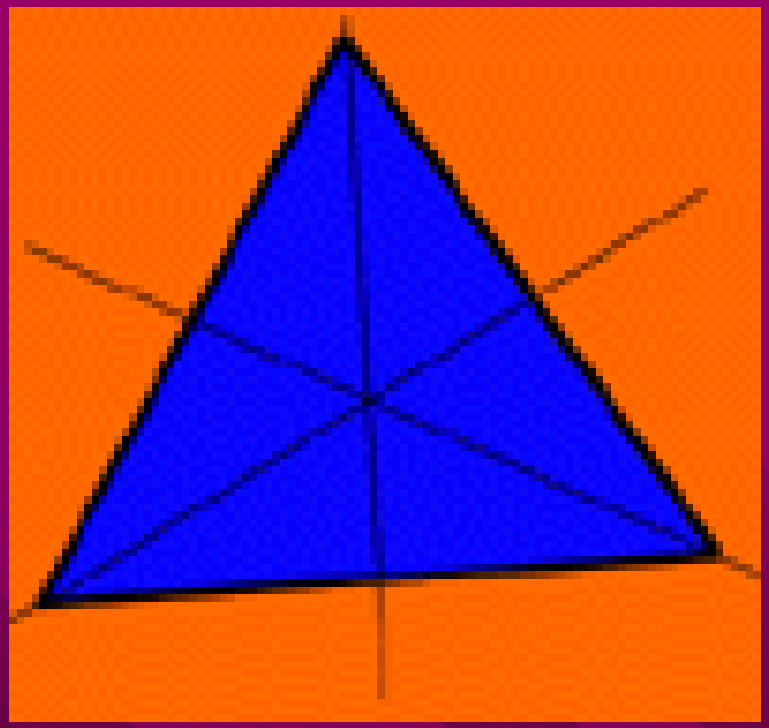
Symmetry exists in architecture all around the world. The best known example of this is the Taj Mahal.

This photograph shows 2 lines of symmetry. One vertical, the other along the waterline.

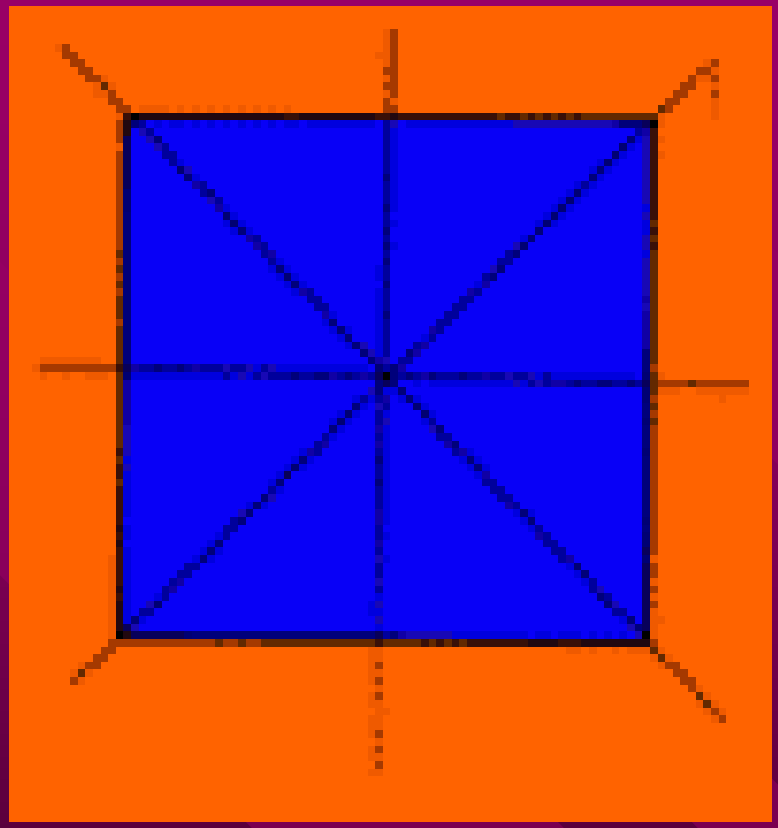
(Notice how the prayer towers, called minarets, are reflected in the water and side to side).

2D Shapes and Symmetry

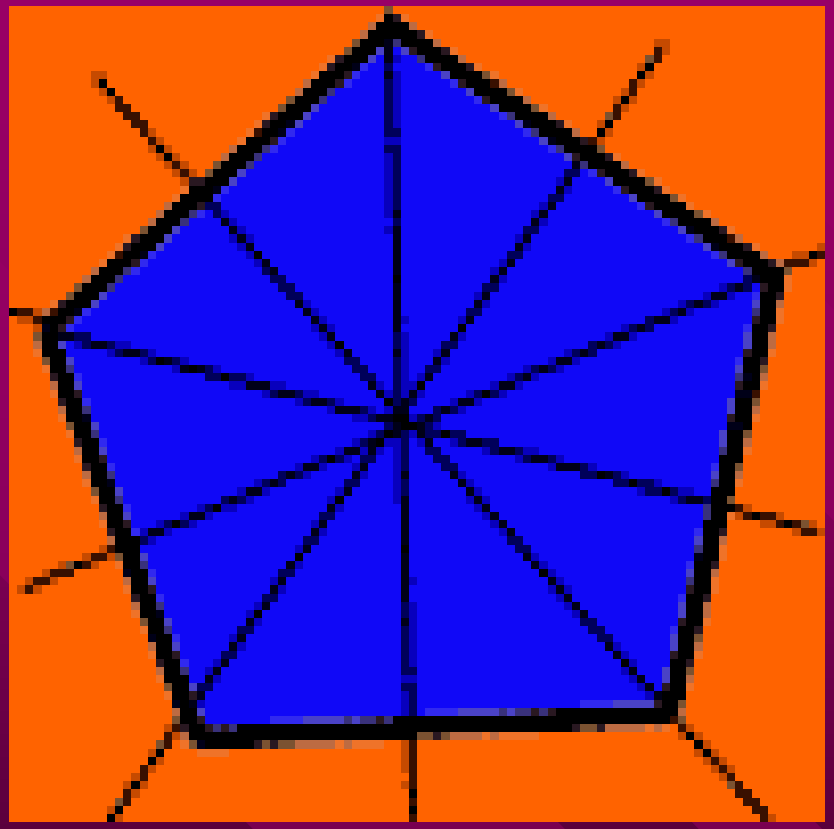
After investigating the following shapes by cutting and folding, we found:



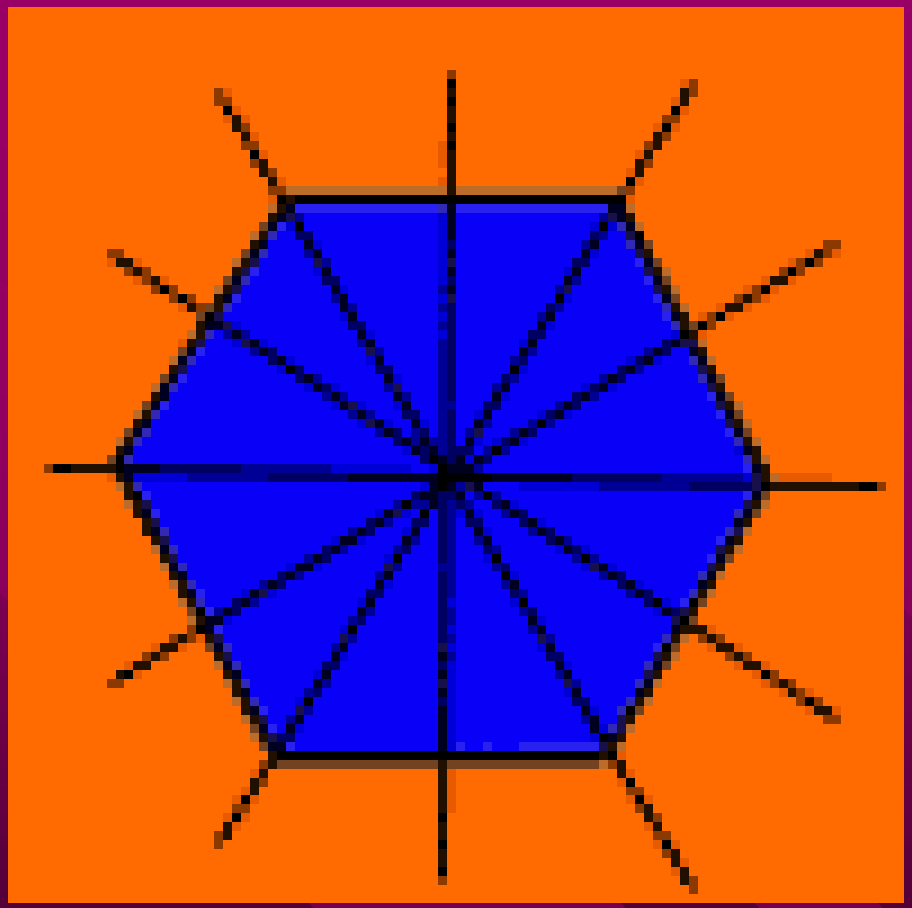
an equilateral triangle has 3 internal angles and 3 lines of symmetry.



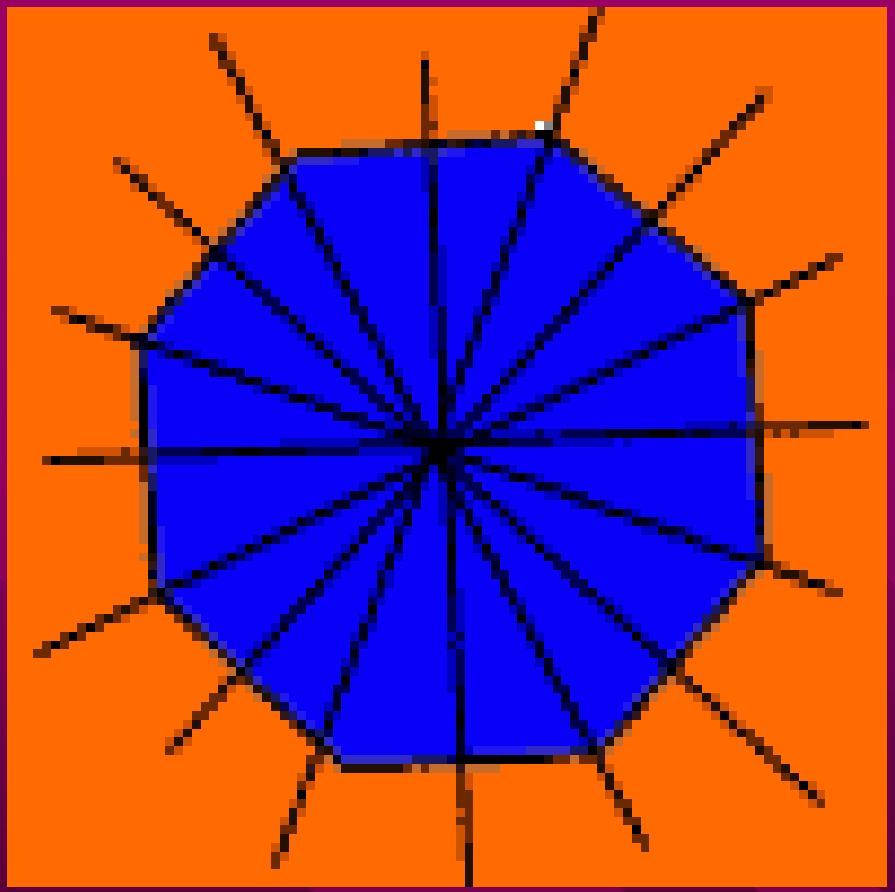
a square has 4 internal angles and 4 lines of symmetry.



a regular pentagon has 5 internal angles and 5 lines of symmetry.

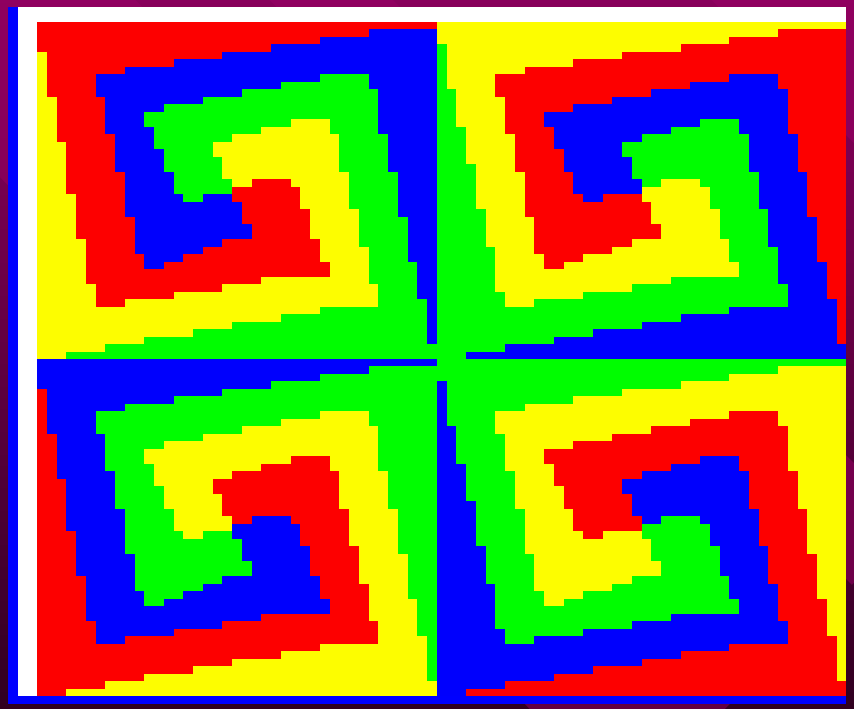


a regular hexagon has 6 internal angles and 6 lines of symmetry .



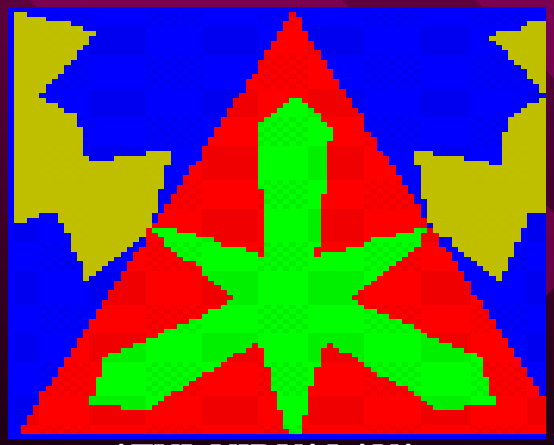
a regular octagon has 8 internal angles and 8 lines of symmetry.

Symmetry



What Is Symmetry?

- Fundamental organizing principle in nature and art
- Preserves distances, angles, sizes and shapes



Symmetry of the Alphabet

- Sort the letters of the alphabet into groups according to their symmetries
- Divide letters into two categories:
  - » symmetrical
  - » not symmetrical

Symmetry of the Alphabet

- Symmetrical: A, B, C, D, E, H, I, K, M, N, O, S, T, U, V, W, X, Y, Z
- Not Symmetrical: F, G, J, L, P, Q, R

Four Types of Symmetry in a Plane

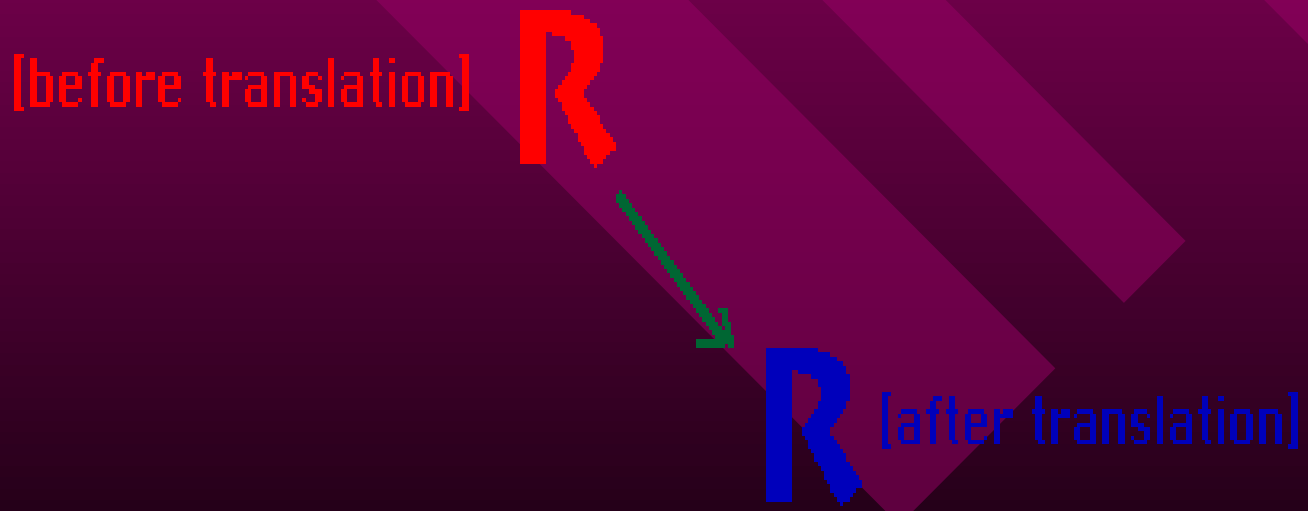
- Rotation
- Translation
- Reflection
- Glide Reflection

Rotation

- To rotate an object means to turn it around
- Every rotation must have a center and an angle

Translation

- Move it without rotating or reflecting it
- Every translation has a direction and a distance



Reflection

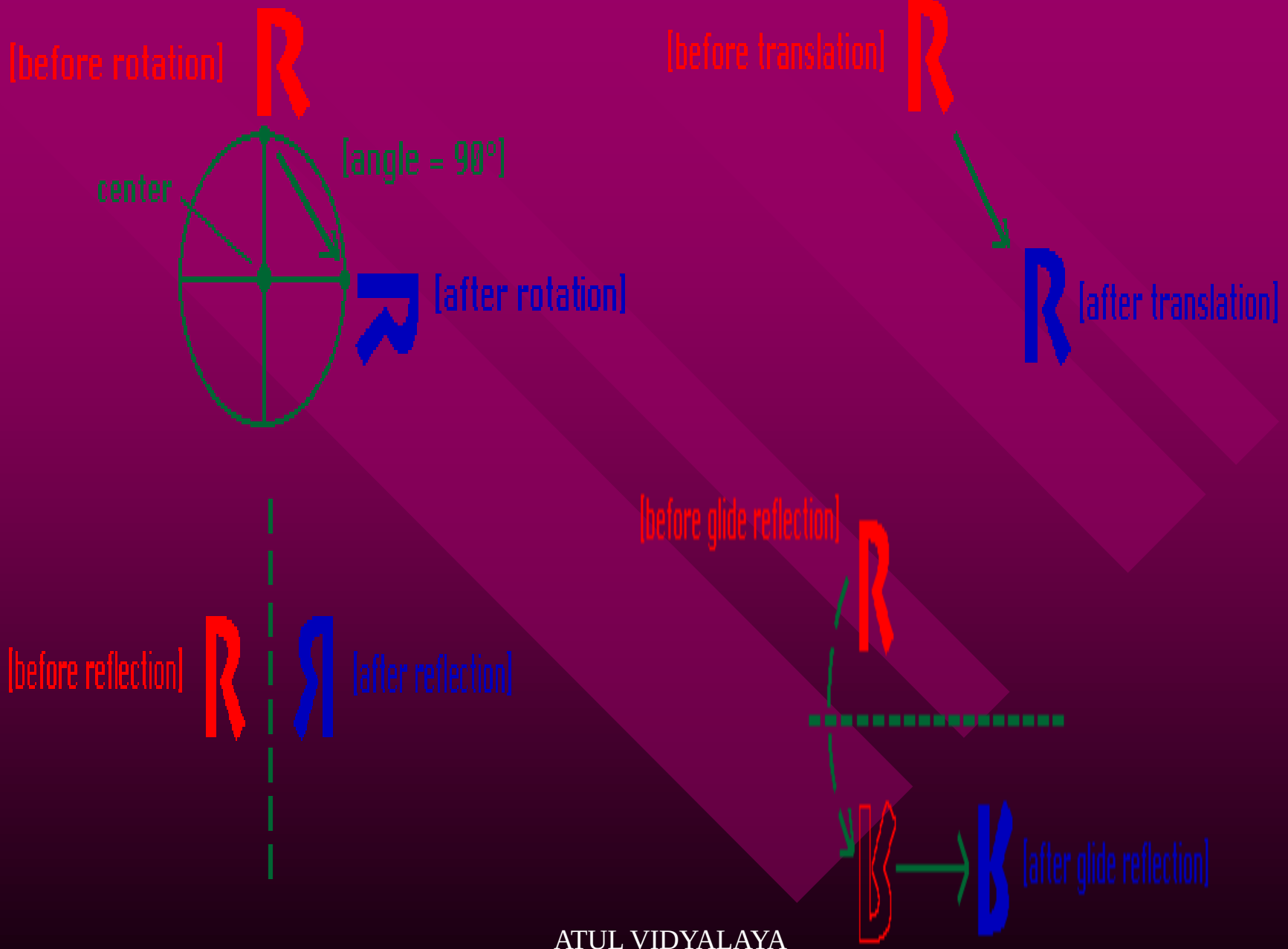
- Produce an object's mirror image
- A reflection must have a mirror line

Glide Reflection

- Involves more than one step
- Combination of a reflection and a translation along the direction of the mirror line

Group Activity

- Choose a letter (other than R) with no symmetries
- On a piece of paper perform the following tasks on the chosen letter:
  - » rotation
  - » translation
  - » reflection
  - » glide reflection


[before rotation]
[angle = 90°]
center
[after rotation]
[before translation]
[after translation]
[before reflection]
[after reflection]
[before glide reflection]
[after glide reflection]

Questions

- What happens if you do the same transformation twice?
- How many combinations of two transformations are there?
- What happens if you combine more than two transformations?

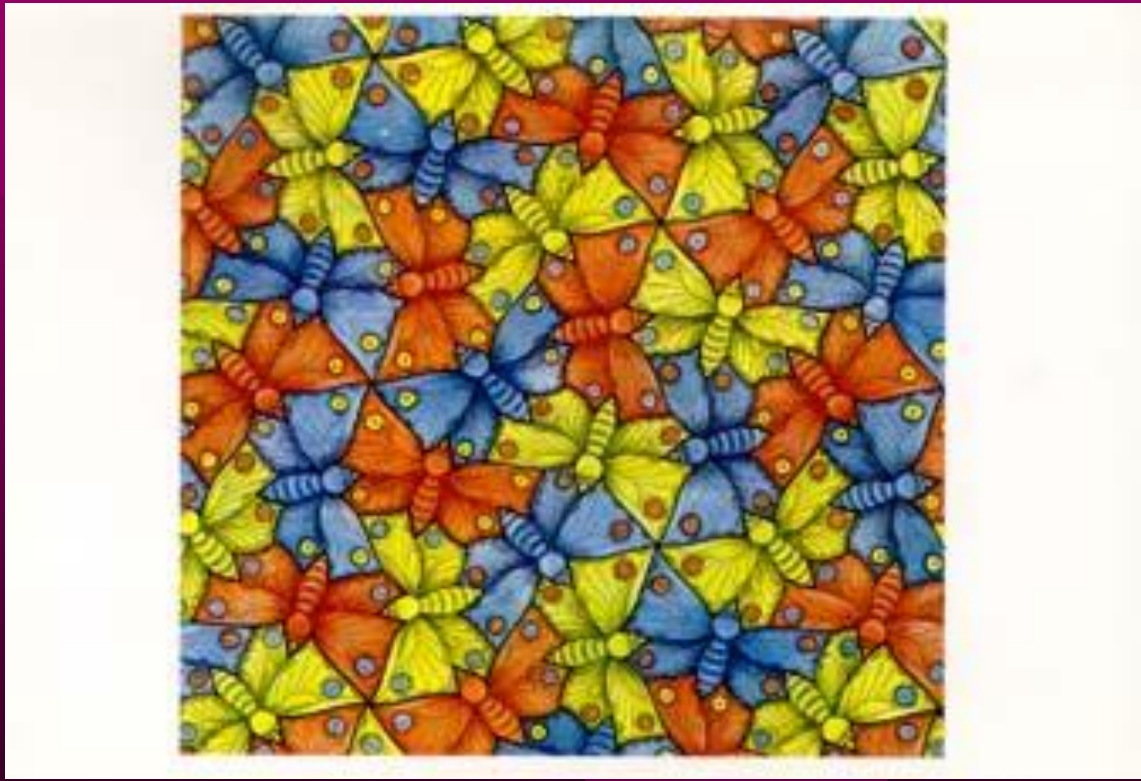
Symmetry In The Real World

- Plants and animals exhibit many forms of symmetry

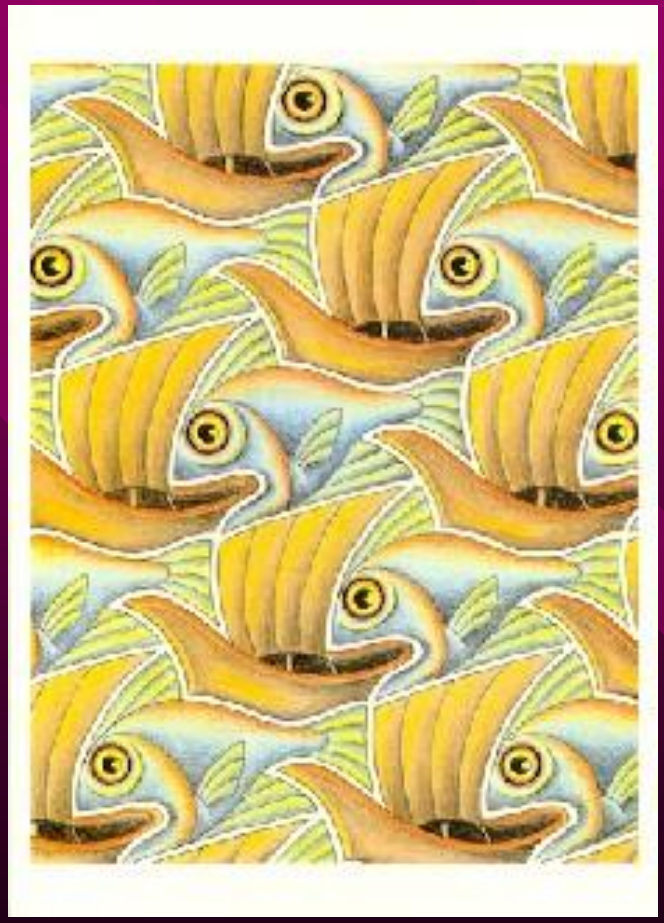
M.C. Escher

- Dutch graphic artist
- No formal training in math or science
- Used intricate repeating patterns in his artwork

Butterflies



Fish and Boats



ATUL VIDYALAYA
SHAPING THE FUTURE

Lizards

THANK YOU

ATUL VIDYALAYA
SHAPING THE FUTURE