Iterative Patterns And Processes/Symmetry
Lesson Plan: Class 05 / IPP / 01

(Rough sketch – design phase)

Overall goal of the lesson: Children will learn about symmetry, broad types of symmetry.

Prior knowledge required: Knowledge of the basic mathematics (done in prior standards).

MODULE 1:
Module time: 45 minutes
Goal: To give a brief introduction to symmetry, different types of symmetry and how to see them surrounding in nature. Through this make the children understand different patterns.
Description: Children will learn about different types of symmetry with various activities.

Material required:
Physical:

1. One copy of the worksheet (Introduction to Symmetry) per child.
2. Writing material to solve the worksheet: pencil and eraser.
3. Any ball – volleyball/football/basketball

Electronic:

1. PPT Presentation for Introduction to Symmetry
2. If there is TuXPaint software then the same can be used for drawing different activities given

Procedure Summary:

1. Distribute the worksheets (Introduction to Symmetry) to the children.
2. Read through the worksheet and discuss with the class the importance of symmetry and different types.

Procedure Details:

1. Start the class by talking to the children about how things around them look.
2. Get their inputs and route their thoughts through looking beautiful, balanced, compatible, incompatible, imbalanced, looking same, similar, repeat and so on.
3. Now ask them to look at their friend's face and see how the eyes, eyebrows, ears are placed.
4. Tell them that if there is a line along the nose and see both sides of the face how does that look.
5. Answers should be look alike, mirror image, look same, look similar.
6. Now show the baby's image on the slide in the PPT and explain with a line on how both sides are looking like exact same images.
7. Tell them this is Symmetry. It is something which is beautiful and matching and proportionate.
8. You can see lots of things around us which are symmetric.
9. Symmetry appears everywhere and can be explained with any subject. You name it and you can explain symmetry with that subject. For example maths, biology, physics, architecture, fashion.
10. Once the concept of symmetry is understood get into the types of symmetry.
11. Ask the children to observe and tell symmetrical things that are seen around in the class room. The answers can be table, chair legs, fan, window rods, two doors, two pony tails ☺ of their friend
12. There are different types of symmetry, in a broad classification, there are 3 types and they are reflection, rotation and translational symmetry.
13. Now explain about reflection symmetry with butterfly's example. Butterfly has 2 wings and both look alike and mirror images. Wherever you see these types of images which are exactly one and the same is called reflection symmetry.
14. Explain about the reflection:

    a. When you put half of one object next to a mirror, and then look at it, you will see the complete object.
    b. Cut out a circle, cut it into half, and put it in front of a mirror. You will see the full circle. That is reflection symmetry.
15. Many animals are reflection symmetric.
16. Explain how animals are reflection symmetric: When animal body is vertically divided into left and right halves, each halve look the same. That is why animals are called reflection symmetric.
17. This is called as bilateral symmetry as well.
18. Most animals are bilaterally symmetric, as it helps forward movement and streamlining of the animal.
19. In nature you would see lot of reflection symmetry. Other examples are Zebra, Peacock feather, leaves.
20. Next type of symmetry is rotational symmetry.
21. Show the flower picture in the PPT and ask the class to tell how the flower looks when it is rotated or turned around.
22. Listen to the answers and if you hear that the flower looks same then that is what you would like to hear.
23. How many times should we turn the flower petal by petal to do one complete round? The answer should be 5.
24. Now show how the flower is rotated twice and still look the same with the picture in the PPT.
25. Tell them that this is rotational symmetry.
26. An object or the image that matches itself some number (incase of flower 5) of times when it is rotated (turned around) from a centre point (stem) is rotational symmetry.
27. Let's take another example of ceiling fan which has 3 wings.
28. When it is rotated (slowly so that you can notice the wings) one full cycle how many times does it look the same? 3 times. So the ceiling fan has rotational symmetry.
29. Other examples of rotational symmetry are star fish, lot of vegetables like onion, ridge guard. Hear from class if they would like to bring any other examples.
30. Many geometrical shapes have rotational symmetry. Ex: rectangles, squares, circles, and all regular polygons.
31. One object can have both reflection and rotational symmetry. That means reflection and rotation symmetry can exist together in one object.
32. Now we have come to the last type of symmetry which is translational symmetry.
33. Ask the children if they have observed any of their mother's saree having a border?
34. They can say that have seen repeating mangoes, peacocks, leafs, some lines. Some object are keep repeating right?
35. Ask them how does that look? Looks beautiful isn't it?
36. Tell them that many manmade objects will have these type of repeated patterns.
37. Ask the class to tell where else they have seen these repeated patterns?
38. Answers can be building elevations, posters, plants in parks, lighting
39. In nature also you can see translational symmetry. Honey comb is the best example. Show the picture in the PPT and explain how the pattern looks and how the hexagons are repeated.
40. Other more examples are snake skin, tiger skin.
41. Translation symmetry is a move or a shift or a slide in particular direction with specific distance without any rotation or reflection.
42. In this the distance, size and shape of the points in the pattern will not change.
43. The only changing factor is the location of the points.
44. These may be moved up-down, left-right or the combination of left-right and up-down.
45. Note that translational symmetry can also be rotational and reflection symmetry.
46. Now reiterate what factors change and what not. And how the pattern can be formed by moving in different directions.
47. Now show the bricks and ask the class to observe the pattern closely. Ask them how the pattern is placed.
48. There are two different patterns of bricks which are repeating in alternate lines. Each of these patterns is made with the combination of different sized bricks.
49. Activities:
    a. Ask the children to rotate or revolve any ball that they have. Ask them observe how the ball looks when it is revolving. It looks the same throughout.

b. Another activity is to draw a star fish. When they finish drawing ask them to number each arm. Now let them turn the page so that star fish takes one full round. Let them count how many number of times it looked the same. The answer should be 5 as the number of arms is 5.

Assessments: as in the work sheet

1. Ask the children to write some (at least 5) words that are reflection symmetric. Examples are: MADAM, KAYAK, MAM, ANNA, ROTOR, RADAR, SOLOS, REFER
2. Ask the children to draw different patterns with 5-10 objects on it and see the translational symmetry.
3. Mix different patterns and try to come up with translational symmetry like the bricks picture.
4. Ask the children to draw any animal that they would like to. Help them draw a line to divide the animal body into two halves. Ask them to explain what they see and how reflection symmetry is seen in the drawing.

Information Broadcast : Leant about patterns, in nature, manmade and different types.