L&T: Nets of a Cube by CL TAM
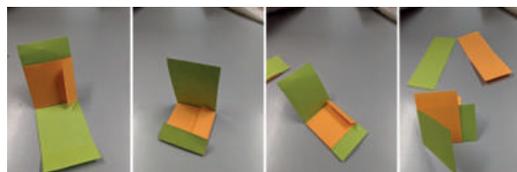
LEARNING OBJECTIVES

- Discover the nets of a cube (a total of 11 nets)

    - Identify some features that make a net to be invalid (Developing inductive reasoning)

    - Identify the 11 possible nets by elimination (Given many possible nets, students test which are valid)

    - Identify the 11 possible nets by making and testing systematically

- Identify whether a geometric arrangement can make a net to be valid or not

- For a valid net of a cube, identify some conditions for two faces to be opposite on the cube to be formed

DIFFICULTIES STUDENTS (INCLUDING NCS) MAY ENCOUNTER:

- With textbook descriptions, illustrations, and videos / teachers' demonstration only, it is not easy for students to imagine what is really going on for a net to become a cube.

    - 3D imagination should be supported by real life experience

    - Watching demonstration of how a cube is formed from a net doesn't sound very interesting for some students

- If there are errors in students' imagination, they cannot self-correct them by doing "paper and pencil" exercise (even with teachers' written feedback).

STRATEGIES

- Give each student a tool (or a way) to make a net whenever they need.

- Provide sufficient hands-on experience for students to make different possible nets of a cube.
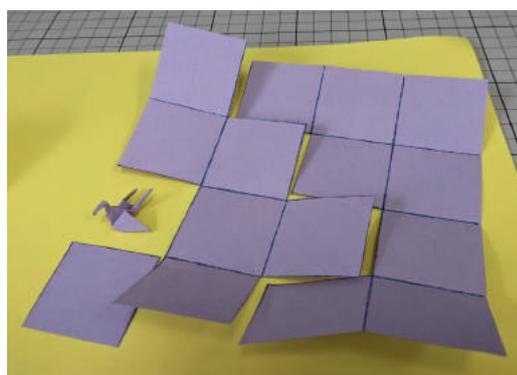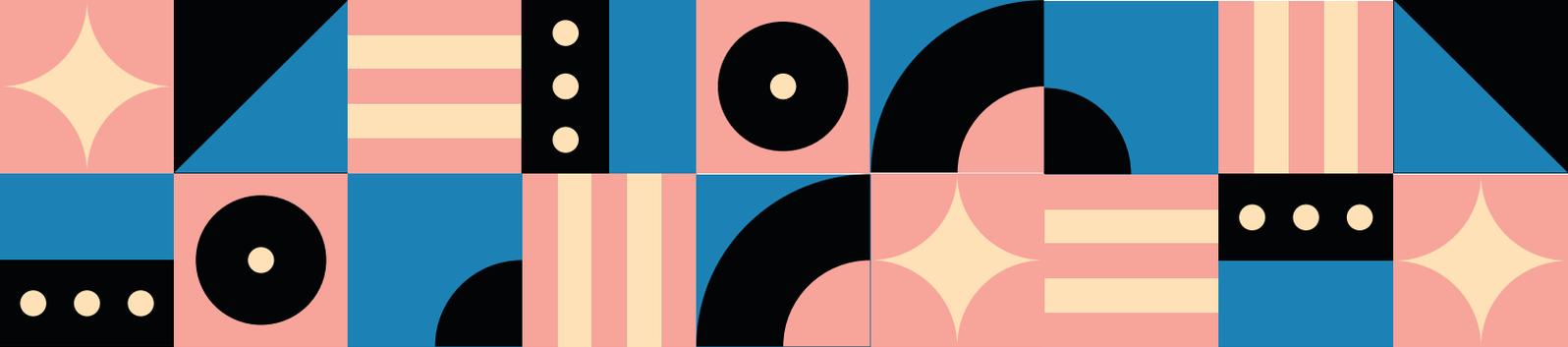
TOOLS

- "Fast Net" form made from a piece of square paper

    - 10 of the 11 possible nets are covered

LESSON DESIGN

- A set of 6 net components is given to each student.

- Students follow teacher's instruction to make a net, fold it up and test if it can form a cube or not.

  - Hands-on activities to help students understand what "folding up a net" is- Identify the 11 possible nets by elimination (Given many possible nets, students test which are valid)

  - Identify the 11 possible nets by making and testing systematically

- Worksheets with potential nets are given to students. They work in groups or individually to test which nets can be folded to form a cube.

  - To test and record the results is an essential STEM skill that students should master

  - Every potential net to be tested is a single experiment. To make observation and to try drawing conclusions are important in developing students' inductive reasoning

- Prepare net components with different colours or use a pencil to mark on the selected pair of squares. With marks or colours, students are able to observe which pieces of squares are adjacent on the cube and which pairs are opposite.

  - Some NCS students who are relatively weak in computation can perform very well in geometry related activities

  - With proper tools, all students become better problem solvers

CLASSROOM OBSERVATIONS

- With proper tools for making nets on demand, students can test every potential net

- Since they can test and have 100% confidence about their finding, they are not afraid to answer questions

- A student's observations on conditions for valid or invalid nets

- Students are encouraged to support their description with diagrams