



# Testing Net Variations



Common Core:

Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems. (6.G.A.4)

Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations. (8.G.A.2)

Objectives:

- 1) Students will learn that a 3D shape may have multiple unique nets.
- 2) Students will use a Rubik's® Cube to test if a potential formation of 6 squares is a cubic net, also known as a hexomino net.
- 3) Students will compile a list of all the unique cubic nets.

Materials:

- Solved Rubik's Cube (1 per student)
- Testing Net Variations worksheet
- Square cut-outs sheet
- Scissors
- Tape (optional)
- Paper for notes (optional)

Procedure:

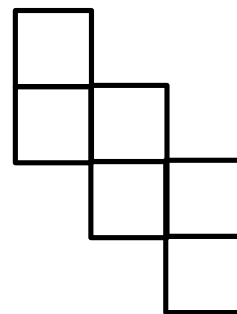
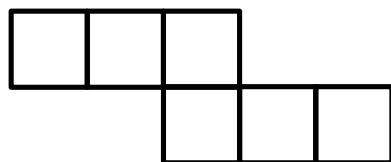
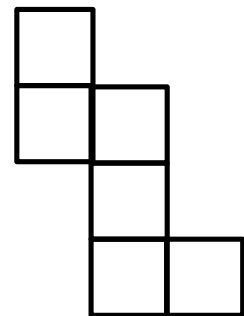
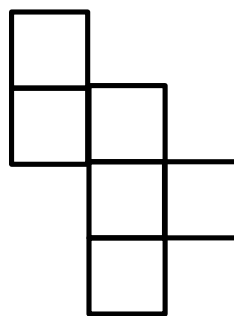
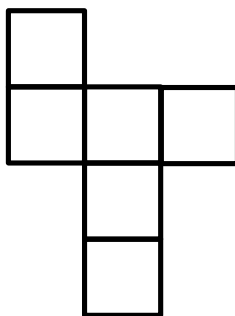
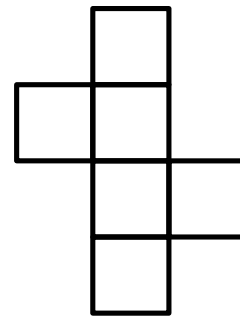
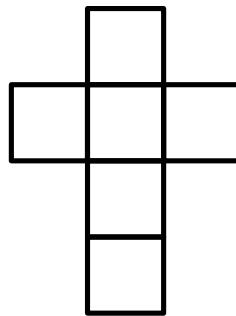
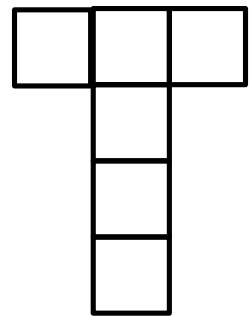
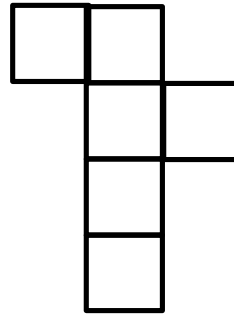
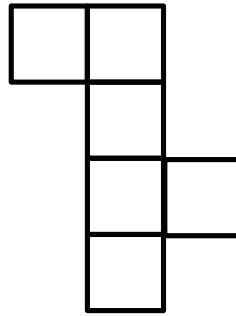
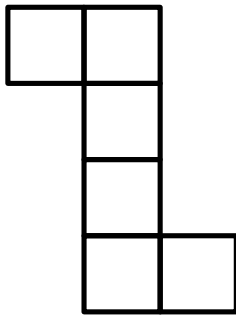
- 1) Prepare 6 squares (cut out) prior to class for demonstration purposes, and tape or magnets for sticking them on the front board.
- 2) Student follow along on their Testing Net Variations worksheet as you demonstrate how the two example problems are done.
- 3) Students cut out the 6 squares from their workbooks, then explore their own 6-square formations, testing them and compiling their discoveries.
- 4) Save the last 5-10 minutes to let students share their lists of unique nets and formations that didn't work.

Notes to Teacher:

Students can roll pieces of tape into circles and place them on the backs of their squares. That way, when they make a formation on their desktops, the squares will not slide around while rolling the Rubik's Cube over them. As for taking notes, I have my student compile their notes on the backs of their Testing Net Variations worksheets.

Here are the 11 possible unique net variations of the cube:

Answer  
Key



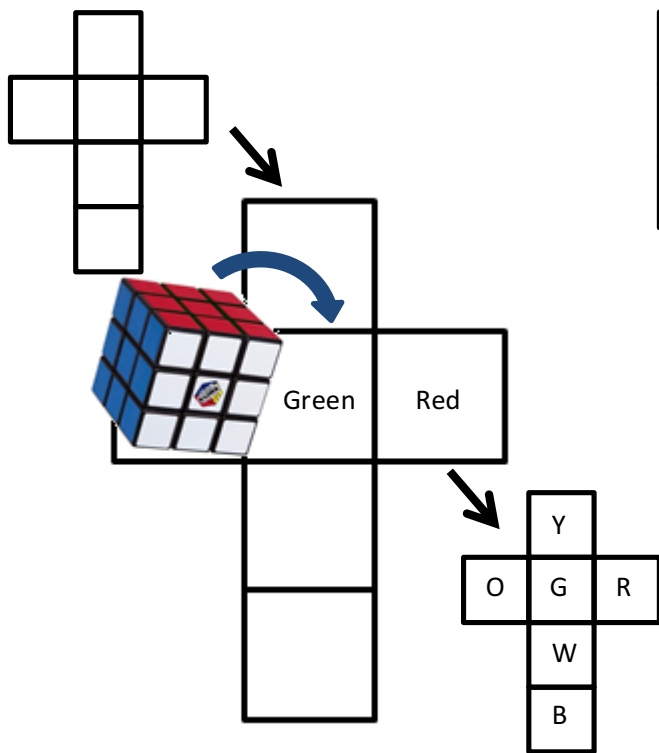
## Testing Net Variations

Polyhedrons may have more than one net. Your goal is to compile a list of unique nets that, when folded, make a regular hexahedron (cube). A net of a cube must consist of six congruent squares. Cut out the six squares on the next page, and use them along with a Rubik's® Cube to create and test different possible net variations.

Here are a couple of examples of how to do this:

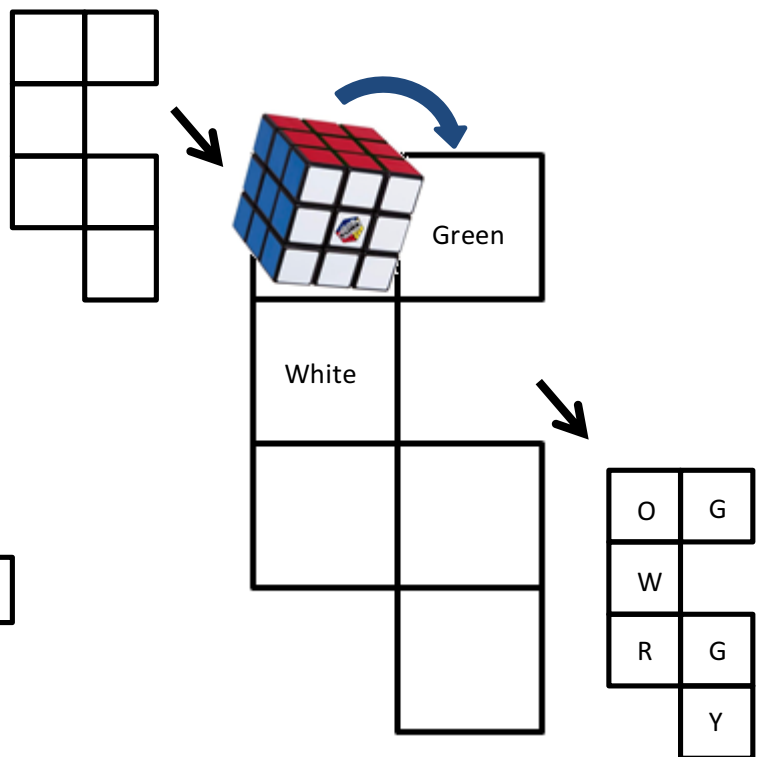
- 1) Make a formation with the squares.
- 2) Set a Rubik's Cube on one of the squares.
- 3) As you flip the Rubik's Cube onto the other squares, document which colors contact each square.
- 4) If a formation ends with each color being used exactly once, then it is a net.

Example 1



This one is a net of a cube because each color has been used exactly once.

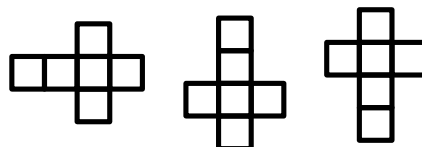
Example 2



This one is NOT a net of a cube because each color was not used exactly once. Green showed up twice (Blue zero times).

How many different net variations can you find?

\*Note: The following nets are examples of what would be considered the same net. Nets are congruent if one net can be made by rotating and/or reflecting the other.



Squares cut-outs sheet for testing net variations

