# Testing Net Variations

**Texas Essential Knowledge & Skills**

## Mathematics 7.9D Expressions, equations, and relationships.

*The student applies mathematical process standards to solve geometric problems.*

solve problems involving the lateral and total surface area of a rectangular prism, rectangular pyramid, triangular prism, and triangular pyramid by determining the area of the shape's net

## Mathematics 8.3 A-B Proportionality

*The student applies mathematical process standards to use proportional relationships to describe dilations. The student is expected to:*

generalize that the ratio of corresponding sides of similar shapes are proportional, including a shape and its dilation;

compare and contrast the attributes of a shape and its dilation(s) on a coordinate plane;

**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)

## www.YouCanDoTheCube.com

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|---|---|
| **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:**
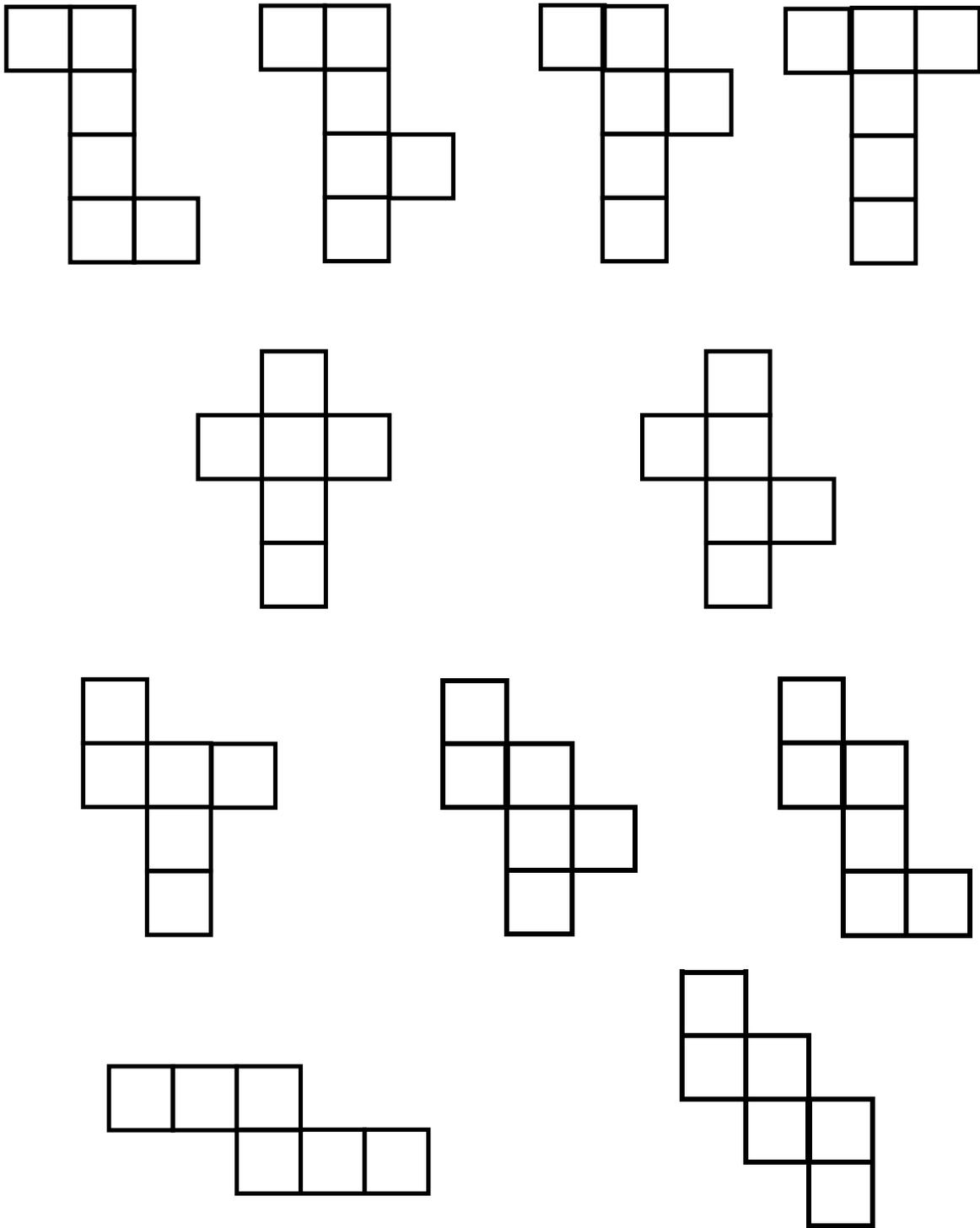
# Testing Net Variations

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.
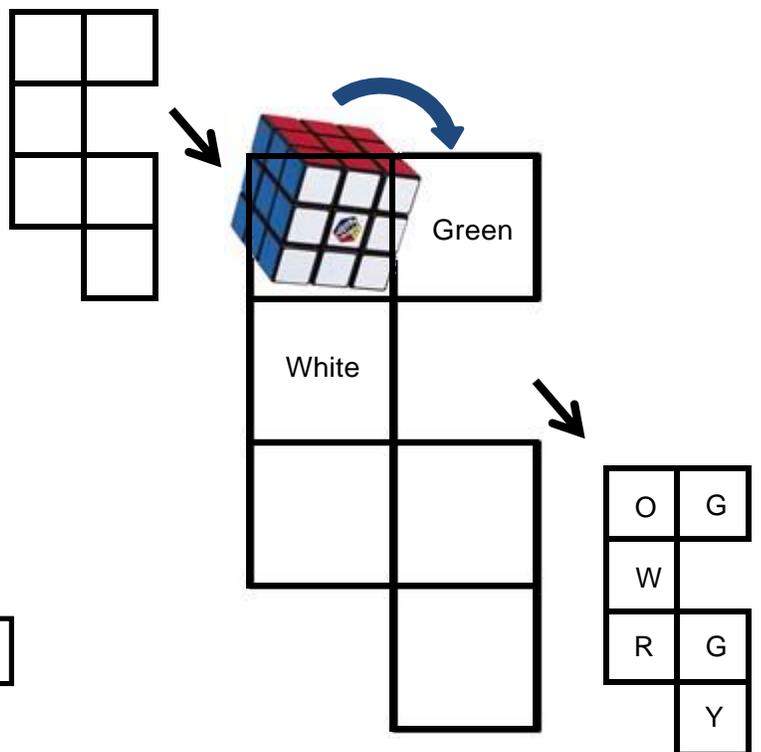4) If a formation ends with each color being used exactly once, then it is a net.

Example 1                                                        Example 2
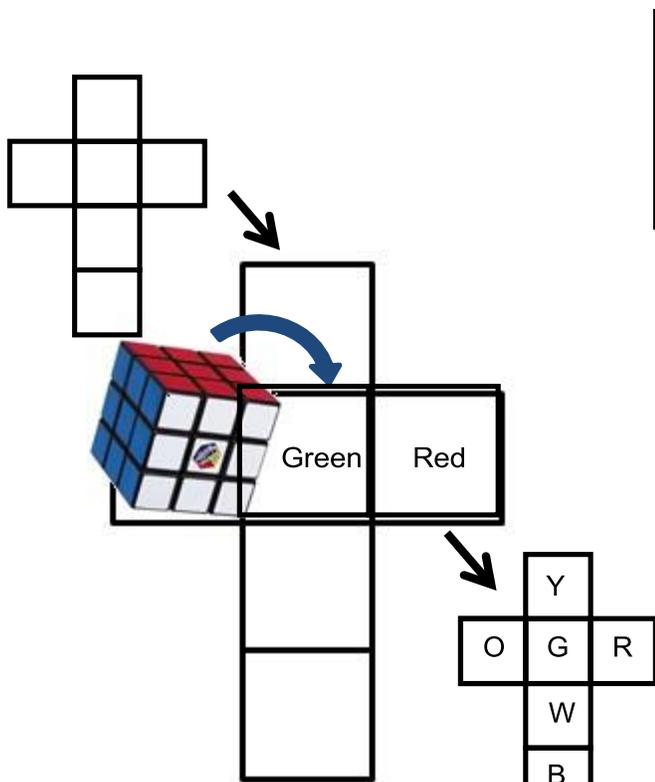


This one is a net of a cube because each color has been used exactly once.

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

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.
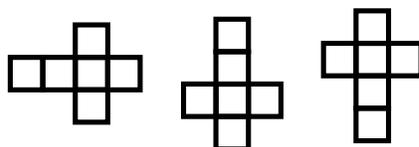
Squares cut-outs sheet for testing net variations