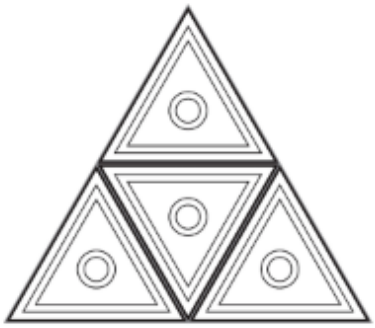
Mathletes Problem of the Week #13

Coloring Solids



A **net** is a 2-dimensional shape that can be folded to form a 3-dimensional shape or solid. For example, if you cut out the net above and "mountain" fold on the dark lines, you will have made a 4-sided solid called a tetrahedron.

a. Cut-out each of the attached nets and mountain fold on the dark lines to make five different 3-dimensional solids. Explore the characteristics of each solid by counting and recording how many **vertices** (corners), **edges** (those dark lines you folded), and **faces** (the sides of the solid) each one has. The mathematician Euler noticed a relationship between the number of faces and edges and vertices in these types of shapes. What do you notice?

b. Now try to color the faces of each solid so that no two faces that share an edge are the same color. We refer to this as a **proper coloring** pattern. What is the fewest number of colors needed to color each shape so it has a proper coloring? This is called the solid's **chromatic number**. Try to find each solid's chromatic number.

Solutions & Explanations: (Try one or try them all! Nets and recording areas are on the attached pages.)

Name _____ **Class** _____

(First and last name, please!) **Solutions due: March 27th**

Tetrahedron

Vertices:

Edges:

Faces:

Chromatic Number:

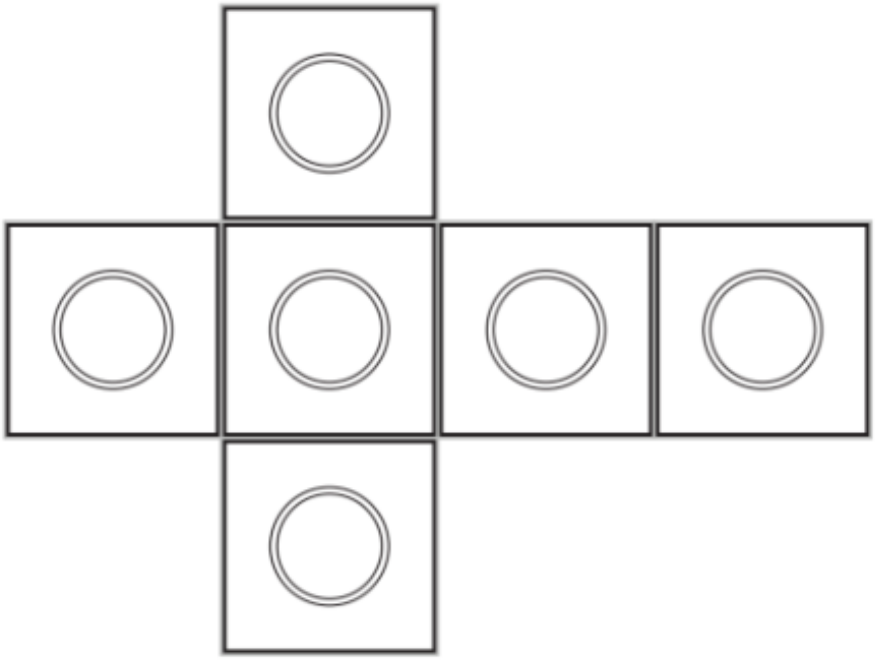
Cube

Vertices:

Edges:

Faces:

Chromatic Number:



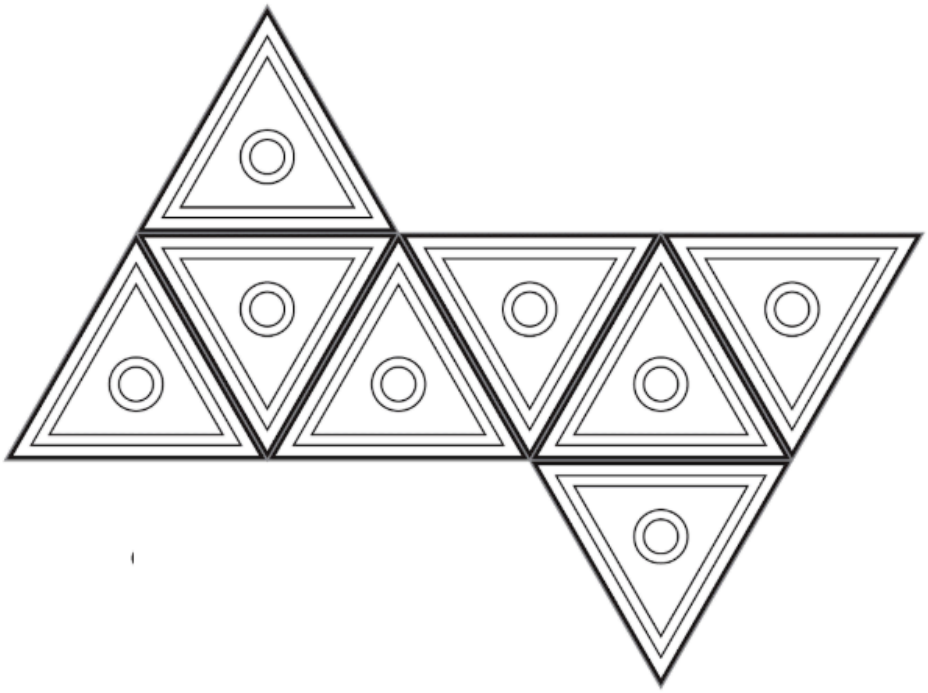
Octahedron

Vertices:

Edges:

Faces:

Chromatic
Number:



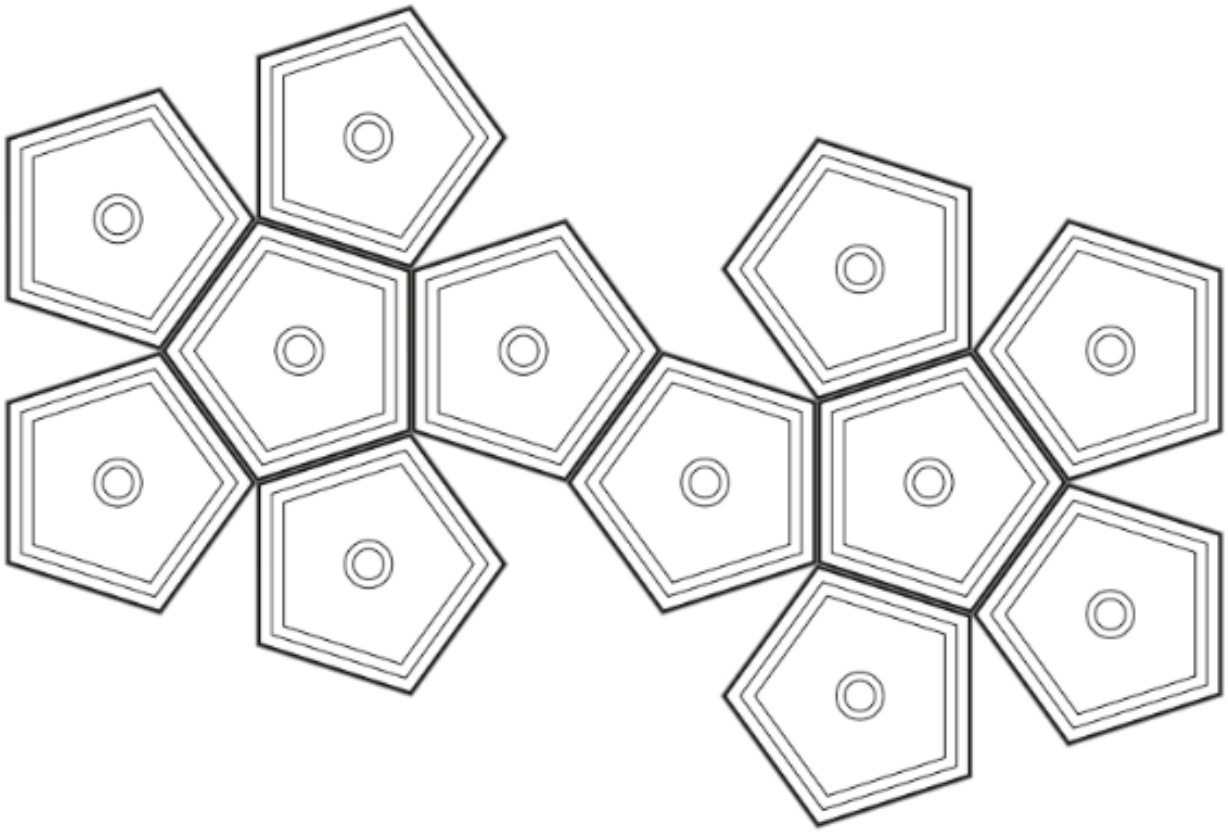
Dodecahedron

Vertices:

Edges:

Faces:

Chromatic
Number:



Icosahedron

Vertices:

Edges:

Faces:

Chromatic
Number: