

# EISENHOWER PROFESSIONAL DEVELOPMENT PROGRAM

## Mathematics Within: Shape, Space & Measurement

### Lesson Plan: Part 5 of a 5-part lesson plan

Part 1, 2, 3, 4, Laurel Kohner Berker, Judy Klatt, Lori Haaland, and Ania Wrase

**Participant Name:** Lynn Bartol

**School District:** St. Paul

**Broad Topic:** Geometry

**Specific Topic:** 2D Polygons - 3D Nets (polyhedra)

**Objectives:** To introduce terms and concepts of 2D and 3D modeling

### Materials & Supplies:

- o Paper
- o Cubes
- o Tetrahedrons
- o Butcher paper
- o Video
- o Prediction sheets
- o Triangle and square templates
- o Cardstock
- o Scissors

### Lesson:

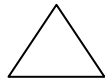
Set:

- o On a large sheet of paper, create a flat drawing of yourself. **Put** it up in front of the students and introduce your new “teaching partner” as **Flat \_\_\_\_\_ (Your name)**. Begin with a quick discussion about the differences between you and your “partner.” If students don’t use the terms, introduce 2 dimensional and 3 dimensional—modeling length, width, and depth with your self and a flat version of yourself. **Record** vocabulary on a large sheet of chart paper.
- o Give each pair 1 sheet of paper, one assembled cube and one assembled tetrahedron (didax or polygon type—which are assembled from polygon shapes).
- o Say: “You’ve been working with 2 dimensional shapes. In this lab investigation, you will explore 3 dimensional shapes.”
- o “Fold the paper in half vertically just to the red line. At the top of each column, write the name of the shape of one side of each solid. (Triangle, square)
- o Now on the next line under each figure, tell how many sides it has. In 3D these are called ‘faces’. Write the word faces in the red line column. Put your finger in the part where the two faces meet. These are called ‘edges’. The corners where the edges meet are called ‘vertices’. For each solid add the word edges and vertices, then write how many each has in the column under its name. (While the students record their observations, write new vocabulary on the chart paper, then circulate and assist, assessing as you go.) **Direct** students to notice how many triangles meet at the vertex (3) then how many squares meet at the vertex (3) **Ask:** Why do you think this is? (3 dimensional length, width, depth) **Say,** “ Now, with your partner you’re going to find and sketch as many different ways as you can to open each solid to make it flat. **Helpful Hint:** The shapes like to fall apart, it works best to keep one face on the desk and carefully open one side at a time! You’ll need to prove to your partner that your sketch works by putting the shape back together! Sketches that will work are called **NETS!** (There are two for the tetrahedron and 11 for the cube.)
- o **Student Investigations:** Allow at least 10 minutes investigation time. Circulate and assist as needed, assessing through observation.
- o **Class Discussion and Revisit** – On large chart paper, students share sketches of possible ways they found.(see possible answers on page 2). **Ask** “What is it that makes these nets work? (same size sides, same faces, and all vertex have an equal number of faces) **Say,** “Remember—these are regular polygons, and a regular polygon has sides that are all the same length, the faces are the same, and all corners have an equal number of faces. To help understand, we are

going to watch a short video. During the video, watch and listen for the names of the two solids we are using.

- o **Show video:** – [The Platonic Solids Video](#), Key Curriculum Press. STOP AT END OF ‘THE 5 PLATONIC POLYGON.REVIEW. **Ask** who can tell me the name of the two shapes (tetrahedron, cube). **Add** to vocabulary list.
- o **Student Practice:** Pass out prediction sheets –Read the instructions with the students, having them test their predictions after selecting them, using polygon/polyhedra pieces.
- o **Assessment** – Pass out a triangle and a square polygon template and a piece of cardstock to each student. **Say** “Pick your favorite net.” Trace, cut out and assemble into a 3-D solid to take home. **Circulate** and assist, while assessing for workable products
- o **Class Discussion and Revisit:** “So what have we learned by exploring 3D shapes?” **Discuss** Student Responses

## Potential Solutions



Triangle



Square

Faces

4

6

Edges

6

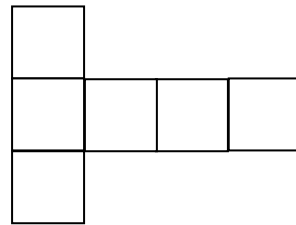
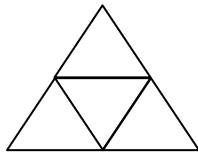
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Vertices

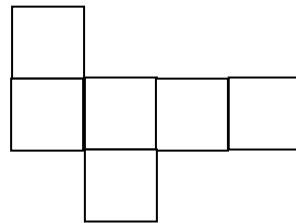
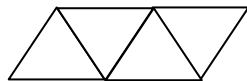
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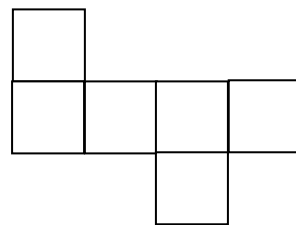
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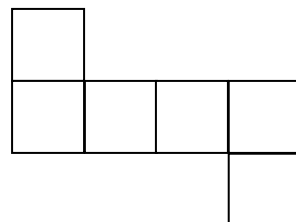
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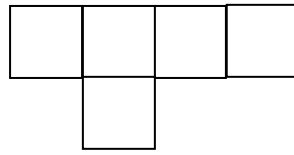
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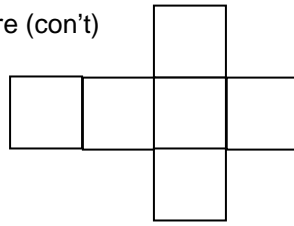


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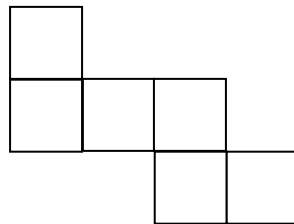


Square (con't)

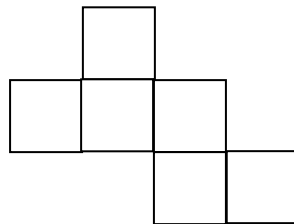
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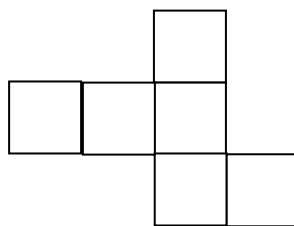
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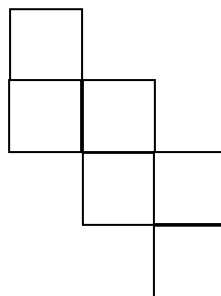
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