**2D or not 2D? THAT is the question!**

**Topic/Subject:** Geometry: Constructing two-dimensional figures

**Length of Lesson:** 30-45 minutes

**Lesson reference (if any):** Use Activity Cards 1-4 from the Build & Learn Geometry Kit

**Objectives:**

* Students will create two-dimensional figures using the Build and Learn Geometry Kit
* Students will identify two-dimensional figures
* Students will be able to define vertex and edge

**National Standards:**

Geometry K.G Identify and describe shapes (squares, circles, triangles, rectangles, hexagons, cubes, cones, cylinders, and spheres).

1. Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as above, below, beside, in front of, behind, and next to.

2. Correctly name shapes regardless of their orientations or overall size.

3. Identify shapes as two-dimensional (lying in a plane, “flat”) or three-dimensional (“solid”).

Geometry 1.G Reason with shapes and their attributes. 2. Compose two-dimensional shapes (rectangles, squares, trapezoids, triangles, half-circles, and quarter-circles) or three-dimensional shapes (cubes, right rectangular prisms, right circular cones, and right circular cylinders) to create a composite shape, and compose new shapes from the composite shape.

Geometry 4.G.2. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, and identify right triangles. 3. Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

**Materials:**

Build & Learn Geometry Kit

**Background Information:**

Students should already be familiar with basic shapes such as triangles, rectangles, squares, hexagons, etc.

Vocabulary:

***Vertex***-A point where two or more line segments meet. A corner.

Examples:

• any corner of a pentagon (a plane shape)

• any corner of a tetrahedron (a solid)

(The plural of vertex is "vertices".)

<https://www.mathsisfun.com/definitions/vertex.html>

***Edge***-For a polygon: A line segment on the boundary joining one vertex (corner point) to another. For a polyhedron: A line segment where two faces meet.

<https://www.mathsisfun.com/definitions/edge.html>

**Lesson Presentation:**

1. Before you begin, split up your students into groups of three or four.
2. “Today we are going to talk about two-dimensional figures. Does anyone know what it means when I say two-dimensional figure?” (two-dimensional is “flat” with only two dimensions: length and width)
3. Create a two-dimensional figure, a square, using the Build & Learn Geometry Kit and hold it up for all to see, or place it under your document camera to be displayed through your projector. Ask your students what shape you have created.
4. Ask students to draw the two-dimensional figure you just showed them.
5. While students draw, divide the Build & Learn Geometry kit among the groups.
6. Point to each corner and explain that each one is called a vertex. Point to each side and explain that they are called edges. (Students can label vertices and edges on their drawings as you explain each)
7. Now present Activity Card 1 to the class and ask them to complete the activity within their small groups (it is also a square).
8. Continue this with Activity Cards 2-4, walking around to monitor and check for understanding, remember to ask where the vertices and edges are located.
9. Now ask students to draw any two-dimensional figure. Tell them to label each vertex and each edge. You can give them guidelines such as “it must contain 5 sides/edges”, or “You should have 3 angles/corners/vertices”. Tell students that these figures must not have overlapping lines and they must be closed figures.
10. Now ask the groups to share their drawings with their group. What makes it two-dimensional? Did they follow the directions? Did the shape they draw have a specific name?
11. Allow a few students to share their drawing with the class.
12. Now tell each group that they will work together to build one of the figures from their group.
13. Repeat 9-12 as many times as time permits. You can either challenge them by starting small (each drawing must have 3 edges, then 4 edges, then 5 edges, etc.), or allow them to choose their own designs.
14. Walk around and monitor the class while they draw/build. Be sure to ask questions such as: what figure did you create? How many sides/edges do you have? How many angles/vertices? Is there another name for your figure? Make sure to stop the class occasionally to show examples.

**Closing/Summarization/Career Connection:**

Review the definitions for vertex, edge, and two-dimensional figure. Ask students “why would it be important to know the definitions?” Explain to students that two-dimensional figures can be treated like puzzle pieces which can fit together. This is especially important to know if you are an engineer as engineers use many shapes in designing and creating things such as aircraft, electronic devices, and everyday household objects.

**Assessment:**

* Teacher observation

**Extension Activities:**

* Have students determine whether the number of vertices effects the number of edges a two-dimensional figure has. Does the number of edges effect the number of vertices?
* Have students name the shapes they created (hexagon, right triangle, quadrilateral, etc.).
* Have students find the perimeter and/or area of the shapes created.
* Have students find the interior angles of the shapes they created.
* Have students determine if a shape is a simple or composite (complex) figure.