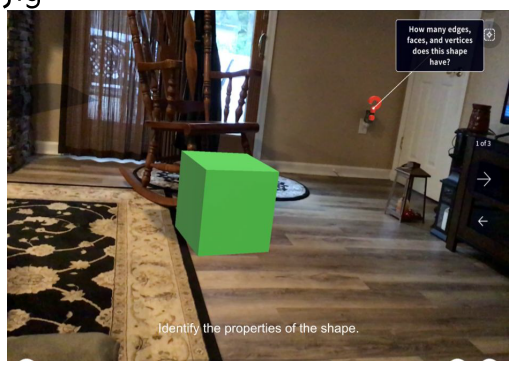
Geometry, Tessellations, and Augmented Reality

Created by: Kimberly Mattina

Jig



Assemblr

Timeframe of activity: 180 minutes

Tags: Geometry, STEM, shapes, patterns, tessellations, AR

Grade Level: middle school

App/Tech Tools: Cleverbook Geometry App, iPad, Chromebook, marker, Google Drawings, AR App of your choice

Additional material: Geometry, Tessellation and AR lesson

Learning Objectives: Students will be able to:

- 3D: explore geometric shapes, such as, prisms, cone, cylinder, sphere, torus
    - solve the specific equation for that shape
    - identify the properties of the shape
- 2D: explore geometric shapes such as hexagonal torus, hexagonal prism
    - identify vertices, faces, edges of the shape
    - solve the specific equation for that shape
- Identify a pattern
- Create a tessellation in Google Drawings.
- Create an AR presentation on shapes.

Lesson Activity:

- Students will work independently or in pairs.
- Each student or group will have a Chromebook, iPad and the Cleverbooks Geometry markers. (circle and hexagon)
- Each student will use the Cleverbooks Geometry app to explore each 2D and 3D shape.
- Each student will choose which shape to explore and study.
- Students will calculate the specific formulas.
- Students will identify the properties of the shape.
- Students will create a tessellation using Google Drawings. Example
- Students will refer to the Geometry, Tessellation and AR Presentation for details

Questions outline:

Part 1: Exploring the shapes

2d shapes:

- How many faces, edges, and vertices did your shape have?
- Given the input, what was the volume of the shape?

3d shapes:

- What were the properties of the shape you selected?
- Given the input, what was the volume or surface area of the shape?

Part 2: Patterns

- Create a tessellation of the shape you selected using Google Drawings.
- Be sure to include additional shapes and colors and to follow the pattern.

Part 3: AR tour:

- Create an AR tour presentation on 3 geometry shapes.
- Use Tinkercad to create your own shapes or find the shapes in the AR app library of your choosing.
- Label or create a voice over to identify the properties of the shape.
- Each shape should have a related question and answer.
- Optional - Include an image of your tessellation into the AR tour.

Math Standards:

Geometry 7.G A. Draw, construct, and describe geometrical figures and describe the relationships between them.

1. Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

2. Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions.

B. Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

6. Solve real-world and mathematical problems involving area, volume and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Technology Standards:

8.2.8.C.1 Explain how different teams/groups can contribute to the overall design of a product.

8.2.8.D.1 Design and create a product that addresses a real world problem using a design process under specific constraints.

8.2.8.D.2 Identify the design constraints and

trade-offs involved in designing a prototype (e.g., how the prototype might fail and how it might be improved) by completing a design problem and reporting results in a multimedia presentation, design portfolio or engineering notebook.

8.2.8.D.3 Build a prototype that meets a STEM-based design challenge using science, engineering, and math principles that validate a solution

8.2.8.D.5 Explain the impact of resource selection and the production process in the development of a common or technological product or system