

GAME LEVEL DESIGN ACTIVITY GUIDE



Materials Needed:

- Graph paper (*Note, you may want to customize the requirements based on unit size of the paper you're using*)
- Pencils and erasers
- Measuring tools (rulers, protractors)

Steps:

1. **Concept Recap:** Begin by recapping the middle school geometric concepts connected to 2D shapes, such as area, perimeter, different types of angles, and symmetry.
 - a. **Area:** This refers to the quantity of space enclosed within a shape's boundary, counted in square units.
 - b. **Perimeter:** This is the total distance around the edge or boundary of a 2D shape.
 - c. **Various Angle Types:** These could encompass acute angles (less than 90 degrees), right angles (exactly 90 degrees), and obtuse angles (more than 90 degrees but less than 180 degrees).
 - d. **Symmetry:** A geometric shape is symmetrical if it can be divided into two or more identical parts that are arranged in an organized fashion.
2. **Game Level Introduction:** Discuss the concept of 2D game level design. Use examples from games the students are familiar with. Highlight how area, perimeter, angles, and symmetry affect the player's navigation and game experience.
3. **Grid System Guide:** Distribute graph paper and ensure students have the required tools for their designs. Make sure they understand how to use these to sketch shapes and calculate area and perimeter.
4. **Geometric Constraints:** Set constraints for their game level design. Students should include different geometrical shapes, a specific area or perimeter, as well as a symmetry requirement.
5. **Design Phase:** Let students design their game level keeping both the constraints and the player's gameplay experience in mind.
6. **Review & Discuss:** Have students present their game levels, discussing how they met each geometric constraint. Encourage them to speculate how their design would change the gameplay experience.

GAME LEVEL DESIGN ACTIVITY GUIDE



(Example) Level Design Activity

Note: This is just an example, you can modify these requirements to match what you're teaching in class. For example, if you are teaching congruency, you could make congruent shapes part of your requirements.

Requirements:

- Design a video game level with a *total area* of 20 square units
- Include a rectangular space with a *perimeter* of 12 units
- Incorporate a path that demonstrates *acute, obtuse, and right angles*
- Design a part of the video game level to be *symmetrical*

Level:

1. Start the video game level design with a 4x5 grid to satisfy the total area constraint of 20 square units.
2. To meet the next constraint, include a rectangular space with dimensions 3x3 in the level (perimeter = $2*(3+3) = 12$ units).
3. Design a winding path with a variety of acute, obtuse, and right angled turns to incorporate different types of angles.
4. Create a symmetrical arrangement of obstacles or decorations on either side of the path to satisfy the symmetry constraint.

This is an example design that meets all these constraints. However, encourage students to think creatively within the parameters set to come up with their own unique video game levels!

GAME LEVEL DESIGN ACTIVITY GUIDE



Expansion Ideas: Boost the fun!

Once students grasp the basics, why not take things a step further? Pump up the fun and challenge by introducing additional elements to enhance the player experience:

Start and Finish Line: Stage the start and finish of the video game level. Maybe there's a 'home base' to return to, or a 'treasure spot' to reach!

Character Creation: Add in the leading character to walk-through—the video game level. Maybe it's a classic video game character, or a unique creation from the student's imagination?

Adversaries: Include adversaries or obstacles around the video game level. The adversaries could be stationary or mobile, or toggle between different geometric shapes!

By adding more fun elements connected to the subject matter, you're cultivating a more immersive learning experience and lifting geometry off the textbook and into a vivid, engaging realm.