

Project 1.4 Design a House Teacher Notes

Introduction

In this project students will model a three dimensional house for one of the three little pigs. The students will be assigned a specific material to use that represents either straw, wood, or bricks.

Equipment

- Brown paper lunch bags, 1 per team
- Sponges, cut into cubes
- Craft sticks
- Rounded toothpicks
- Modeling clay
- Glue
- Paper or disposable plate for base (optional)
- Launch Log for each student
- iPad® tablet
- Tablet application
 - Autodesk® SketchBook® Express

Procedure

1. To prepare for this project, the teacher provides paper bags that contain materials for one of the three houses. The students may work individually, in pairs, or in small groups.
 - a. Straw: Toothpicks
 - b. Wood: Craft sticks
 - c. Brick: Sponge cubes
2. The teacher may choose to limit the quantities of the supplies or determine whether the students will be allowed to use more of the same material as they construct their houses. If the quantities will be limited to what the students find in the bag, the teacher will need to determine an appropriate quantity for each material. Suggested amounts of materials are listed below:
 - a. Toothpicks, 80 or an estimated 1/3 of a box of 250
 - b. Craft sticks, 30
 - c. Sponge cubes, equivalent to 1 hand-sized sponge
3. The toothpicks, craft sticks, and sponge cubes may be assembled using either the glue or clay as determined by the students.
4. Note: To prepare the sponge cubes, cut the sponges when they are slightly damp or fresh out of the package. Allow the cubes to dry 24-48 hours, as this will ensure the glue or clay adheres to the sponge.
5. The teacher will decide what material the students will use a base for their houses. Construction paper, foam trays, or paper plates work well.

6. The teacher guides and supports the students as they use the design process to create and test their models.
7. The first step in the process is **Ask**.
 - a. Guide a discussion where students **ask** questions to gather information that will help them define the problem.
 - b. With support and guidance, the students will define the problem – that they need to build the strongest house possible to withstand a gust of wind.
 - c. Document the discussion under the heading of “Ask” on a piece of chart paper as part of an interactive engineering notebook.
8. The second step engineers and designers follow is **Explore**.
 - a. Allow students to **explore** ideas by talking in small groups or as a class about possible ideas for their houses.
 - b. Using the worksheet as a guide, have students circle the material they have been assigned or found in their paper bags. Students will sketch ideas for their house design using pencils, crayons, or colored pencils on the page titled Project 1.4 Design a House in their Launch Log. The students may also sketch ideas using SketchBook Express.
9. The third step in the design process is **Model**.
 - a. Ask the students to circle their best design if they drew more than one idea.
 - b. The teacher facilitates the creation of the houses.
 - c. Document some of the models under the heading “Model” by either printing photographs of the houses in progress or finished. You may also choose to include sketches of the students’ house designs.
 - d. Models should be allowed to dry overnight before beginning the Evaluate step of the design process.
10. The fourth step in the design process is **Evaluate**.
 - a. Students compare the strengths of their houses with others in the class by exposing the house to a gust of wind using a high velocity blower fan.
 - b. The students draw what their house looks like after the fan has attempted to blow it over in their Launch Logs. The teacher may also choose to have the students use the tablet to take a photograph or video of their house to document the testing.
 - c. The teacher then leads a discussion on the features, strengths, and weaknesses of the different house designs and documents key insights under the “Evaluate” heading in the interactive engineering notebook.
11. (Optional) Student work may be photographed and/or displayed.

Conclusion Questions for Discussion

Note: The conclusion questions may be for discussion only and may be documented as a whole class.

1. Which material protected the pigs the best in the story? In the class testing?
2. What are some “wolves” in your region? [This may include earthquakes, hurricanes, or blizzards – anything that would threaten a poorly built structure.]