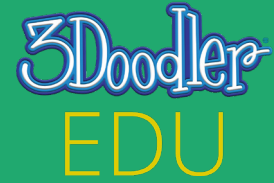


# Lesson Plan



## Non-edible Gingerbread House STEAM Challenge

**TIME REQUIRED:** 5 X 40 min.

Class sessions: 1 planning, 1 designing, 2 constructing/decorating, 1 evaluating

**SKILL LEVEL:** Beginner - Intermediate

**RECOMMENDED GRADES:** 3-5

### LESSON SUMMARY:

In this activity, students will work in teams of 3-4 to construct a non-edible gingerbread house, combining upcycled materials and 3Doodler plastics. The students will plan, construct, and decorate their “gingerbread house” within materials constraints. The student groups will evaluate their own houses, as well as a second team’s house, on a rubric to determine the “best constructed” house.

### KNOWLEDGE

#### STUDENTS HAVE:

- had an introduction to grade-level appropriate, basic concepts of house construction (foundation, exterior walls, etc.)
- A basic working knowledge of 3Doodler Start pen

### OBJECTIVES

#### STUDENTS WILL:

- Create a rubric listing characteristics of a “well constructed” house
- Work together in teams to plan and build non-edible “gingerbread houses”
- Use 3Doodler pens to aid in constructing their designed house
- Compare and contrast 2 different structures on a rubric

### MATERIALS

#### STUDENTS WILL NEED:

- 3Doodler Start+ Pen (2 per group of 4 students)
- Access to 3Doodler App (for stencils)
- Gingerbread House Worksheet
- Consumable materials for building, including cardboard, etc.
- Scissors, rulers, pencils, etc. for building
- 10 sticks of 3Doodler Start+ plastics
- Copies of class created rubric in Google Classroom (as appropriate for skill level of class)

# INSTRUCTIONS

## STEP 1

Discuss with the class the requirements of a good house. Students may compare constructing a house to constructing a block structure in that they need a good foundation/base. They should be led to establish criteria for their class developed rubric: required structures, foundation, design, teamwork. Be sure to record a list of the criteria they generate for use on the rubric later.

## STEP 2

Break students into groups. Student groups will now create a "blueprint" sketch for their houses, including the structures established in STEP 1. Blueprints should be colored and as detailed as possible, including a list of materials that students intend to use to construct their houses and justification for using those materials.

## STEP 3

Spend approximately 10-15 minutes introducing the 3Doodler Start pen, including how it works: What is filament? What does it mean to extrude filament? How do you mold the filament once it is extruded? What does the big button do? How do you connect 2 pieces of extruded plastic? Students who have never used a 3Doodler before may want to practice extruding filament and molding a small item.

Students should also be introduced to the 3Doodler app.

## STEP 4

Have the students discuss dividing up the work in constructing the house. Remind them they only have 2 pens per group but that all students must help construct. Brainstorm ways that students can be helpful in the construction without using the pens. Students should construct the houses to resemble their blueprints as closely as possible.

The teacher should circulate throughout this process to assist students in using 3Doodlers or in using tools/materials for house construction.

## STEP 5

Once houses are constructed, return to the recorded list of criteria to create a rubric for students to use to evaluate their houses. This can be shared with students in the Google Drive or in a manner the teacher feels is appropriate for the skill level of the class.

## STEP 6

Instruct students to evaluate their own team's house based on the created rubric. When they have evaluated their own houses, discuss their results. If time allows, students may return to their houses to improve them, based on how they feel they performed on their rubrics and re-evaluate their own construction.

## STEP 7

Allow students to evaluate another team's house construction. Prior to filling out the rubric, teams should be able to interview/question each other on their houses: who built which parts, how the houses differ from the blueprints and why. Each team should fill out the rubric for the other team, including comments, so they can share their evaluations with each other.

## WRAP UP

Students will debrief with their group by reflecting on their process and the rubric/comments provided by the other team. Teacher will conduct a discussion that addresses how feedback can help improve a project but that students may not agree with all feedback received.

## ASSESSMENT

The teacher will assess students' work based on the houses and student-scored rubrics, as well as participation in class discussion.

## POSSIBLE EXTENSIONS

- Students can use their non-edible gingerbread house to make an edible one at home and submit pictures.
- Students can measure their houses and calculate the area/perimeter of measured shapes in their houses.

## VOCABULARY

**FOUNDATION** — the natural or prepared ground or base on which some structure rests.

**INTERSECTION** — the place where 2 pieces of cardboard meet

**EXTRUDE** — to push out; in the case of the 3Doodler, the way the plastic comes out of the pen

**FILAMENT** — the material that is used to print with a 3D printer or pen; in the case of the 3Doodler, the plastic sticks that we are using to build/cement our houses

**DOODLEPAD** — the plastic sheet used to Doodle with the 3Doodler pen on so that designs can be lifted and moved

**EXTERIOR WALL** — a wall separating the outside environment from the accommodations inside a house

## EDUCATIONAL STANDARDS

### COMMON CORE

#### CCSS.ELA-LITERACY.CCRA.SL.1

Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

#### IN THIS LESSON

Students will be working in teams with 3 other students to design a non-edible gingerbread house from recycled/upcycled materials.

#### CCSS.ELA-LITERACY.CCRA.SL.4

Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

#### IN THIS LESSON

Students will be evaluating and conferencing with other student teams regarding reasoning behind their house designs.

### CSTA

#### 1A-CS-01

Select and operate appropriate software to perform a variety of tasks, and recognize that users have different needs and preferences for the technology they use.

#### IN THIS LESSON

Use the 3Doodler app to find a stencil.

**1A-DA-06**

Collect and present the same data in various visual formats.

**IN THIS LESSON**

Fill in a spreadsheet with data from a rubric.

**ISTE****4B**

Students select and use digital tools to plan and manage a design process that considers design constraints and calculated risks.

**IN THIS LESSON**

Use the 3Doodler app to find a stencil.

**4C**

Students develop, test, and refine prototypes as part of a cyclical design process.

**IN THIS LESSON**

Students build models of a non-edible gingerbread how and can refine the model as they test their designs.

**NGSS****K-2-ETS1-2**

Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

**IN THIS LESSON**

The students will draw sketches of their design ideas to create their non-edible gingerbread houses.

**3-5-ETS1-1**

Define a simple design problem reflecting a need or a want that includes a specified criteria for success and constraints on materials, time, or cost.

**IN THIS LESSON**

Students will draw sketches and carry out their design ideas with constraints on materials (using 10 sticks or less of filament).