

Create Frankenstein's Laboratory

Intended Grade Level

4-6 Grade

Goal

By the end of this project, students will be able to use geometric methods to solve design problems.

Summary

Students will be asked to design a Steampunk themed laboratory. They will be given a list of required items for their laboratory. For each item, they will be asked to find the perimeter, area, and shape. Then they will build a 3D model of their laboratory using paper.

Common Core Standards

CCSS.MATH.CONTENT.4.MD.A.3

CCSS.ELA-LITERACY.W.4.10

CCSS.MATH.CONTENT.5.MD.C.3

CCSS.ELA-LITERACY.W.5.10

CCSS.MATH.CONTENT.6.G.A.1

CCSS.ELA-LITERACY.W.6.10

Alternatives

This project can be made more challenging by changing the measurement key. For example, 1 square = 3 units or 1 square = 5 units. This would satisfy CCSS.MATH.CONTENT.4.MD.A.1.

This project can also be adapted by adding volume of an object to satisfy CCSS.MATH.CONTENT.5.MD.C.3.A and CCSS.MATH.CONTENT.6.G.A.2.

About This Resource

Materials Needed

- Computer paper
- Card stock (optional for building the laboratory)
- Crayons and colored pencils
- Scissors
- Tape and glue

Units

The measurement used for this project will be a single unit per cube. You may choose to increase the difficulty by making each cube worth more. This is an easy way to differentiate for students.

Example: 1 square = 3 units or 1 square = 5 units

No feet, yards, or meters are used here.

Optional Materials

- Books or magazines on building
- Online videos that show houses being built or designed (possibly an HGTV show)
- Online videos that show the relationship between math and building/designing

Time Frame

This time frame for completing this project will vary since students work at different paces. We recommend giving students 45-60 minutes a day if you are planning on completing this in a week. This amount of time will allow students to finish the requirements and maybe add something else to it.

Creativity

Encourage students to try new ideas. They may be hesitant at first, but let them know there are multiple ways of completing this assignment.

Frankenstein's Laboratory

Imagine you are Dr. Victor Frankenstein, the mad scientist who created the famous monster we often call "Frankenstein." Since you had bad luck with your last monster, you need to relocate and create a new laboratory.

Your Task

You will be designing and building a new laboratory. For this, you will need to know how to find the perimeter and area of the items you will need to continue with your experiments. This information will help you to design the most effective layout for your laboratory, so you will calculate and record your results. You will be creating a 3-dimensional model of your laboratory.



Laboratory Parts

There are four parts of the laboratory that you will be building and designing. Each major part will be on a separate piece of paper. We will be putting them together to create a laboratory in the shape of a rectangular prism.

The Base

This is where you will create the floor of the laboratory. The base will be the bold part of the full sized paper. We will not be using the whole sheet to provide stability

The Walls

Each wall section contains a wall. They will be taped to create all the walls of the laboratory. They can be cut out to fit the rectangular base.

The Ceiling

This is the final part of the laboratory. This piece is a little larger than the base to prevent it from falling apart.

Furniture and objects

These will be created using the extra squares from the grid sheets. You will also be provided with whole sheets of grid paper. For directions on how to build these objects, please see the 3D building sheet.

Laboratory Layout

When you finish your layout, you will be finding the area and perimeter of each item in your laboratory. Don't forget to leave room for Dr. Frankenstein to walk throughout his laboratory when you're designing. Consider the area and perimeter that he will need to walk around.

Example:

This laboratory layout is one that is in progress.

Notice that not all the items you add will align perfectly, so a close estimation will be fine.

Tesla Coil

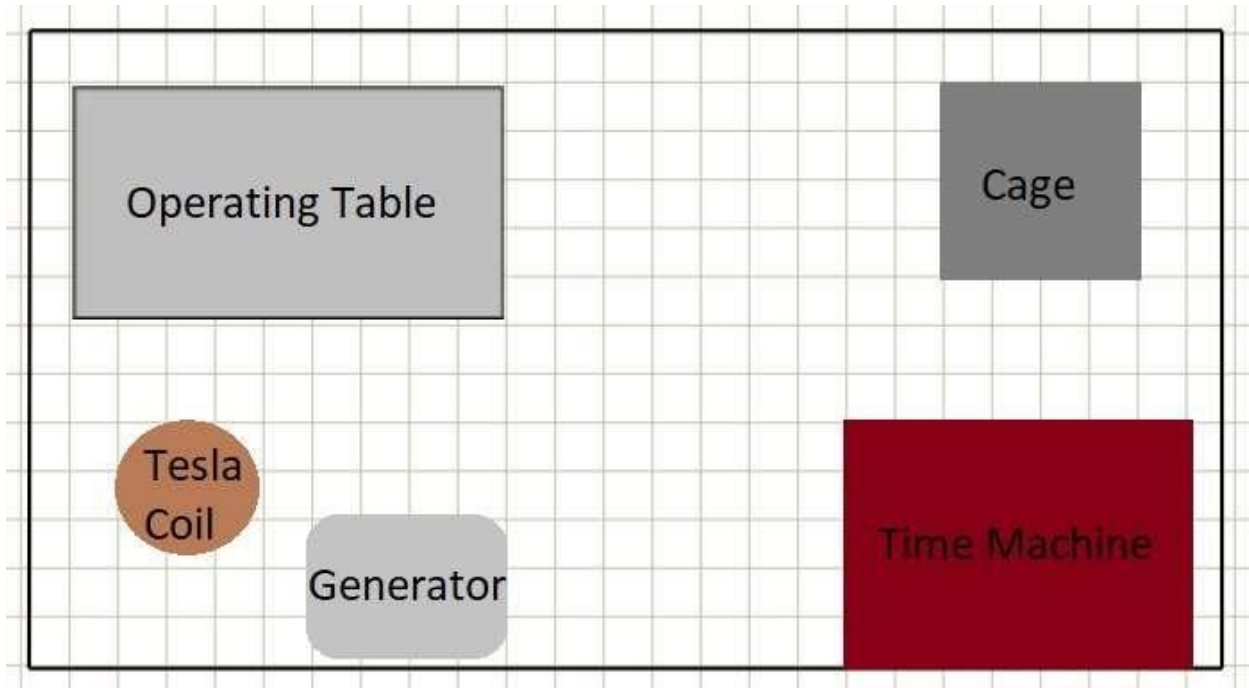
Area: 2.25π units²

Circumference: 3π units

Cage

Area: 16 units²

Perimeter: 16 units

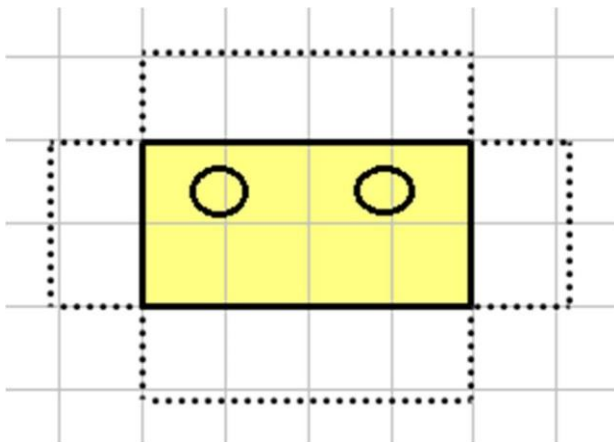


Building 3D Furniture

You will be provided with blank graphing sheets, or you can create your own.

1. You want your furniture size to match what you have in your laboratory.
2. 3D (three dimensional) means you will need to design the sides for most of your furniture. Some good examples of this is Minecraft and LEGOS.
3. It's important to map out what you will be making before cutting it out. Leave some flaps on each side for gluing or taping.
4. Tape often works better than glue, but you can try glue.
5. This can be difficult to do at first, but you will master this skill.
6. If you have a better way of creating 3D furniture, then do what works for you.

Example:

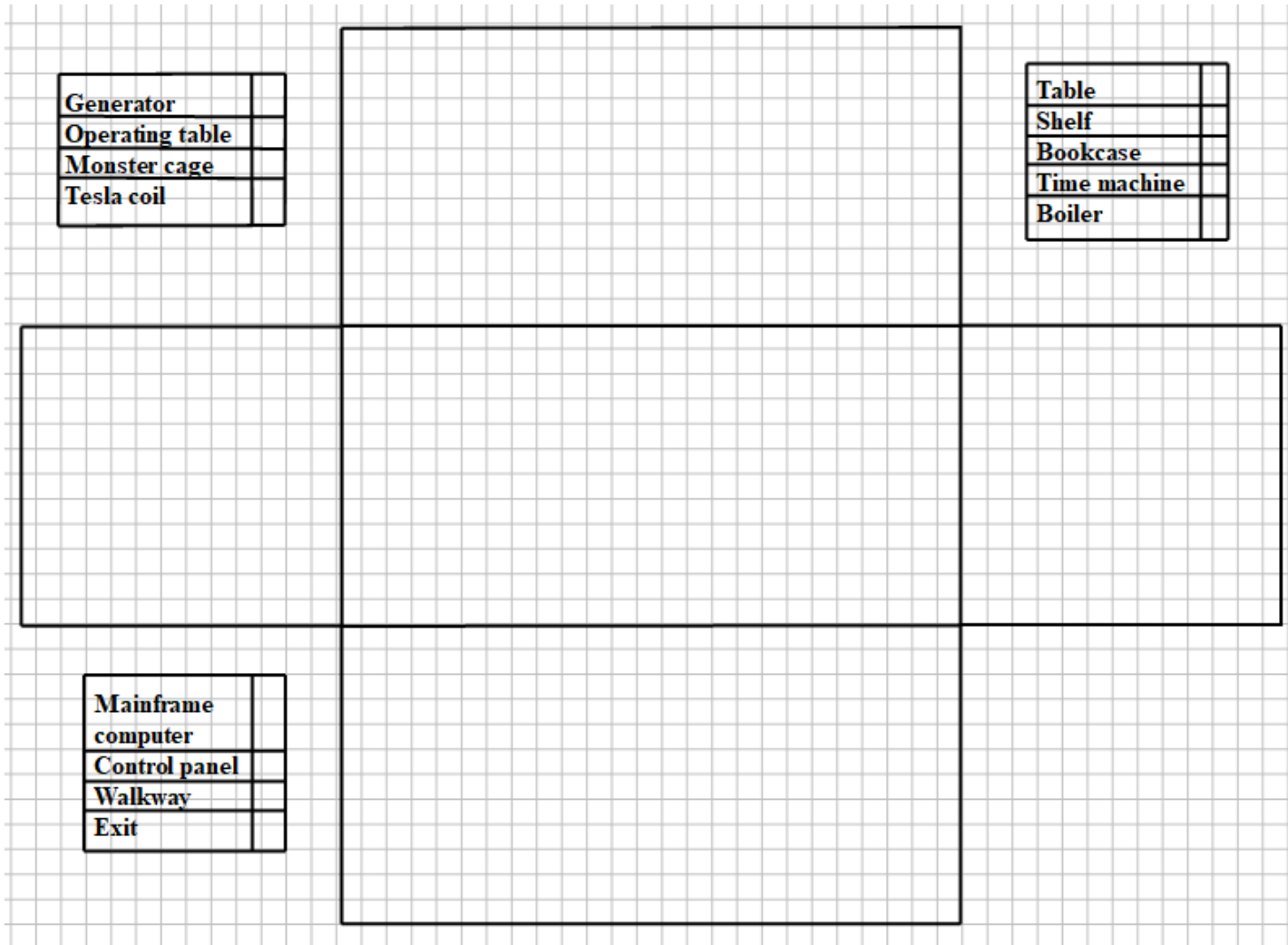


Name _____

Blueprints

Design a rough draft of your laboratory. Be sure to check off the times as you go along.

Note: The middle rectangle is the base and the outside rectangles and squares are the walls. You may need to tilt your paper so that your model matches up with each side of the laboratory.



Laboratory Interior

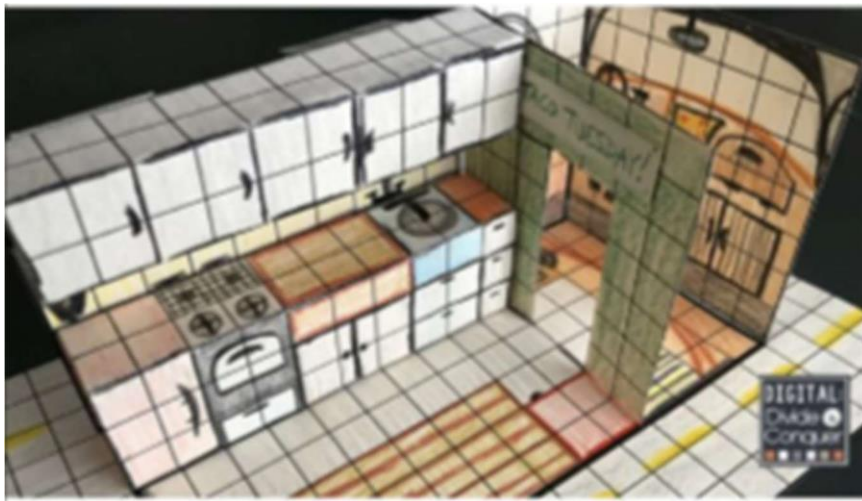
Coloring

- Only use crayons or colored pencils
- Markers could bleed through
- Look at some pictures of a mad scientist's laboratory for some ideas of what they look like.

Windows and Doors

- If you want a challenge, trying cutting out where you could have windows.
- Work slowly and try to be patient.
- You can try a swinging door by making only two cuts in the wall and folding it over.

Example:



Note: This is not a laboratory, but this is the same idea.

Something Extra

If you have extra time, you can design the outside of the laboratory. Is it a secret laboratory hidden behind a bookcase? Or will your mad scientist just keep his laboratory in a room next to his study? Is it located in the basement, the attic, or on the ground floor?

Name _____

Project Reflection

Answer the following questions. Give an explanation why for each answer.

1. The most challenging part was...

2. My favorite part was...

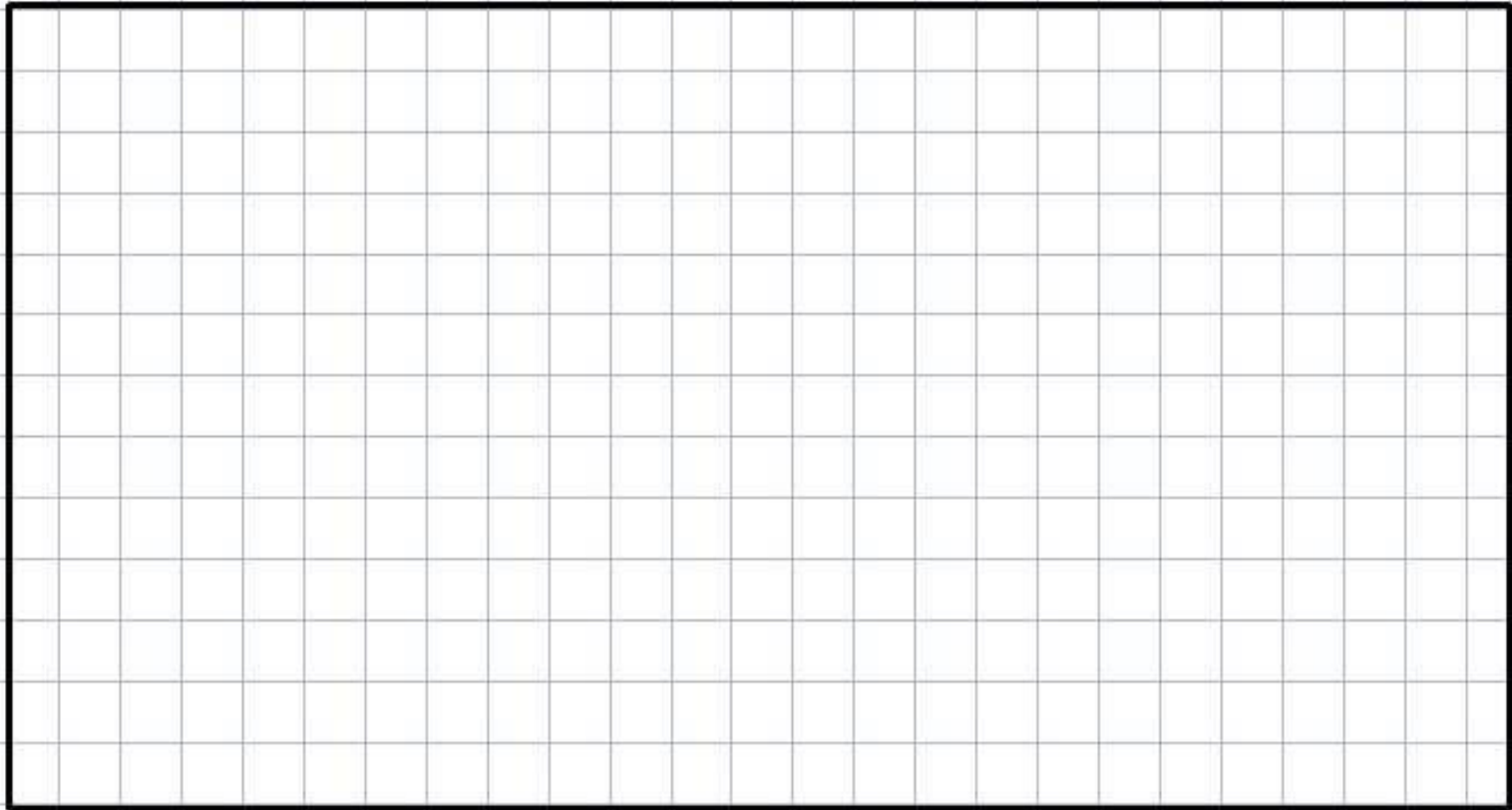
3. What surprised me most about this was...

4. If I could change one thing, it would be...

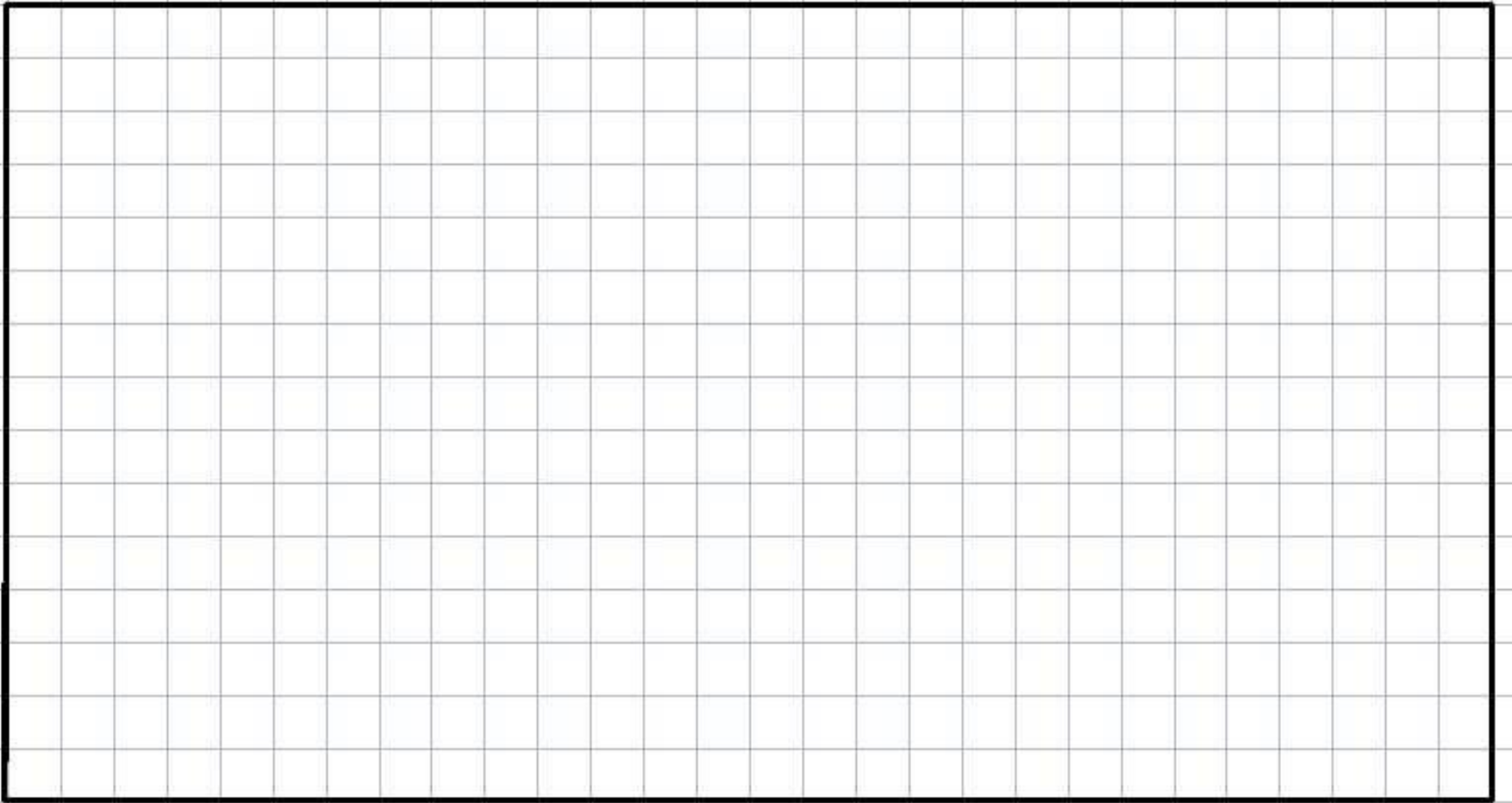
5. If I was a scientist, I would want to create...

6. My design is effective because...

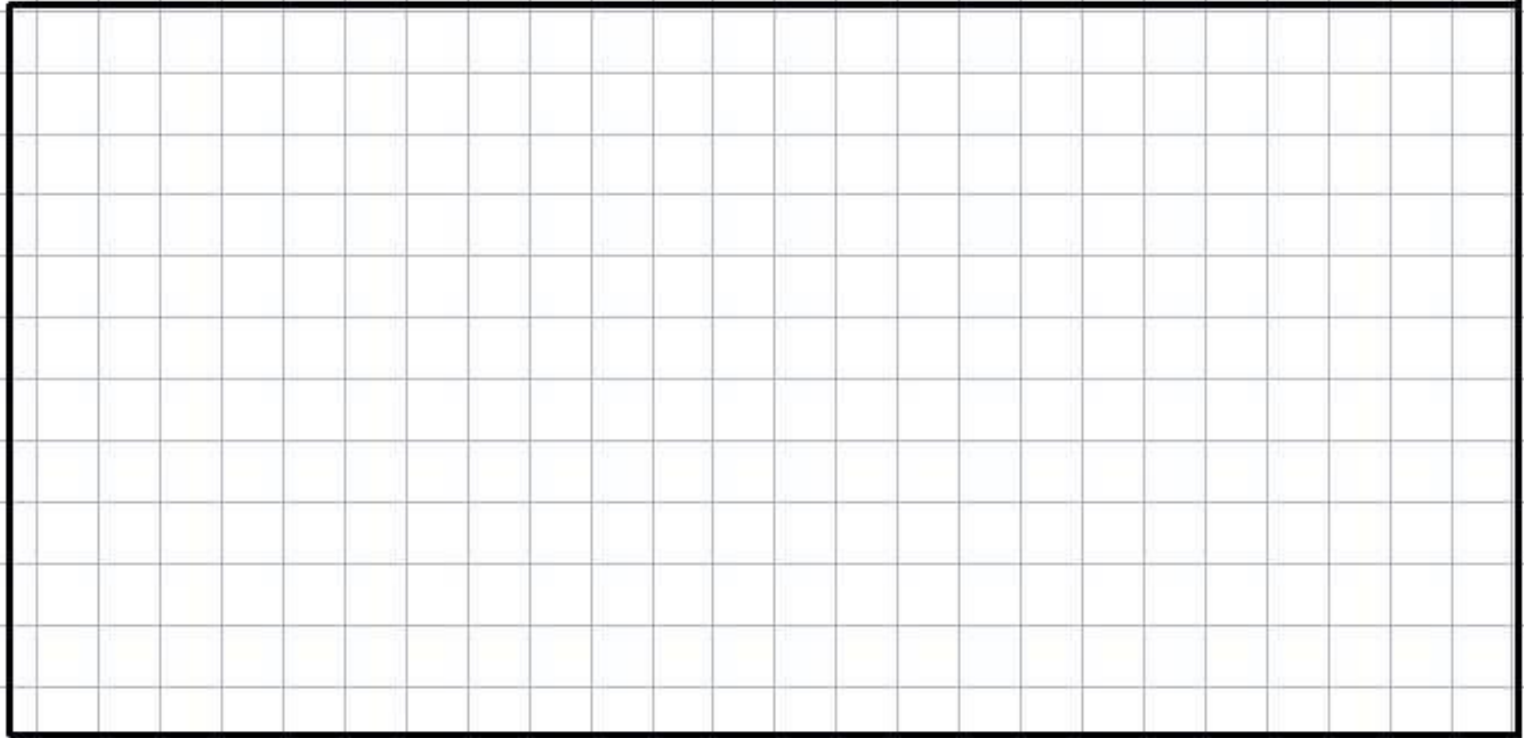
Base



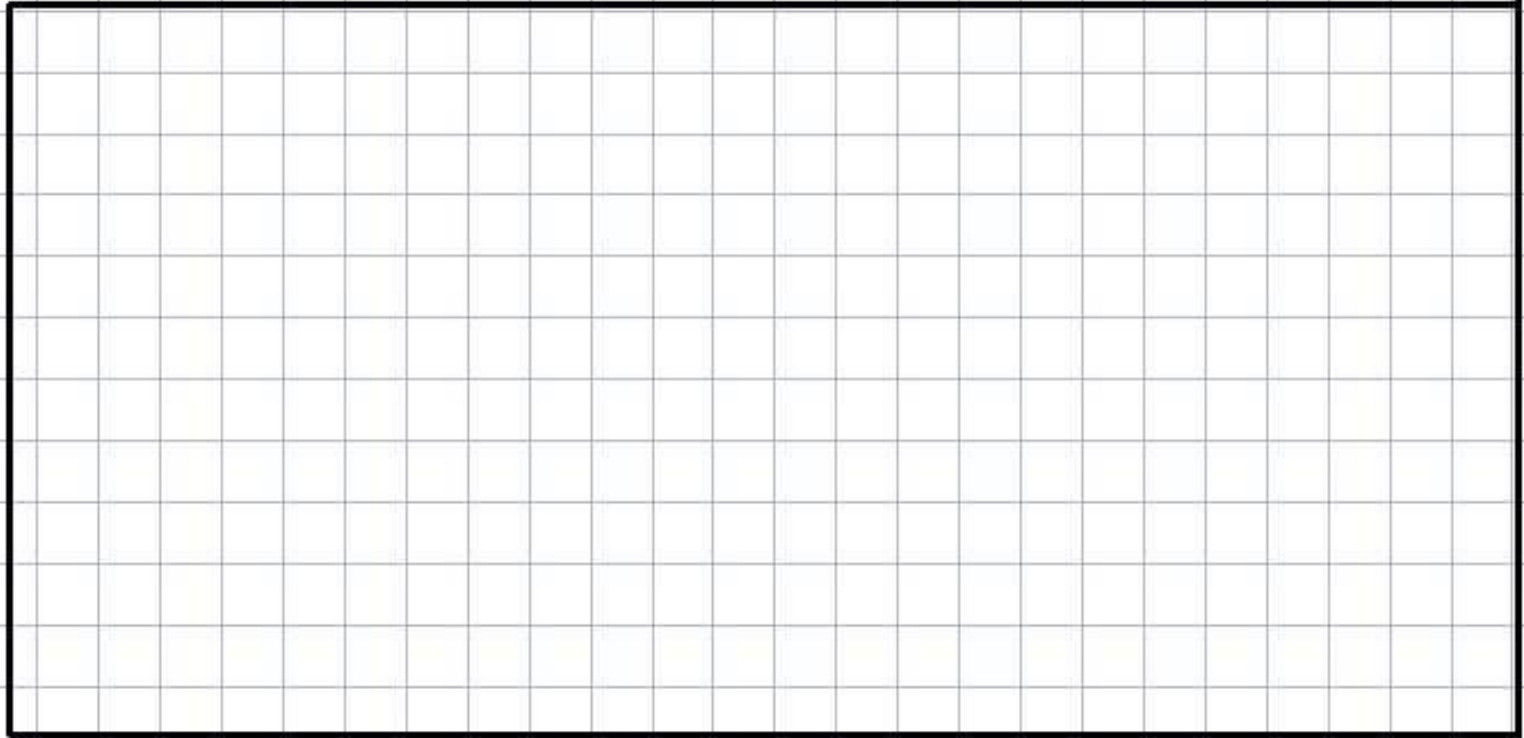
Ceiling



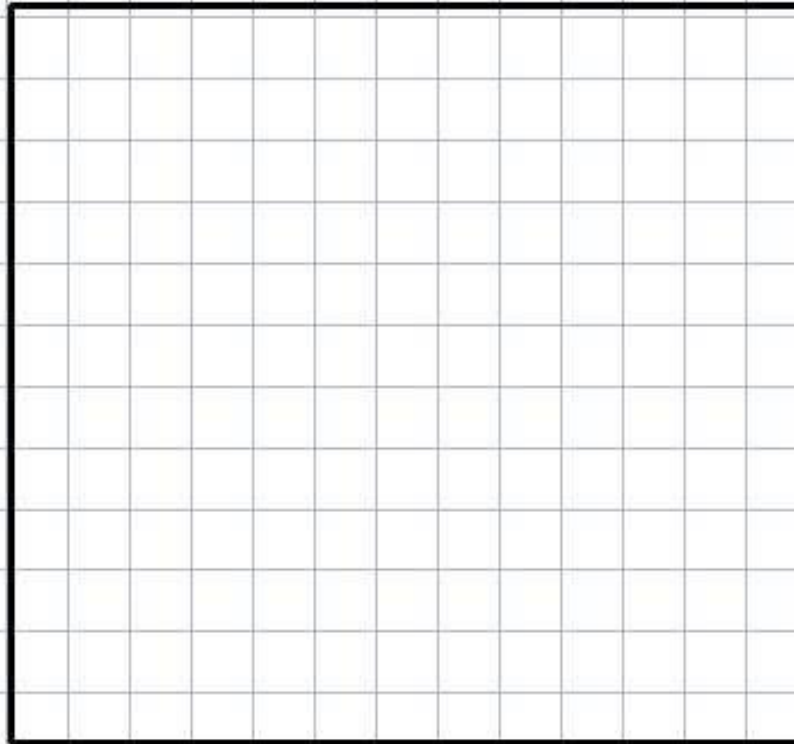
Wall



Wall



Wall



Wall

