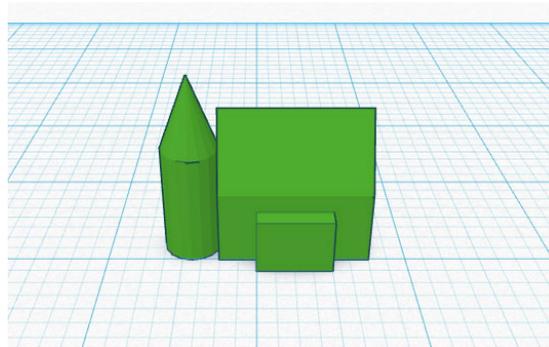


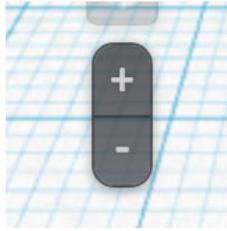
Scarsdale Middle School  
Technology Education  
3D Printing using TinkerCad

In this activity you will learn how to design a 3D model using the web based program called TinkerCad. Before you design your own building for the village project, we are going to do a tutorial project in order to teach you how to use the program. This tutorial will show you how to design a small barn and an attached silo. After completing the tutorial you will go on to design your individual building.

### The Barn and Silo Project

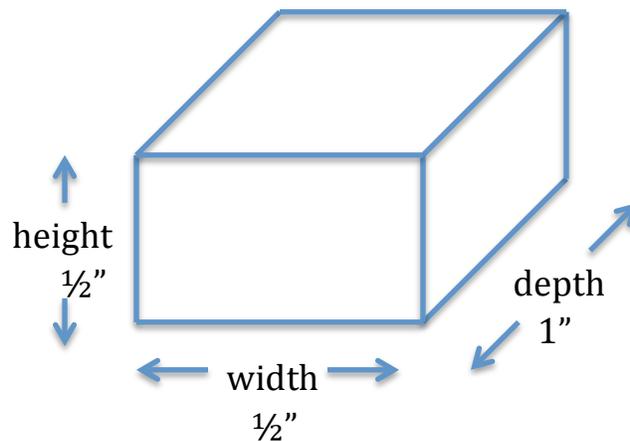


- 1) Log onto the computer and open up the program TinkerCad. Click on the button that says "Create new design". The workplane will open up (it will be a blue grid). Each project will be given a crazy name by the program, you will see this in the upper left on the screen below the TinkerCad logo.
- 2) Click on the word "Design" it is in the upper left next to the TinkerCad logo. Click on "Properties" and where it says name, type in your name. Then click "Save Changes".
- 3) On the lower right next to the workplane, click on "Edit Grid" and change units to inches, leave everything else alone and click "Update Grid" Snap grid should read 1/8".
- 4) Each large blue square is 1" x 1". Each little blue square is 1/8" x 1/8".
- 5) Click on the plus tool once to enlarge workplane. The tool is on the left and looks like this.



6) Click on the red box shape and drag it to the workplane. Place the box approximately in the middle of the workplane and line it up on a dark blue line. By clicking on the little white boxes on the corners of the box, make it the following dimensions.

$\frac{1}{2}$ " wide- 1" deep -  $\frac{1}{2}$ " high



### **Making the Roof**

- 7) To add roof- Click on the green roof shape and place someplace on the workplane. Make the roof  $\frac{1}{2}$ "wide – 1" deep –  $\frac{1}{2}$ " high
- 8) Align the roof along the same dark blue line as the box shape.
- 9) Click on the up arrow (the up arrow is a small black arrow on top of the roof). Drag roof up  $\frac{1}{2}$ " and using the curser, drag the roof on top of the square.
- 10) With the curser, select both shapes and group them (the group tool is up on the top right). Both shapes should now be the same color.

### **Making the Silo**

- 11) Click on the cylinder shape and drag to workplane. For now, place it anywhere on the workplane. Make the cylinder  $\frac{3}{8}$ " wide,  $\frac{3}{8}$ " deep and  $\frac{3}{4}$ " high.
- 12) Click on cone shape and drag it on the workplane. Make the cone  $\frac{3}{8}$ " wide,  $\frac{3}{8}$ " deep and  $\frac{1}{2}$ " high.

- 13) Click on the up arrow and raise cone  $\frac{3}{4}$ " high. Drag cone and place it on top of the cylinder.
- 14) With the curser, select both cylinder and cone and group them together with the group tool.
- 15) Drag silo shape and place it touching the side of the barn.

16) Click on "Rotate View Tool"

The "Rotate View Tool" looks like this



Click on the right arrow to turn barn facing you. Click on the bottom arrow to look at the barn from the front. You should now be looking at the front of the barn and silo

### **Making the Barn Door**

- 17) Drag a box to the workplane. Make it  $\frac{1}{8}$ " wide,  $\frac{1}{2}$ " deep and  $\frac{3}{8}$ " high.
- 18) Drag the door and center it by eye and place it on the front of the barn. It should stick out  $\frac{1}{8}$ "
- 19) Drag curser around completed barn and click on group. You are now done!  
Print a paper copy of your barn and hand it into Mr.Rambone with your name on it.

## The Village Project

The class mission is to design a village. Any well planned community has many different buildings. Here is the list of buildings we will be designing for our class.

Houses  
Places of worship  
Stores  
Schools  
Industry/business

Your table will be assigned to one of the above categories. As stated before, each student at your table is to design their own building within the given category. When everyone has completed their design you will vote for the best design at your table to be 3D printed. Because 3D printing is a very slow process, we can not print everyone in the classes project. But we will take the final printed buildings and assemble all the pieces on a board from the different classes and develop a village. To start the activity you have to understand "scale". The scale we will be using is as follows  $1/8" = 10$  feet. Since we are setting the workplane in Tinkercad to  $1/8"$ , each little blue square equals 10 feet.

$1/8" = 10$  feet  
 $1/4" = 20$  feet  
 $3/8" = 30$  feet  
 $1/2" = 40$  feet  
 $5/8" = 50$  feet  
 $3/4" = 60$  feet  
 $1" = 80$  feet

### Maximum Sizes

For the houses-  $3/4"$  wide,  $3/4"$  deep and  $3/4"$  high

For all other buildings-  $1\ 1/2"$  wide,  $1\ 1/2"$  deep and  $1\ 1/2"$  high

## Steps to Design your Building

- 1) Once you hand in the printout of your barn and silo design, you may start to design your own building. Open up TinkerCad and just like you did on the barn project click on “Edit Grid” and change units to inches, leave everything else alone and click “Update Grid” Snap grid should read 1/8”. Each large blue square is 1” x 1”. Each little blue square is 1/8” x 1/8”. Click on the plus tool once to enlarge the workplane.
- 2) While using the skills you learned while making the barn use the geometric shapes to design your own building. Do some research on Google to come up with some ideas. For example if your category is “houses” type in houses in Google and click on images to look at house ideas.
- 3) To do some real detail work, you will have to shut off the Snap Grid feature.
- 4) When your building is complete be sure to group all the shapes together using the group tool.
- 5) When complete, make a paper printout of your design and hand it in to Mr. Rambone. Be sure to put your name and house on the design.

## To prepare for 3D Printing

(we will not be printing the barn design but will be printing some of your building designs)

- 1) Click on the top left (next to the TinkerCad logo) where it says “Design”.
- 2) Click on “Download for 3D Printing”
- 3) Click on .STL file and it will download onto the computer.

## Grading Criteria

You will get one grade for both paper print outs. The barn/silo tutorial **and** the building. I am looking to see if you stay in the given parameters for size and the amount of detail on your building. The more detail, the better the grade. Be sure both your first and last name is on both paper printouts and they should be stapled together.