

Activity 1.5.5 Pegboard Toy - Part 1

Purpose

Designing a toy can be a challenging but fun process. You must consider many factors, such as safety, materials, and appropriate use. In this activity you will see how a pegboard with matching mallet is designed. You will learn how to test the pieces to ensure that they fit appropriately and that they are easy for a young child to enjoy.

Procedure

As a new employee of Tattered Toy Company, you have been asked to learn more about their best selling toy, the Pegboard (Figure 1). Your supervisor, Mr. Duggle, states that you need to know how the pegboard was designed. He wants you to learn as much about the design process as possible while working on this project.

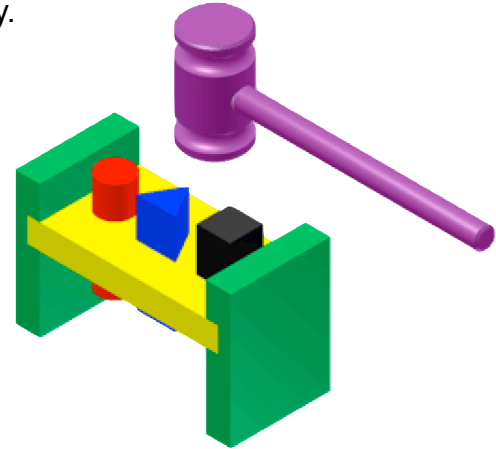



Figure 1

Directions

Read each step, perform each operation, and check them off after completion.

Create round peg

1. **Create a new part** in Onshape
 - a. Create > Document > call it “pegboard toy” > Create public document
 - b. Make units inches  > Workspace units ... > Inch
 - c. Name part “round peg”: right click on “Part Studio 1” > Rename ... > round peg
2. Create a round peg 1 in. diameter and 3 in. long.
 - a. Sketch > click on the Top
 - b. Click circle tool > click in the middle (origin), move cursor away from center > click mouse > type in the number “1” > press enter
3. Extrude circle 3 in: Click “Extrude” > click on circle > type “3” > press green checkmark
4. Color round peg red: right click on the part > Edit Appearance > choose color

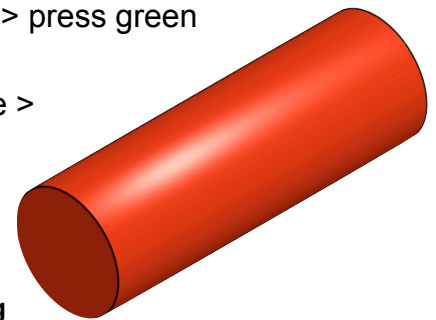


Figure 2 Round peg

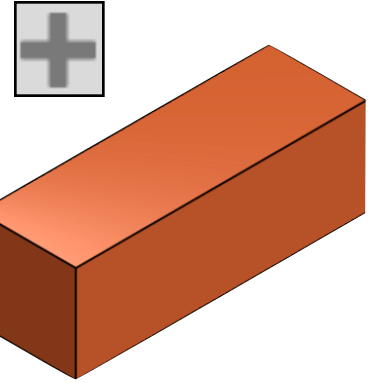
Check box when step is completed.

Create square peg

1. **Create a New Part** in the same “pegboard toy” file
 - a. Click the “plus sign” in the bottom left corner → Create part studio > Name part “Square peg”
2. Create a square peg 1in x 1in x 3in long.
 - a. Click on sketch > click on Top Plane
3. Click on rectangle tool, make 1in x 1in square (start at the origin)
4. Extrude square 3in: “Extrude” > click on square > type 3 > click green checkmark
5. Color square peg orange: right click on the part > Edit Appearance > choose orange color

5.75

Figure 3 Square peg



Check box when step is completed.

Create the Pegboard

Dimension pegboard as follows: $\frac{3}{4}$ in. (height) x $5\frac{3}{4}$ in. (width) x 3 in. (depth). The holes must accept the round and square pegs you designed. Both holes should be centered both vertically and horizontally within the rectangular base.

1. **Create a New Part:** Click the “plus sign” in the bottom left corner > Create part studio > name part “Pegboard”
2. **Create Pegboard**
 - a. Click “sketch” > click on Top Plane
 - b. Use “Rectangle” tool to create pegboard (height=0.75, width=5.75)
 - c. Extrude 3in: “Extrude” > click on board > type 3 > click green checkmark

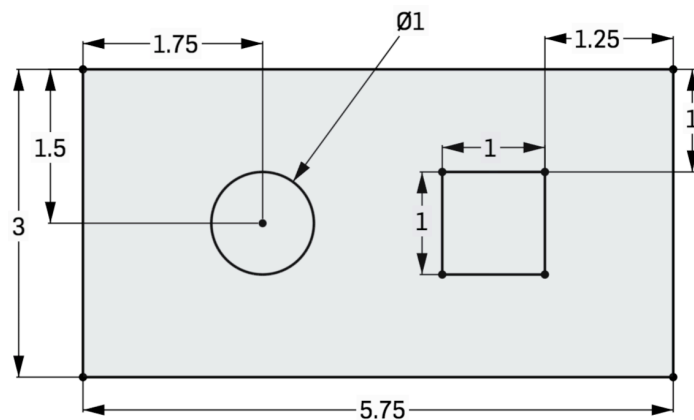


Figure 4 pegboard

3. **Create Holes**
 - a. Click “sketch” < click on top of pegboard
 - b. Add a circle hole (use circle tool) add a square hole (use the rectangle tool)
 - c. Dimension the pegboard as you see in figure 4
 - d. Extrude holes: “Extrude” $\frac{3}{4}$ in (remove) > click green checkmark
 - e. Color pegboard yellow

Check box when step is completed.

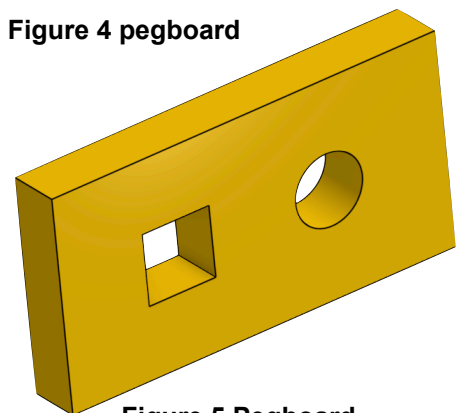
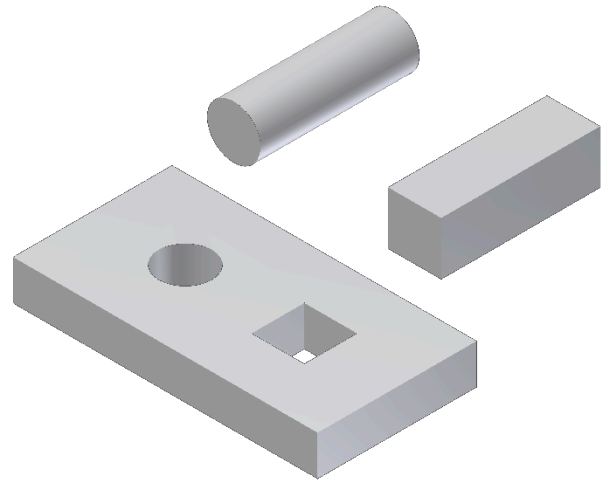


Figure 5 Pegboard

Create Assembly of Parts

1. Click on **Assembly 1** (*bottom right tab*)
2. Add all parts into the assembly file
 - a. Click “Insert” > click on one of the parts (round peg, square peg, pegboard) > click inside the main sketch area to ‘insert’ the part (repeat with all parts)

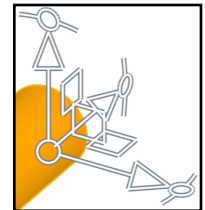


Grounding pegboard

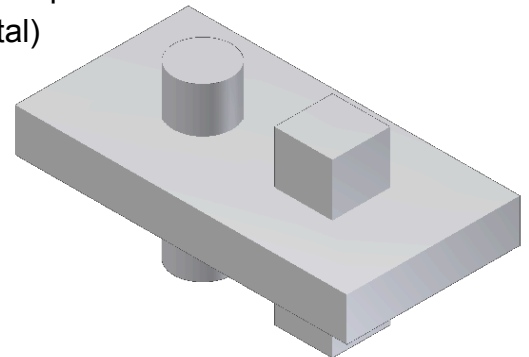
1. Left-click on pegboard > “Fix” (this keeps the pegboard from moving around once you start adding things to it)

Assembling pegboard and pegs

1. **Mate** the pegs so they can slide up and down through the holes.
 - a. To move objects, click on them and drag the arrows
 - b. Round peg: Click on “Slider Mate” tool first then click on the end of the peg, then click on the centre of the hole
 - c. Click green checkmark each time you finish a ‘mate’
 - d. Square peg: Click on “Planar Mate” first, then click on one of the sides of the peg and the matching inside of the square hole (You may have to move the assembly around). Repeat process with another side of the square peg (2 constraints total)



Check box when step is completed



Adding Ends

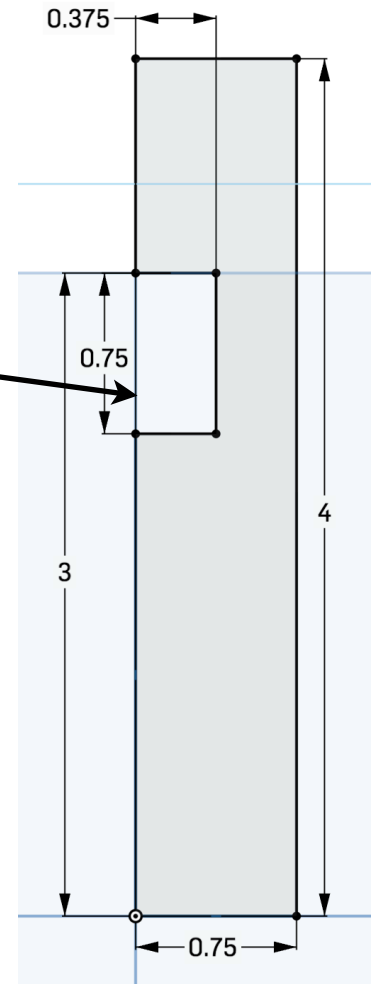
Next, you will add end legs to the Pegboard Toy. These legs will raise the pegboard up off of a table so that the square and round pegs may be inserted until they are flush with the top surface of the pegboard.

You will be using wood that is $\frac{3}{4}$ in. thick. The end legs will be assembled to the pegboard using a Dado Joint, a special joint that adds strength when joining two pieces of wood.

Again, read each step on the next page, carefully performing each operation while keeping track of your work by checking each box after completion.

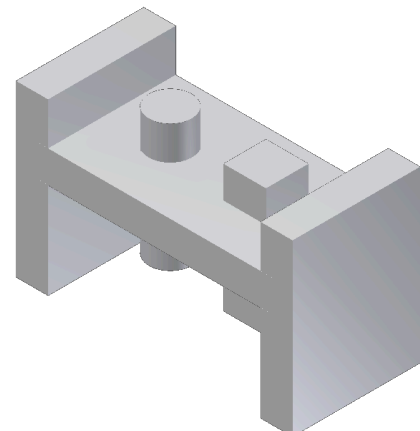
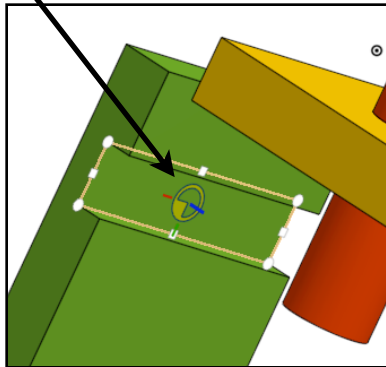
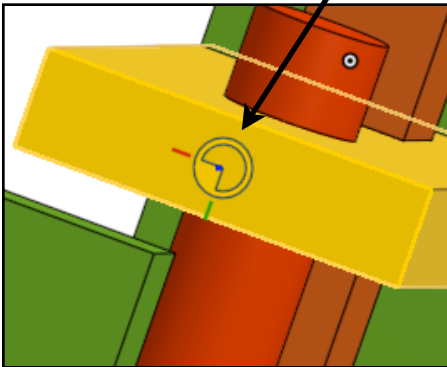
Create Ends

1. **Create a New Part** in the same “pegboard toy” file
 - a. Click the “plus sign” in the bottom left corner > Create part studio > Name part “End”
 - b. Create a new sketch and click on the “Front view”
2. Draw the “end” piece with the rectangle tool (start at origin)
 - a. Make the end .750 in wide, 4 in high
 - b. Select the “line” tool (or rectangle tool) and make lines for the “dado” cutout (inset .375)
 - c. Use the “trim” tool to delete this line of the “end” > Finish sketch
 - d. Extrude end 3 in. > Click green checkmark
 - e. Color ends green



Mate ends to pegboard

- a. Go to “Assembly 1 and insert the 2 ends
- b. Mate the ends to the pegboard with this constraint
- c. Click on the parts that you want to stick together





Check box when step is completed.

ALERT!

You have now completed the first draft of the 3D model of the Pegboard Toy. The Tatter Toy design department has just finished with their review of your Pegboard Toy. They decided that the Pegboard Toy needs an additional triangular-shaped peg to improve the design. You must modify your current design to include a triangular-shaped peg. The rest of the Pegboard should remain the same size.

Create triangle peg

1. **Create a New Part** in the same “pegboard toy” file
 - a. Click the “plus sign” in the bottom left corner 
 - > Create part studio > Name the part “triangle”
 - b. Create a new sketch and click on the “Top” view
 - c. Create an equilateral triangle peg 1in high and 3in long.
2. Click on “Polygon” tool  click on the origin, drag straight down and click again > type “3” for the number of sides in a triangle
3. Dimension the triangle so it is 1 in high
4. Extrude triangle 3 in. > Click green checkmark
5. Color it “Blue”

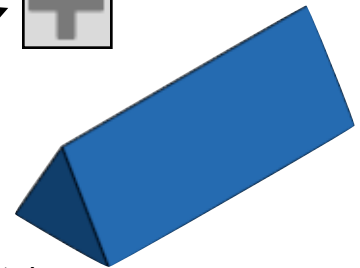
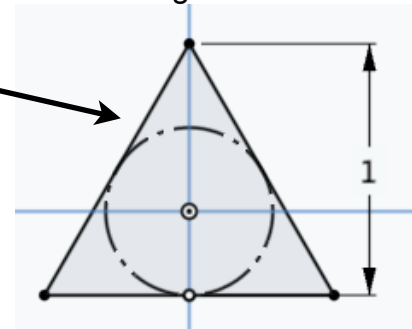


Figure 10



Check box when step is completed.

Add triangle hole to pegboard

1. Open the Pegboard sketch
2. Click twice on ‘Sketch 1’ to edit sketch
3. Change dimensions to match figure 11
4. Add the triangle shape in the middle
5. Finish sketch > extrude triangle (remove)
6. Open the **PEGBOARD** assembly
7. **Update** the assembly by adding and mating the triangle peg

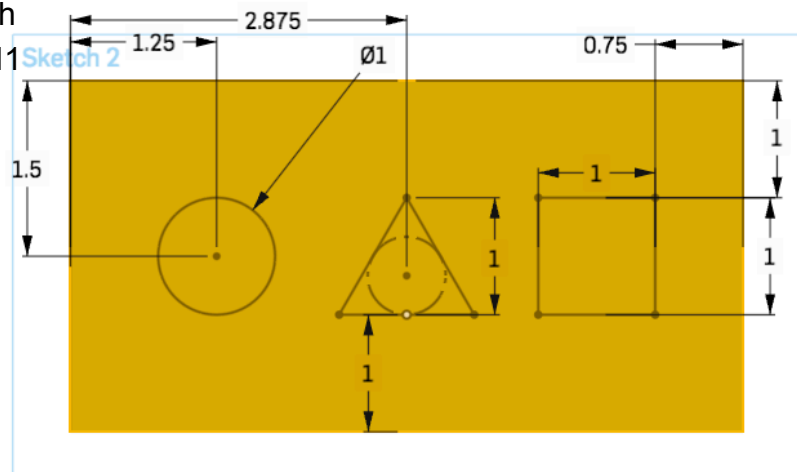




Figure 11

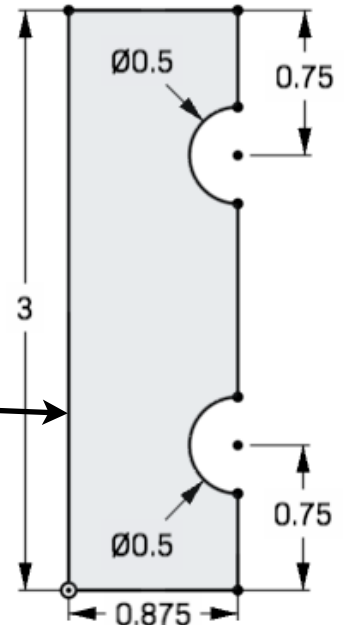
Check box when step is completed.

ALERT!

After you completed the “updated” Pegboard Toy, the Design Department team decided they want you to create a mallet for the Pegboard Toy.



Creating the Mallet Head

1. **Create a New Part** in the same “pegboard toy” file
 - a. Click the “plus sign” in the bottom left corner > 
 - b. Create a new sketch and click on the “Front view”.
2. Create rectangle 3 in tall, .875 in wide
3. Use circle tool to make two circles with diameter .5 in center point .75 in from top and bottom
4. Use trim tool to erase extra lines (so it looks like picture)
5. Revolve mallet head:
 - a. Click on “Revolve” tool > click on part
 - b. Click “Revolve axis” > click the left line of the drawing
 - c. Click the green checkmark
6. Click “Chamfer” > 0.063 in 
 - a. Click on the top and bottom of the mallet > OK
7. Finish sketch > Click green checkmark
8. Color the mallet brown



Check box when step is completed.

Drill hole in Mallet Head

- In order to sketch on a circle, we have to create an “offset Plane”
1. Click on the “Offset Surface” tool  and select “Plane” 
 2. Click on the Front plane
 - a. Set an offset distance of 0.875 > click the green checkmark
 3. Make a “new sketch” on the work plane you just created (Plane 1)
 4. Make a circle with a 0.625in diameter (5/8in)
 5. The circle should be 1.5in from top or bottom
 6. Extrude circle 0.875in (remove)
 7. Finish sketch

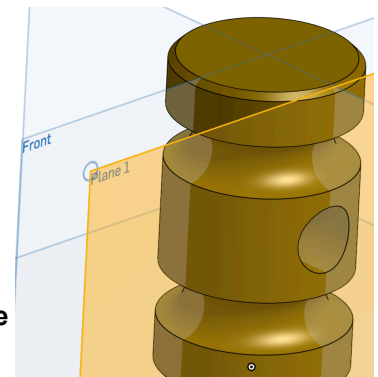
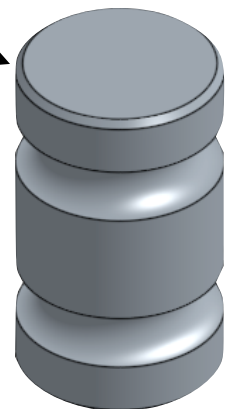






Figure 14. Mallet w/work plane

Create the Mallet handle

1. **Create a New Part** in the same “pegboard toy” file
 - a. Click the “plus sign” in the bottom left corner > 
 - b. Create a new sketch and click on the “Front view”.
3. Create a circle with a 0.625in diameter (5/8in)
4. Extrude circle 8 in
5. Click the “Chamfer” tool 
 - a. Type 0.0625 > click on both ends (diameter) of the handle
6. Color the handle brown
7. Click the green checkmark



Assembly of Mallet Head and Handle

1. Click on the “Assembly 1” tab along the bottom of the screen
2. Insert the Mallet head and Mallet handle into the assembly file 
 - a. Click on the mallet and the mallet handle to bring them into the assembly
3. Attach (mate) the mallet head to the mallet handle
 - a. Move the parts into approximately the right orientation
 - b. Use the “Fastened mate” tool 
 - c. Click on the end of the mallet and the hole in the mallet

Check box when step is completed.

