Design out the box

Time 60-80 mins approx

Level of difficulty ★★★★☆

Lesson Objectives…

- To understand the basic tools used in SketchUp.
- To understand the advantages of using CAD
- To be able to successfully use CAD independently to complete a range of tutorials in 2D and 3D
- To develop advanced skills and problem solving skills when using SketchUp

Lesson Outcomes…

By the end of this tutorial you will be able to…

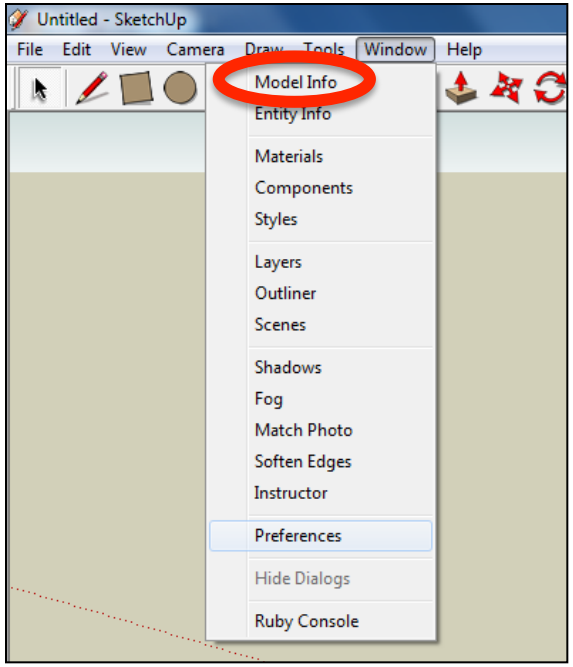
- Use the push pull and move tool
- Learn about centre lines
- Create, Move and Rotate components
- Use the offset tool to make objects and add detail
- Shape and form your design
- Colour and render your design

Skills to be used in this project…

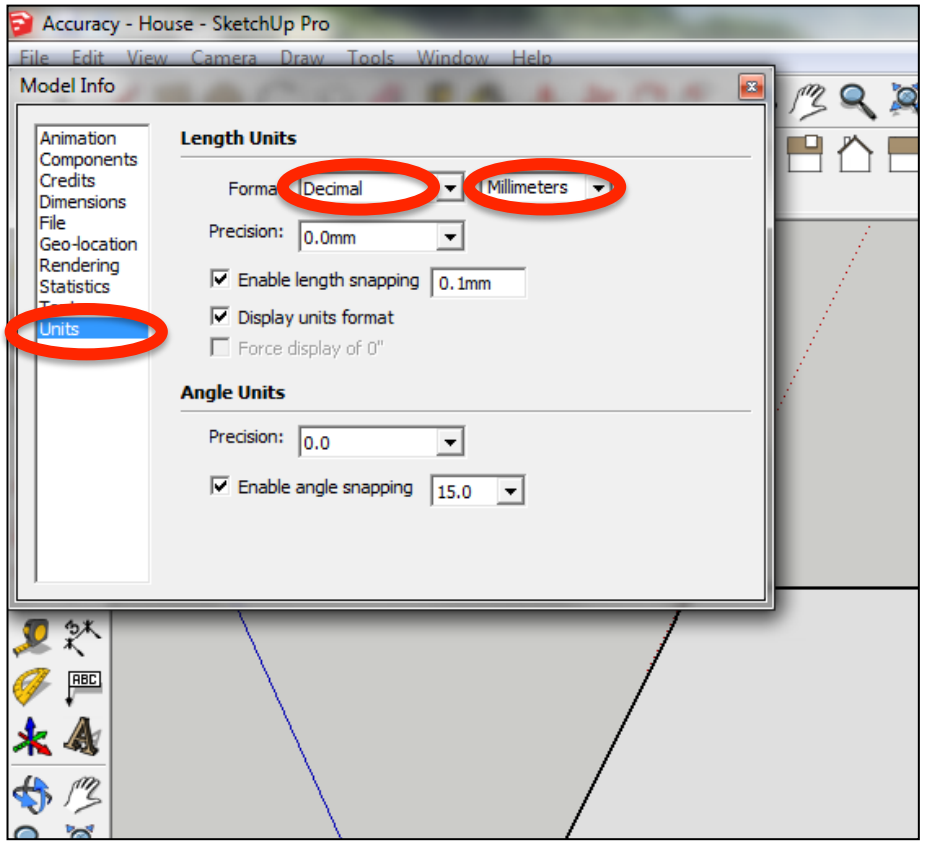
Basic Skills	New and Higher Skills
Zoom tool	Rotate tool
Orbit tool	Move tool
Pan tool	Offset tool
Line tool	Arc tool
Rectangle tool	Follow Me tool
Circle tool	Paint Bucket tool
Eraser tool	3D Text tool
Push/Pull tool	Making Components

Basic skills are those required to do very basic drawings and are detailed as part of this presentation.

New and higher skills may be new to the novice and are the focus for learning in this presentation.



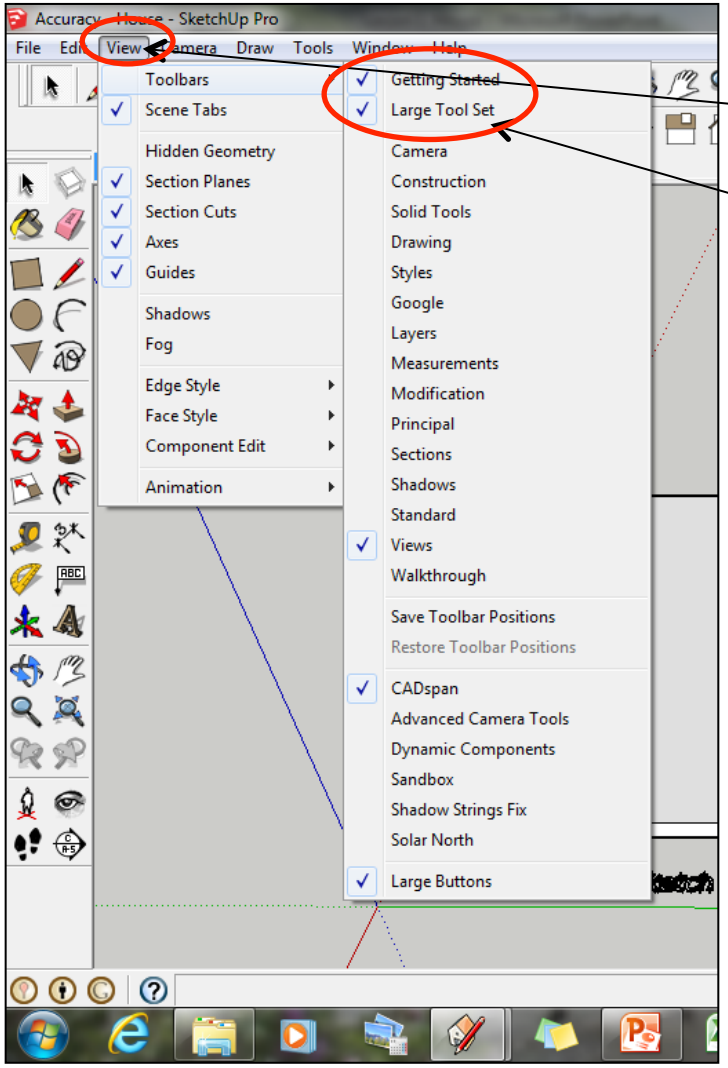
1. Open the sketch up drawing. Once you have opened SketchUp, go to **Window** and select **Model Info**



2. Select **Units** and choose **Decimal Millimetres**. We are using this template because we are doing a product design.

***Note**: It is often necessary to start a new file to use the new template. Go to **File** then **New**.*

3. Now select the **View** then **toolbars** and ensure **Getting Started** and **Large Tool Set** are ticked



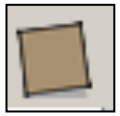
3a Select **View**

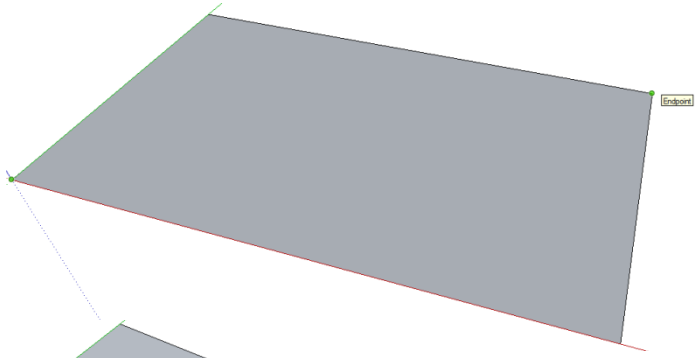
3b Tick Getting Started

3c Tick Large Tool Set

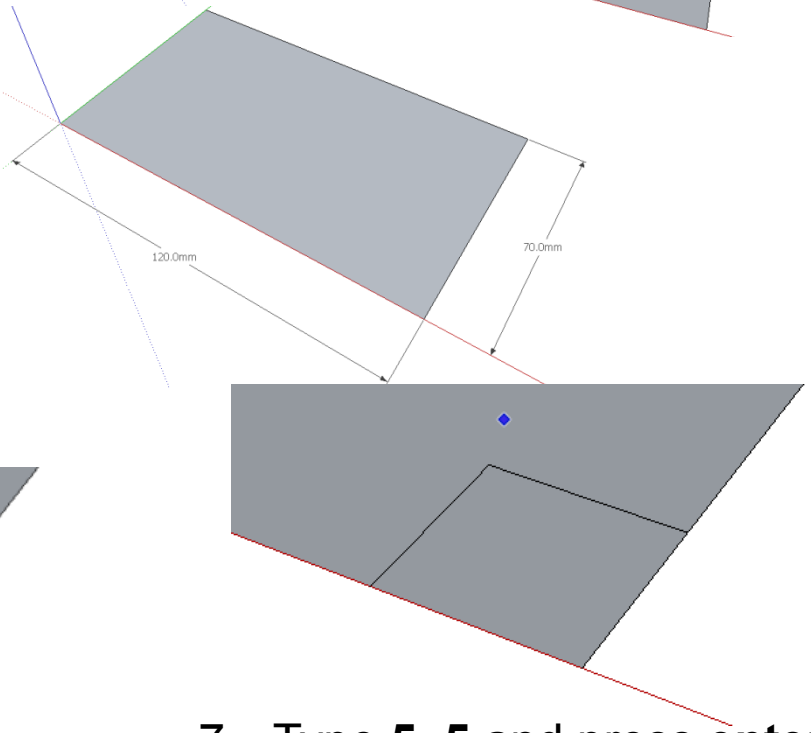
Note**: this will place a tool bar across the top **(getting started)** and the side **(Large Tool Set)

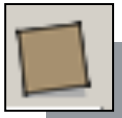
4. Select the ***Rectangle tool*** and draw a rectangle on the base by clicking and ***dragging the cursor diagonally.***

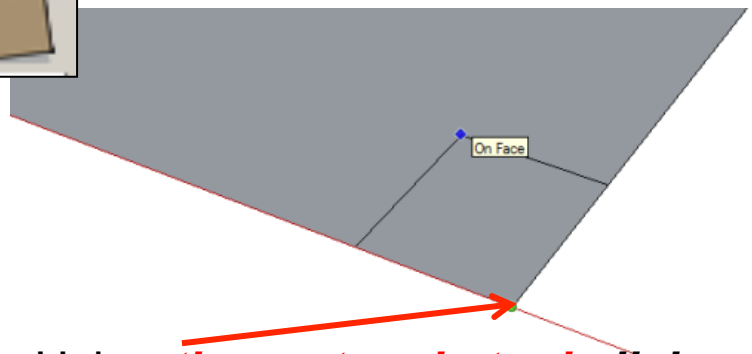




5. Once you have drawn the rectangle, enter ***'120,70'*** and then press ***Enter***. ***This is the real-life size of the iPhone 6plus screen size.*** **. Click on the zoom exte symbol.**

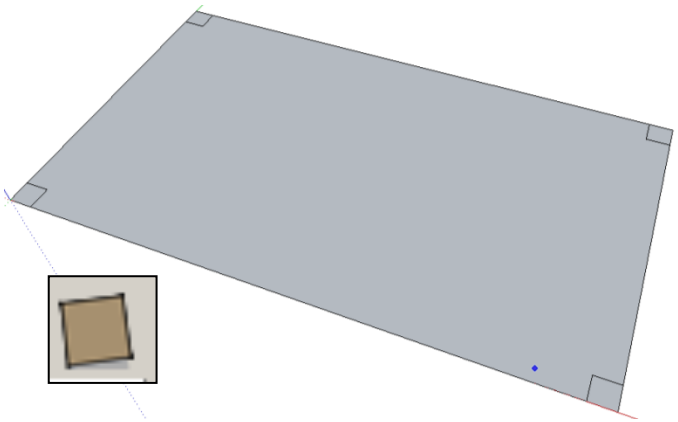




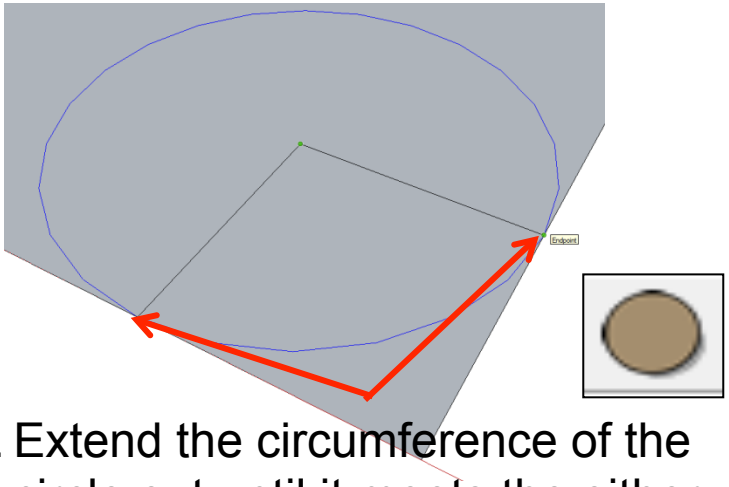


6. Using ***the rectangle tool click*** on the corner of the rectangle you have just drawn**.**

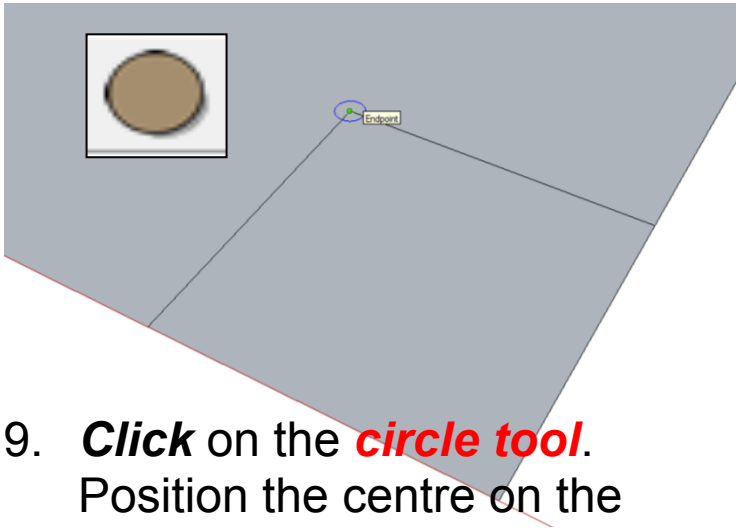
7. Type **5, 5** and press **enter**



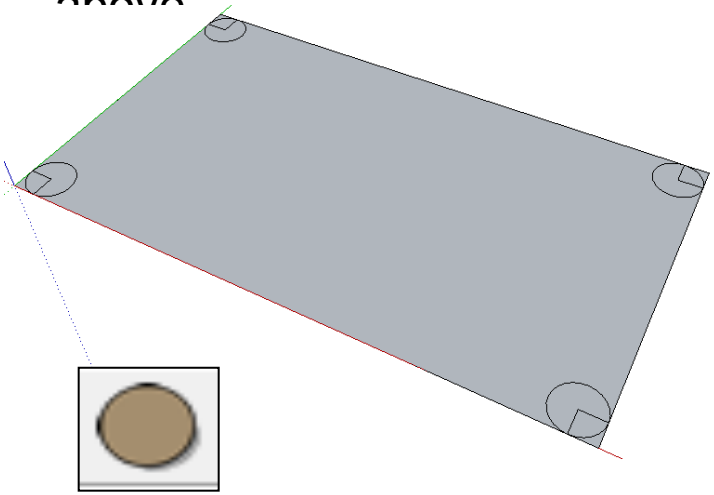
8. ***Repeat*** the process for the other 3 corners. Remember to type **10, 10** and press **enter**



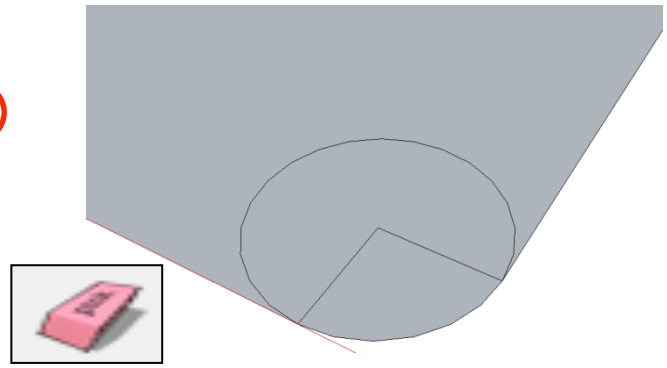
10. Extend the circumference of the circle out until it meets the either corner shown. It will say ***endpoint***



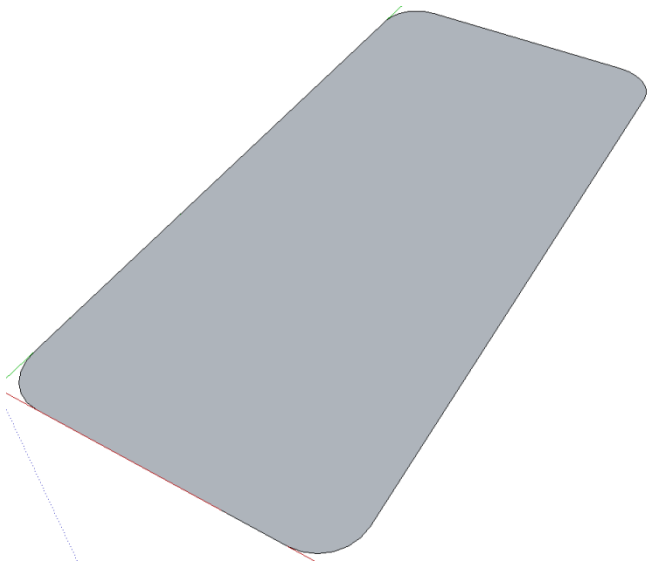
9. ***Click*** on the ***circle tool***. Position the centre on the corner of the square shown above

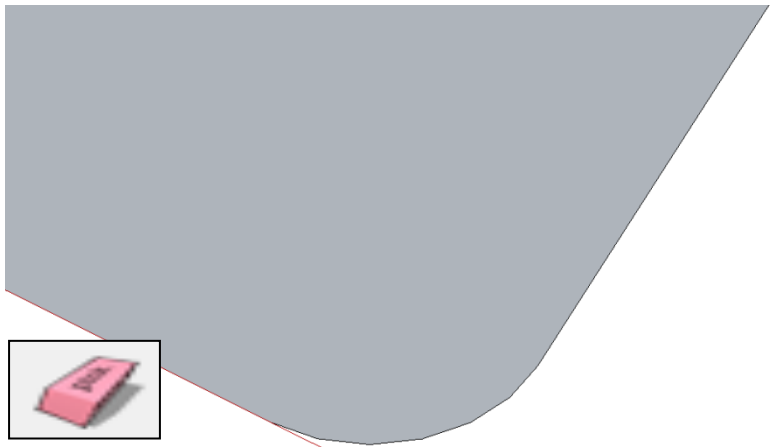


11. ***Repeat*** the process for the other 3 corners.

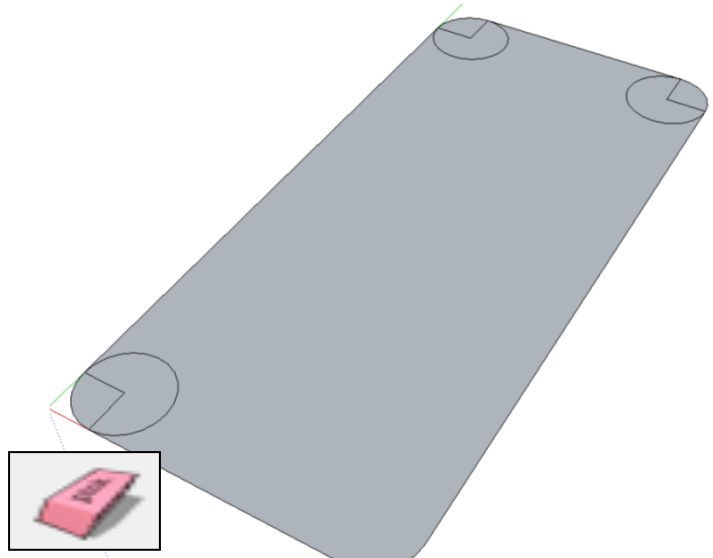


12. Use the ***rubber tool*** to erase the corners so you are left with a radius as shown

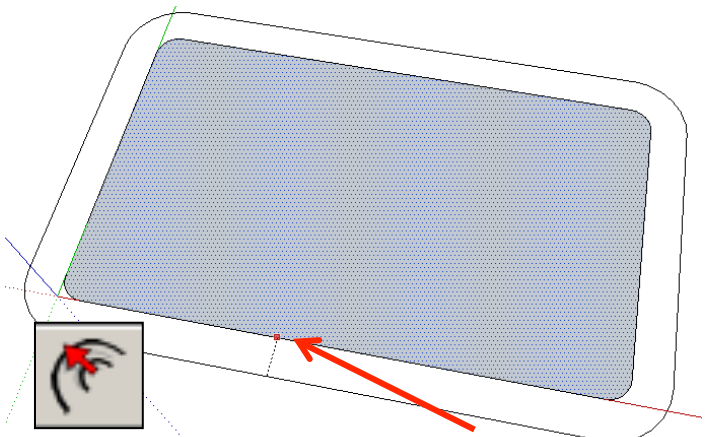




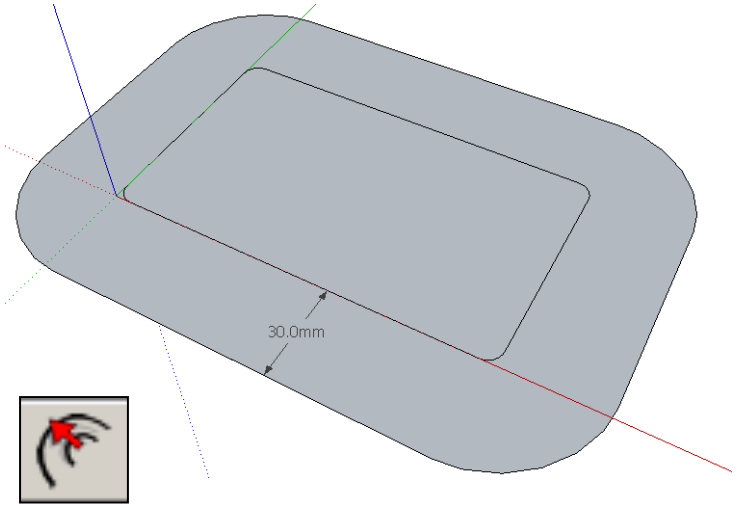
13. ***Erase*** the remaining parts of the circle.



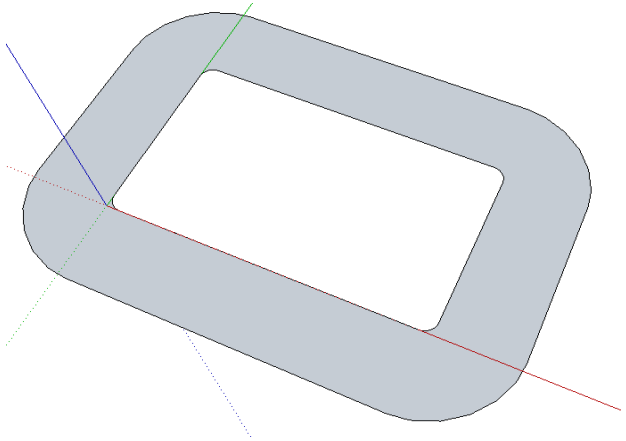
14. ***Repeat*** the process for the other 3 corners.



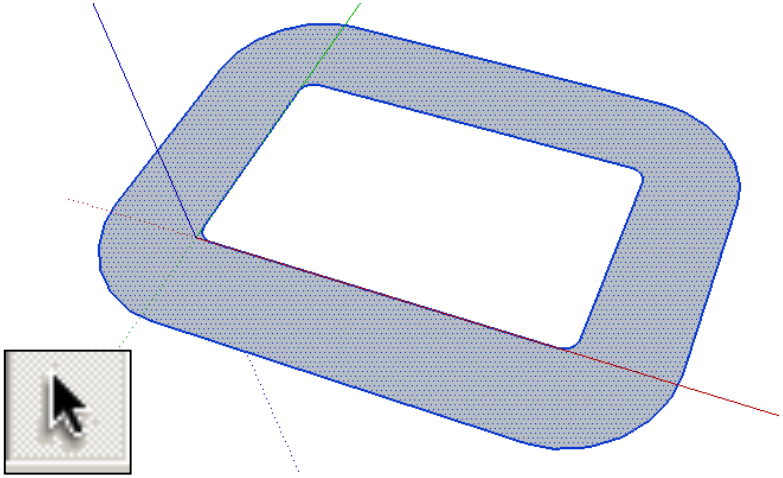
15. Use the ***offset tool*** to select the edge shown. Pull a parallel line outwards as shown.



16. Type in ***30*** and press ***enter.***

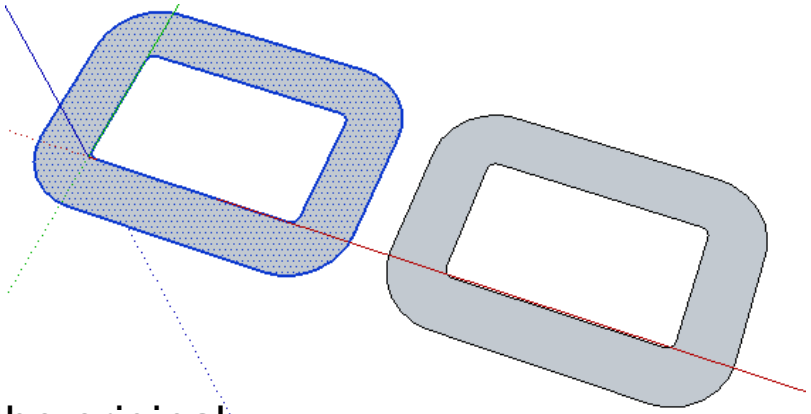


17. Use the ***select tool*** and click on the middle shape. Then ***press delete.***

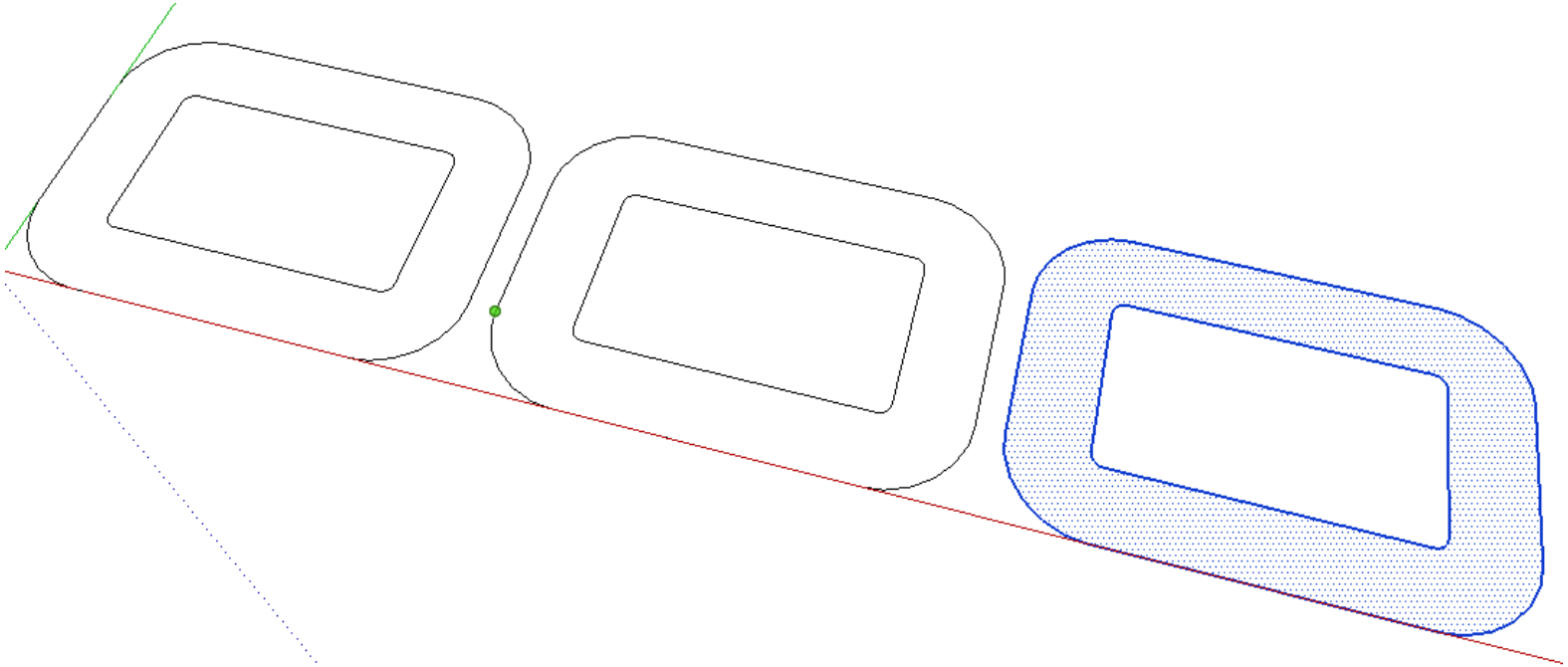


18. Use the ***select tool*** and click on the middle shape. Then ***click on it three times*** to select the entire object.

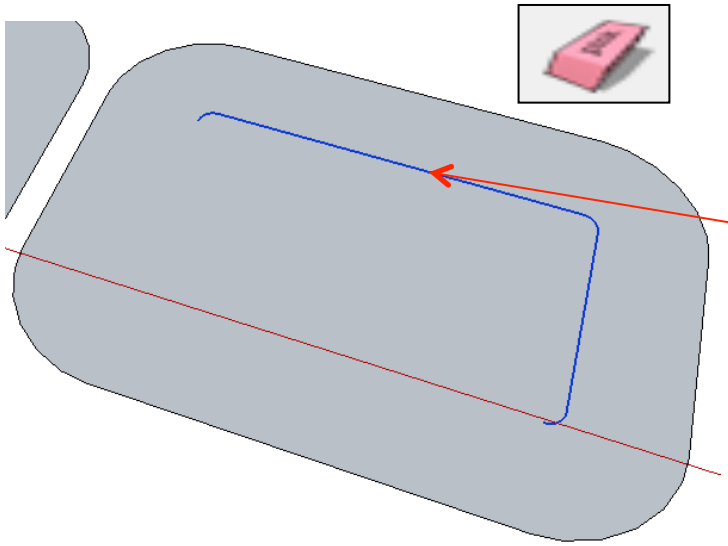
19. Hold the ***Control button down*** and then ***press C (copy)***
20. Hold the ***Control button down*** and then ***press V (paste)***



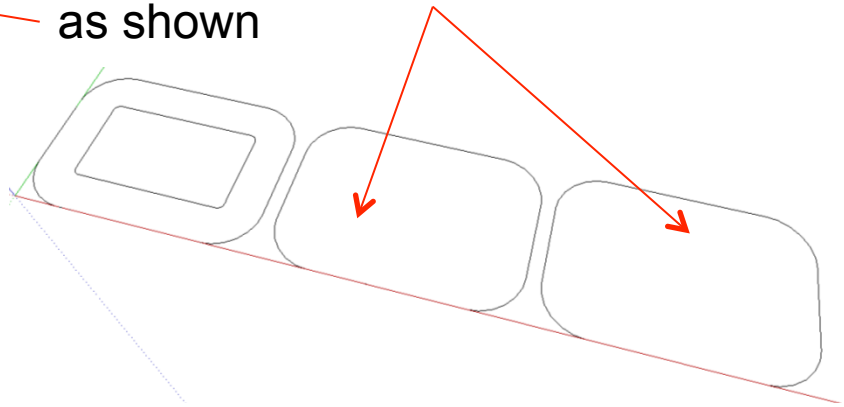
21. Move the piece to the right of the original



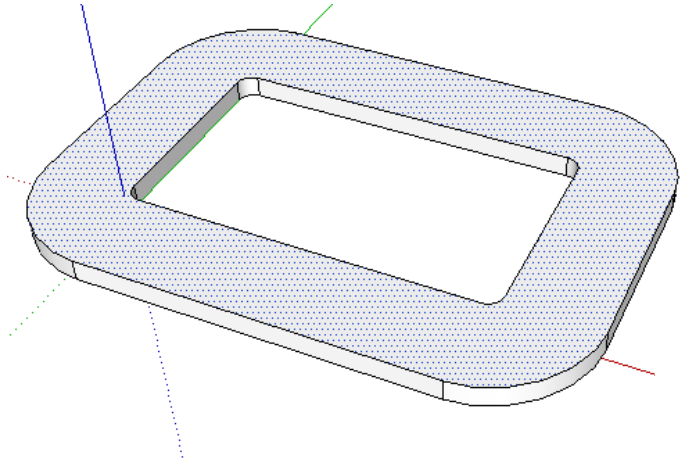
23. Repeat steps 19, 20 and 21 until you have three pieces



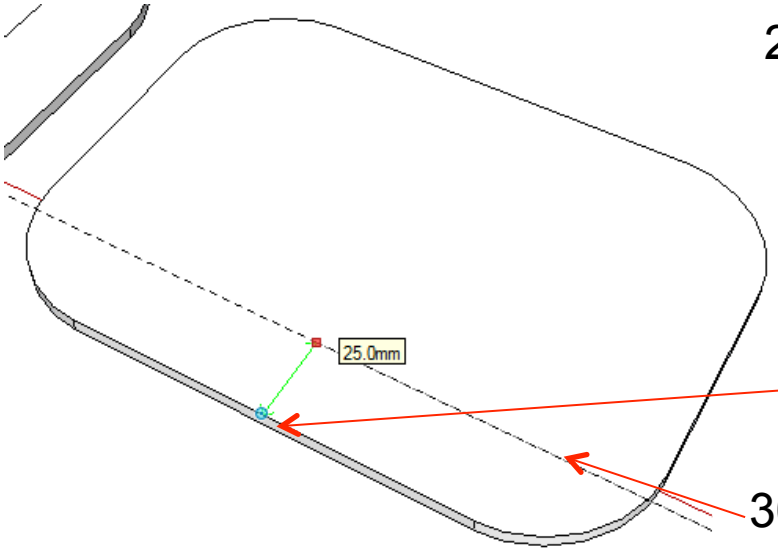
24. Use the ***rubber tool*** to erase the edge of the inside shape to make the last two pieces solid as shown

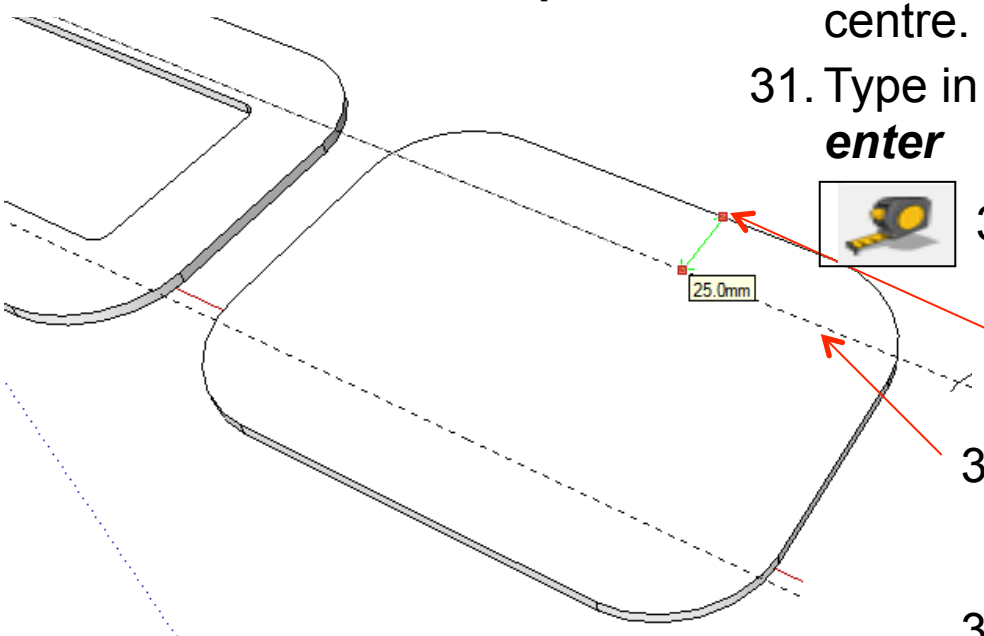


25. Use the ***push pull tool*** to raise each shape up. Type in ***4 and press enter.***



26. All four shapes should have a thickness of ***4mm*** which is the ***laser-ply material*** we will laser cut.





27. Use the second shape in from the left.

28. Select the tape measure tool.

29. Click on the edge shown.

30. Pull the tape measure into the centre.

31. Type in ***25*** and ***press enter***

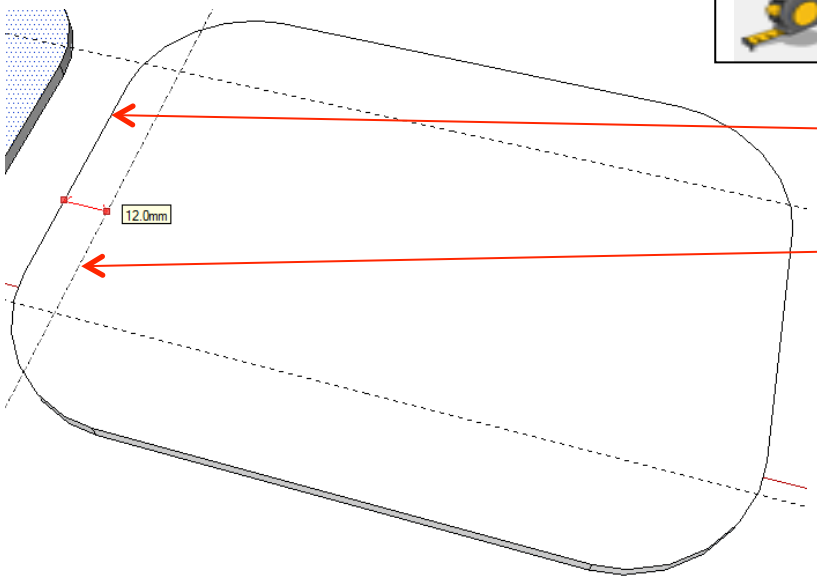
32. Select the tape measure tool.

33. Click on the edge shown.

34. Pull the tape measure into the centre.

35. Type in ***25*** and ***press enter***

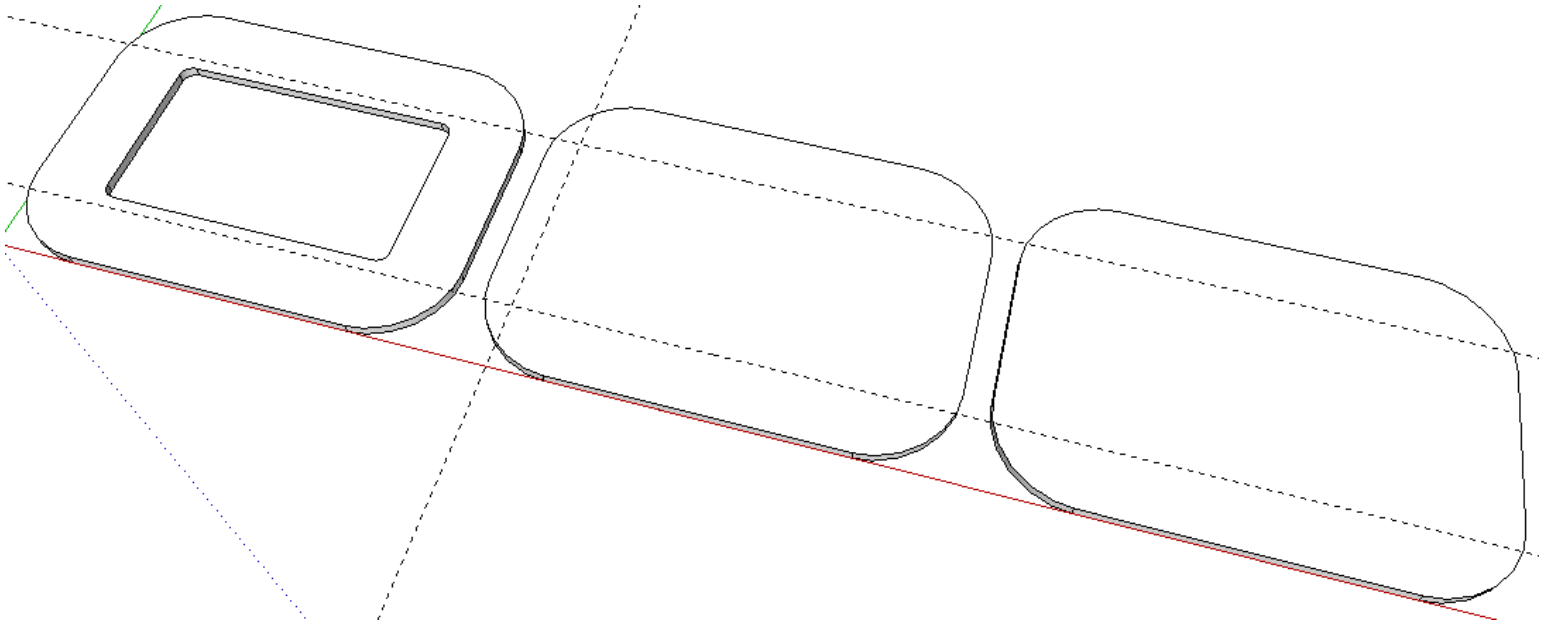
36. Select the tape measure tool.

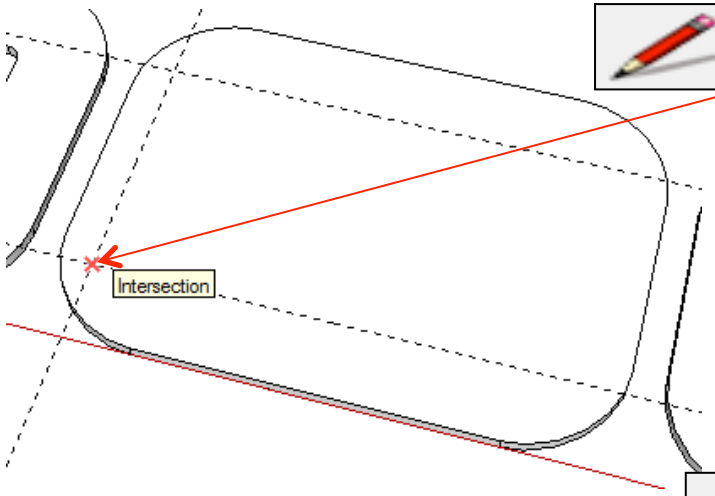


37. Click on the edge shown.

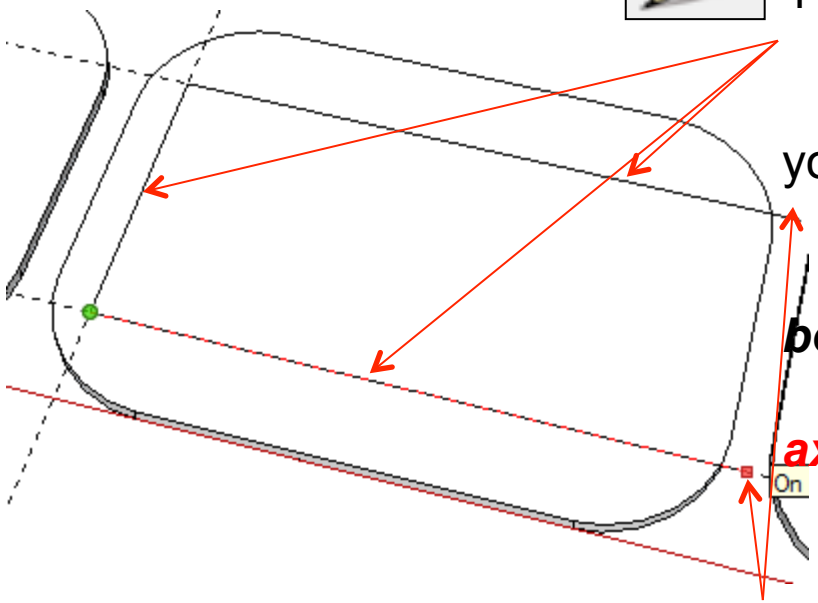
38. Pull the tape measure into the centre.

39. Type in ***12*** and ***press enter***



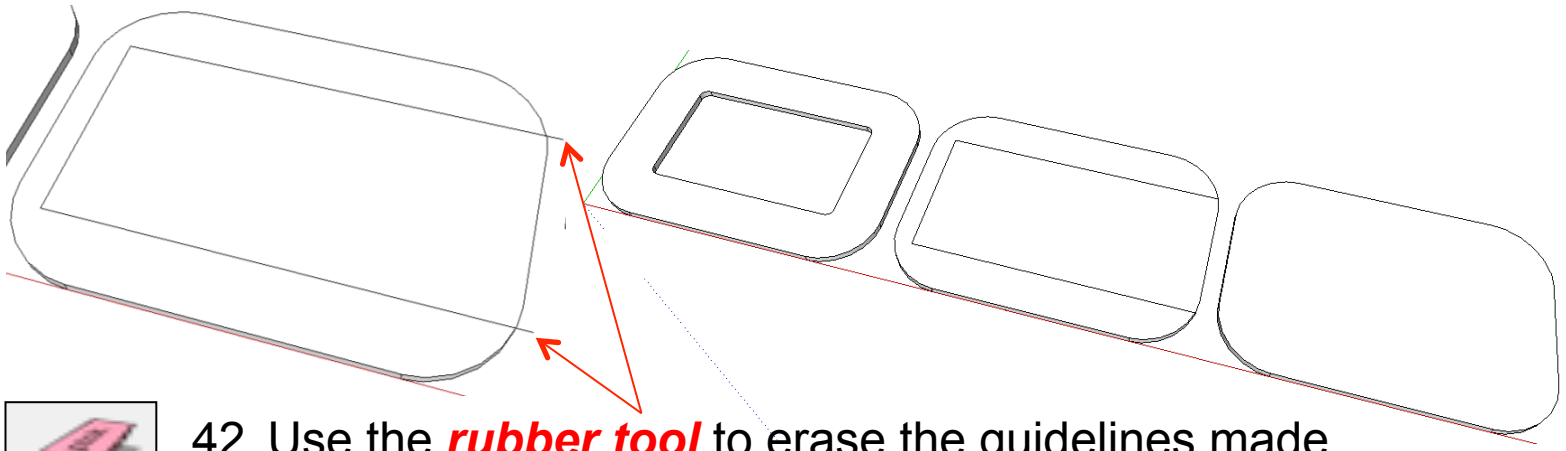


40. Select the ***pencil tool*** and snap to the intersection shown



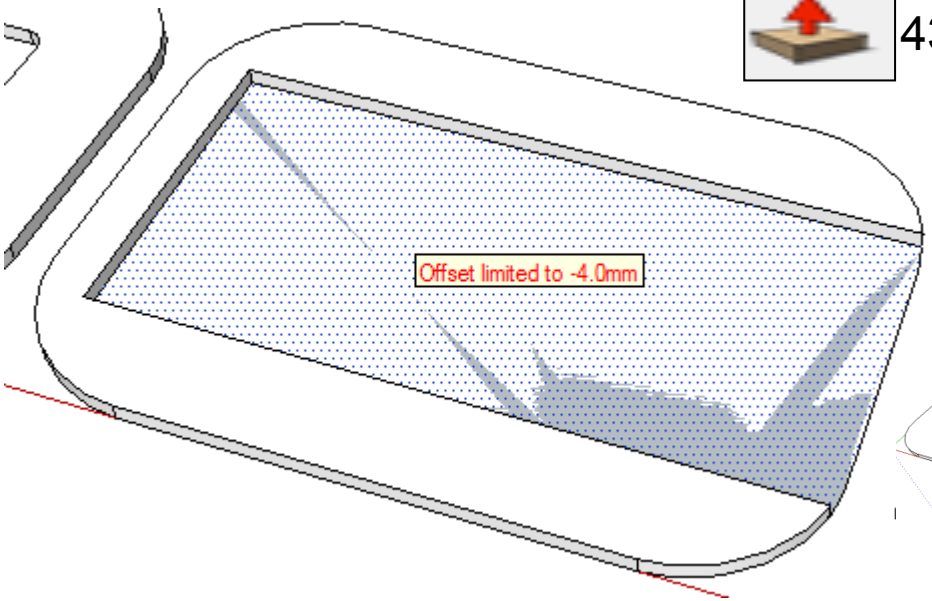
41. Use the ***pencil tool*** to draw lines over the construction lines you made with the tape measure earlier. ***These lines should be on the green axis or the red axis***

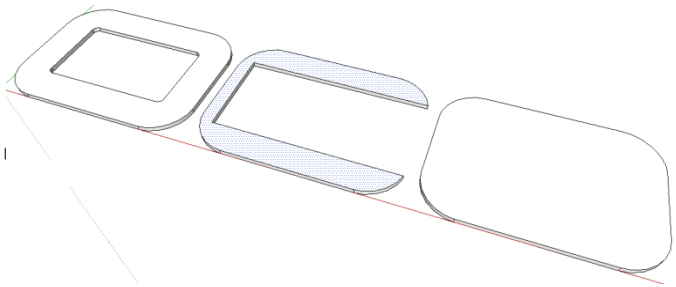
Note: On these two lines you may need to extend them past the edge to remain on the red axis

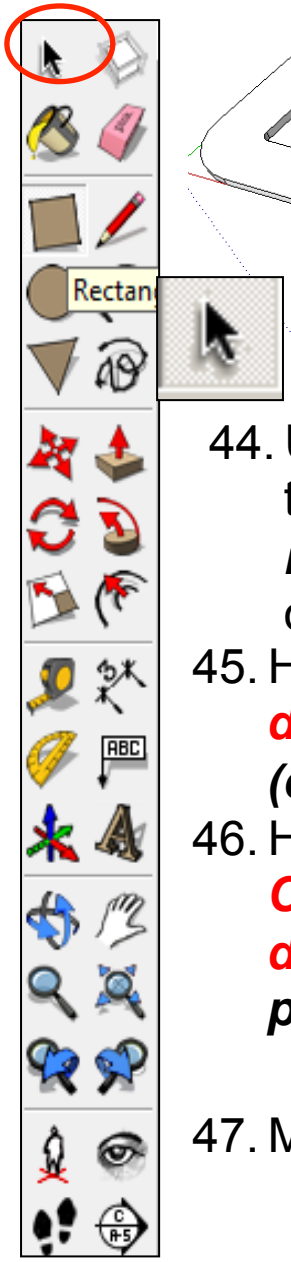


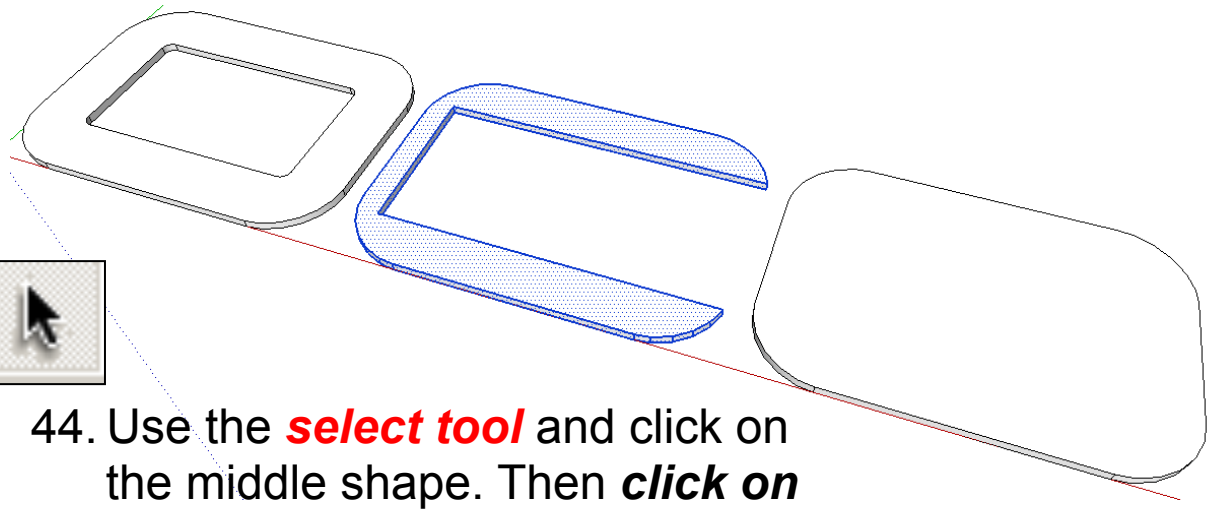
42. Use the ***rubber tool*** to erase the guidelines made by the tape measure and any excess lines hanging of the edge of the piece

43. Use the ***push pull tool*** to push the centre part away. You can push down and type **4** and ***press enter*** and its should disappear.

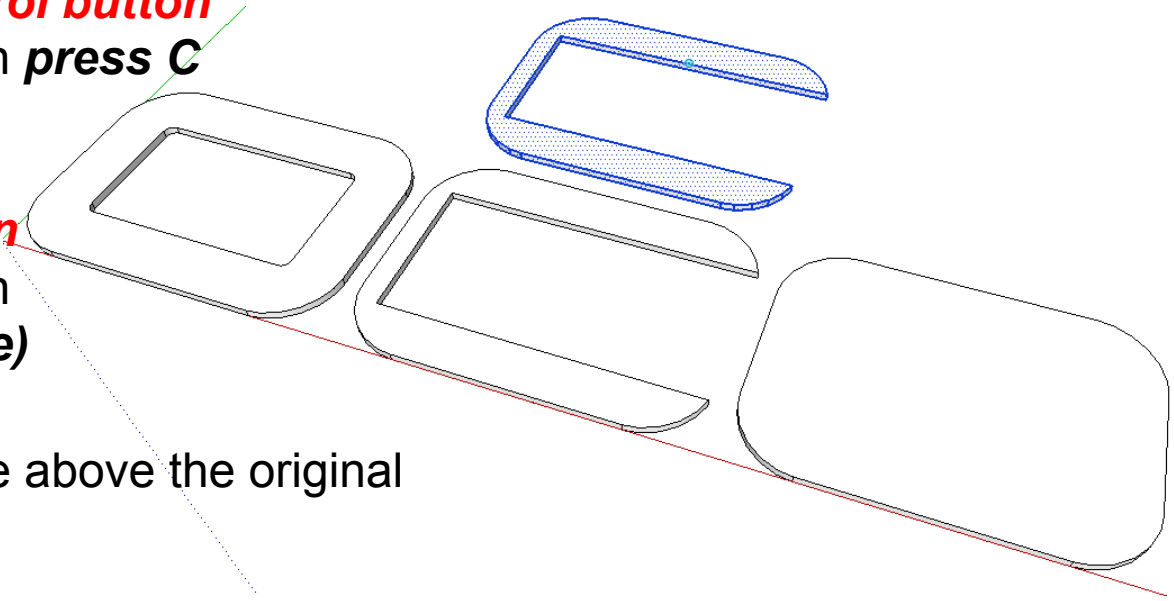






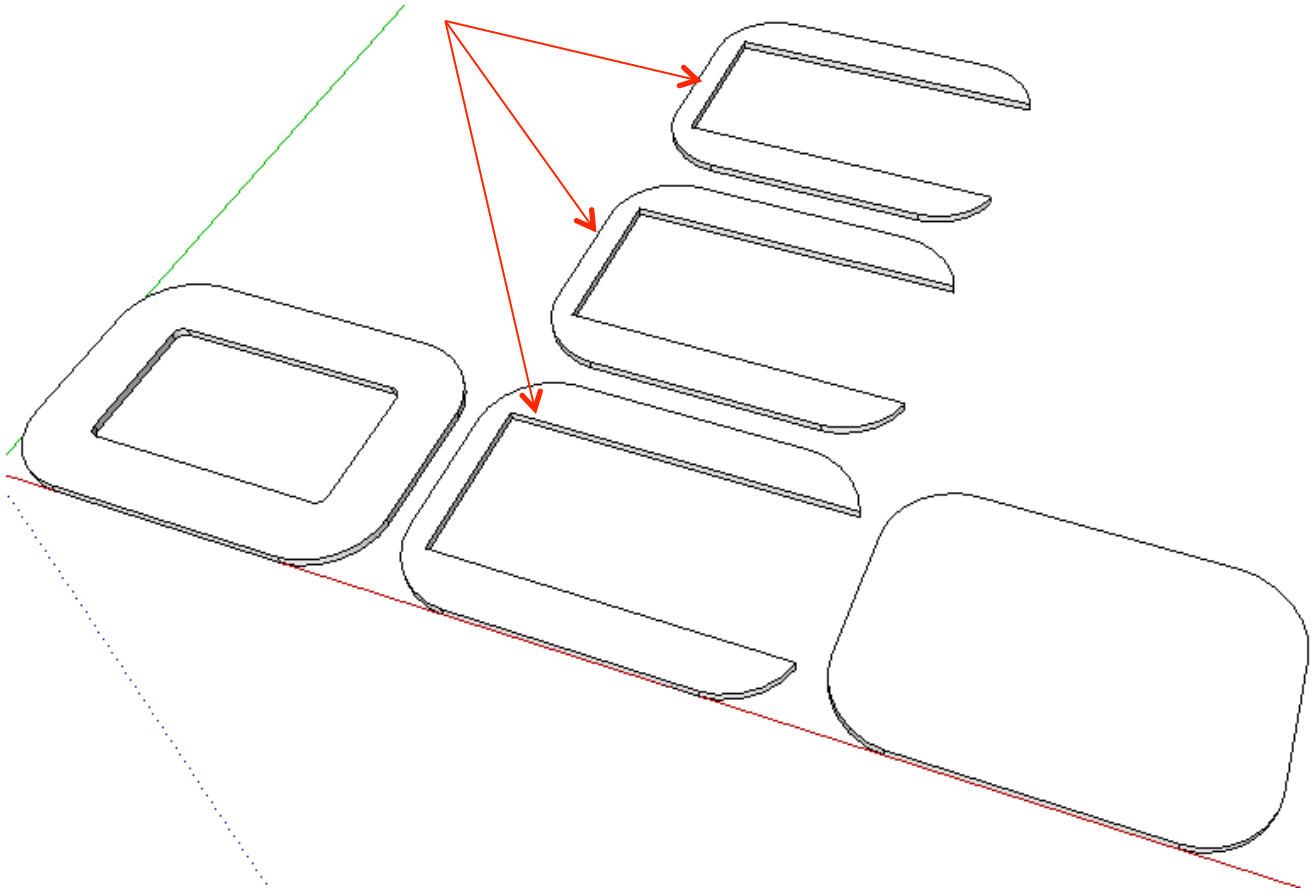


44. Use the ***select tool*** and click on the middle shape. Then ***click on it three times*** to select the entire object.
45. Hold the ***Control button down*** and then ***press C (copy)***
46. Hold the ***Control button down*** and then ***press V (paste)***



47. Move the piece above the original

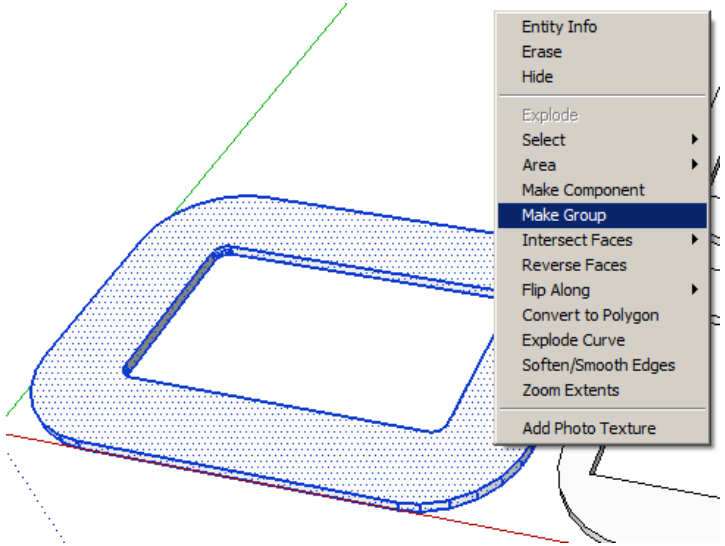
48. ***Repeat steps 44, 45, 46*** and ***47*** until you have ***three pieces***



49. You should now have a ***front piece***, ***middle pieces*** and ***back piece.***

CAD Tutorial 20: Gadget Tidy

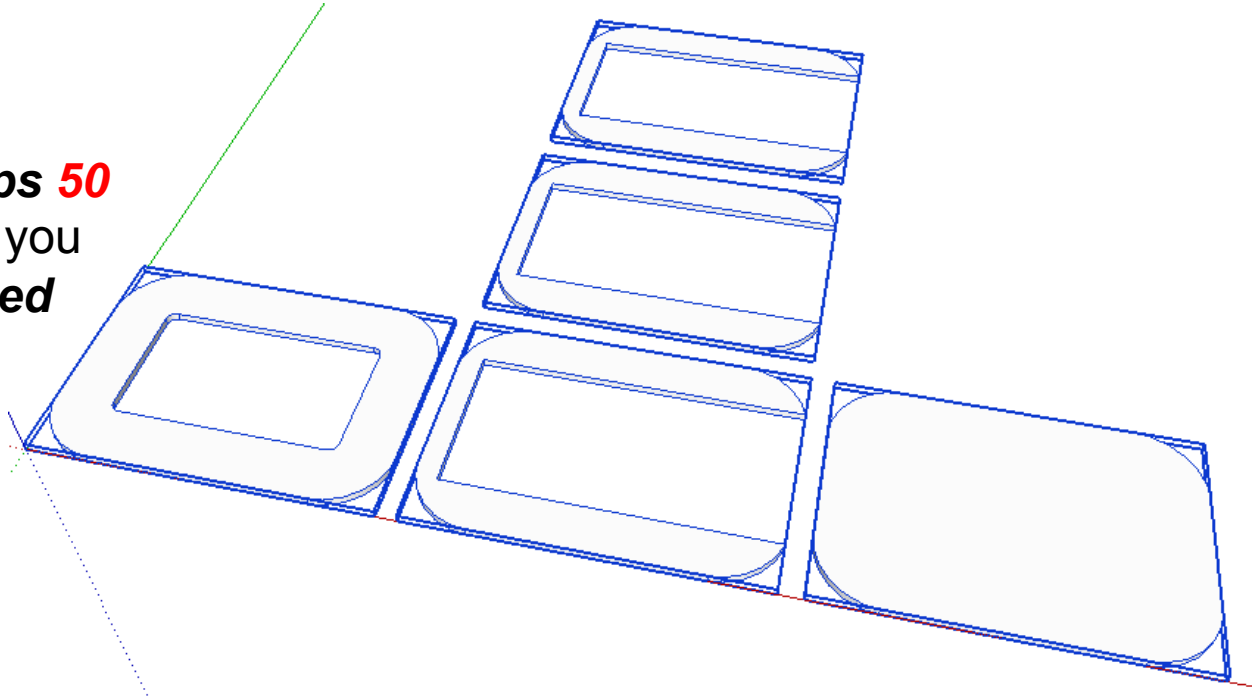
Assembly and Details

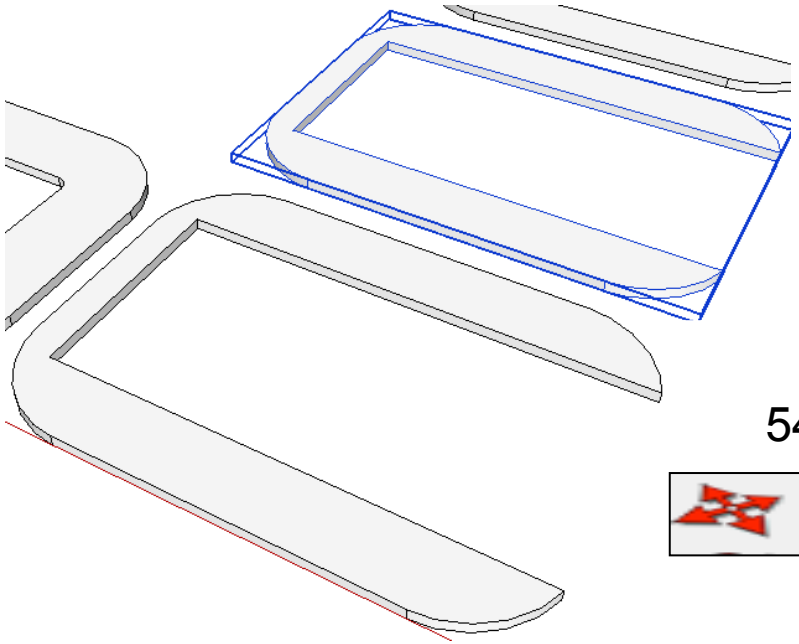


50. Use the ***select tool*** and click on the middle shape. Then ***click on it three times*** to select the entire object.

51. On the mouse ***right click*** and then select ***make group.***

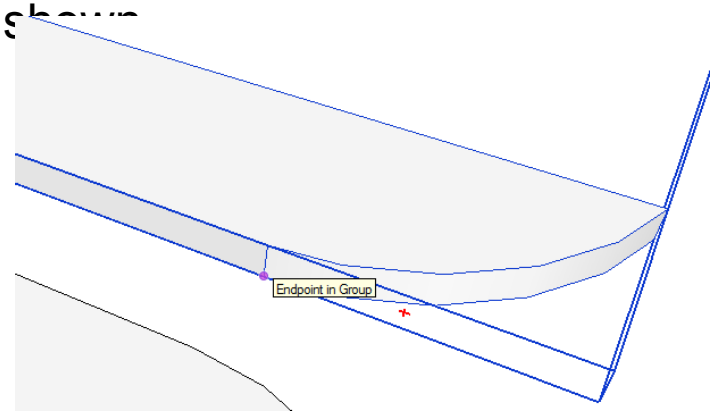
52. ***Repeat steps 50*** and ***51*** until you have ***grouped all the five pieces separately***



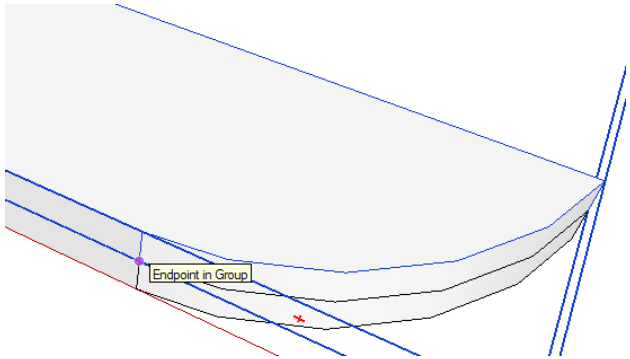


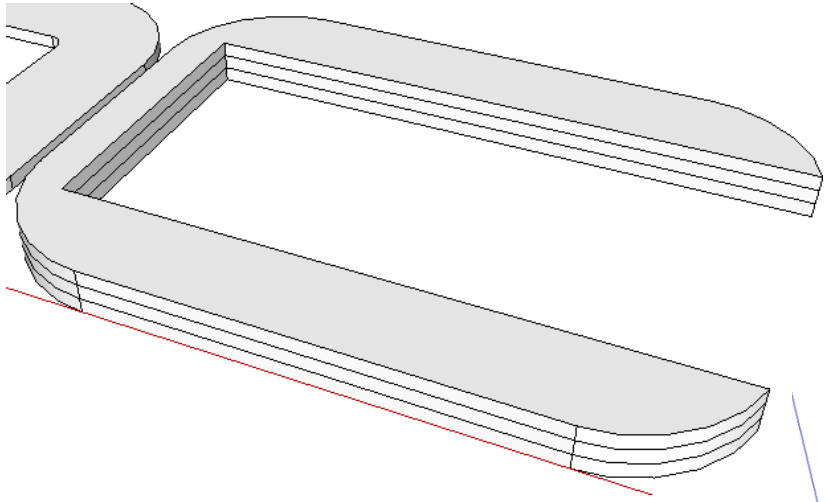
53. Use the ***select tool*** and click on the shape shown.

54. Select the ***move tool*** and click on an endpoint like the one shown



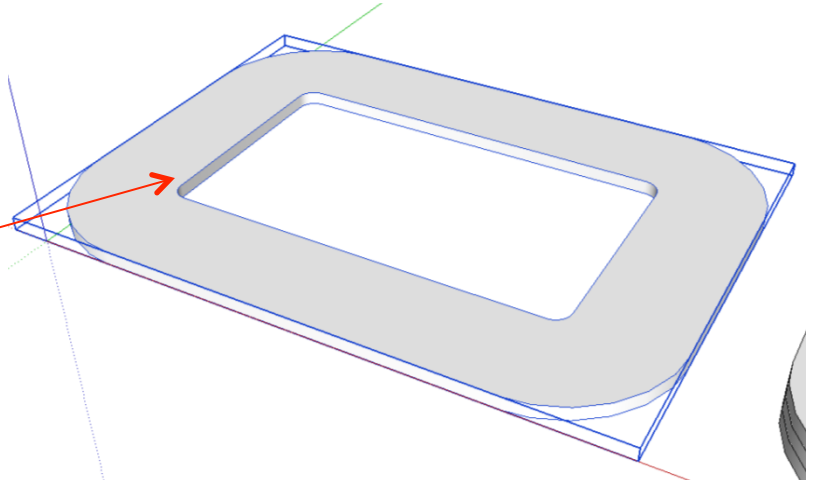
55. Using the ***move tool*** place one part on top of the other as shown



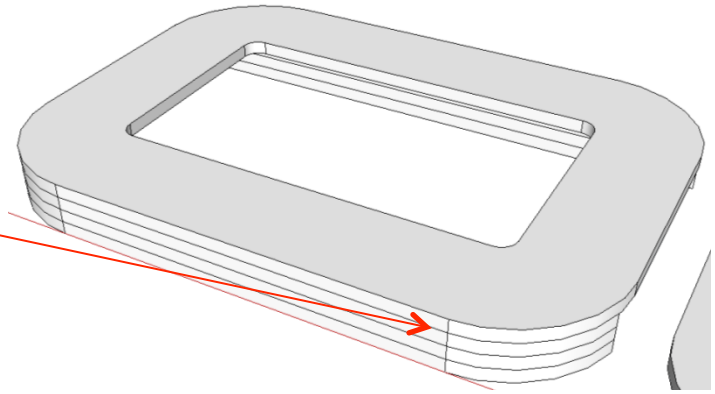


56. ***Repeat steps 53, 54*** and ***55*** so you have the three pieces stacked on top of the other as shown

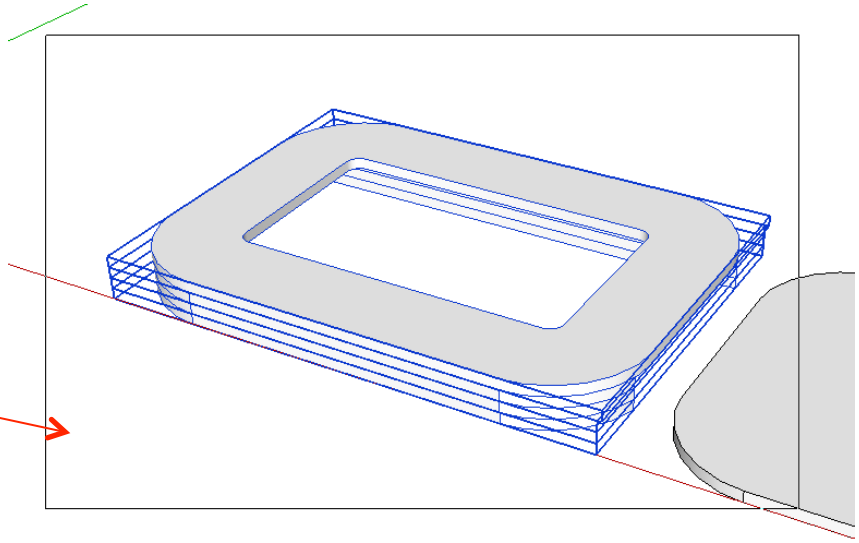
57. Use the ***select tool*** and click on the front screen shown.



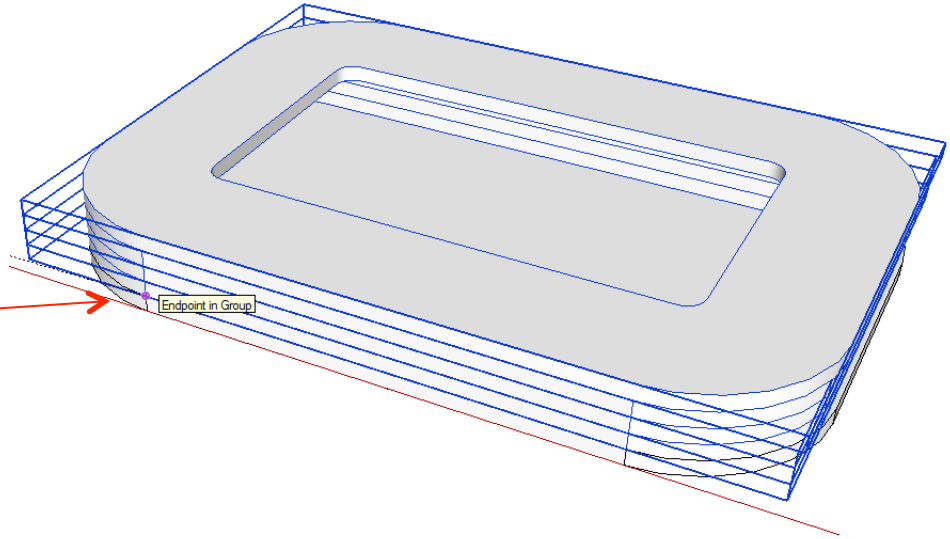
58. Select the ***move tool*** and click on an endpoint like the one show

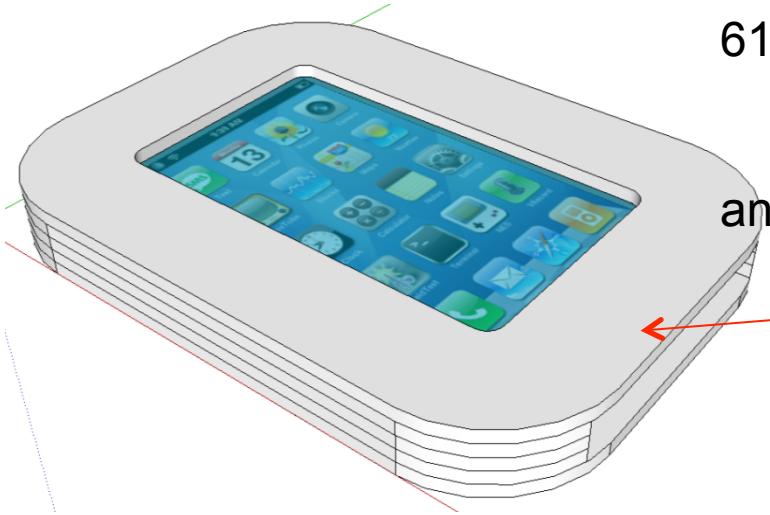


59. Use the ***select tool*** and ***drag the cursor diagonally*** over the main part of the phone stand as shown to ***highlight*** all of it in ***blue***



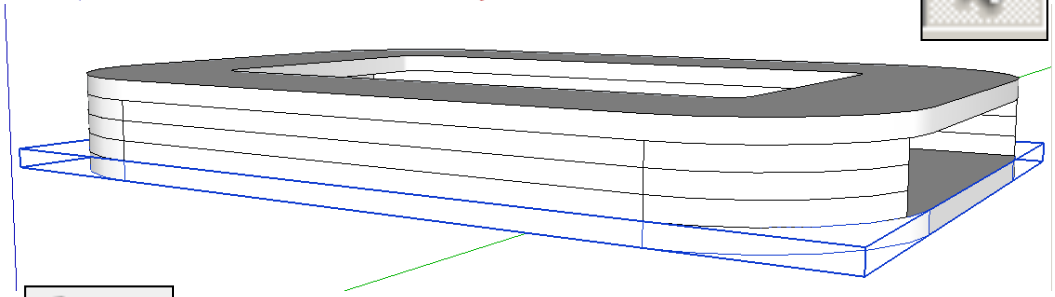
60. Select the ***move tool*** and move the main body onto the back piece using the endpoints that you used previously





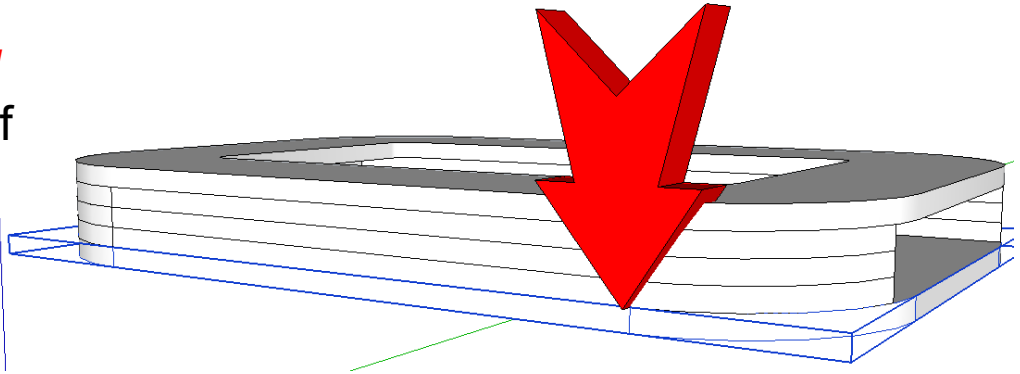
61. This is how the front of the TV stand will looks. We now need focus on details such as speakers, legs antennas etc. the phone slides in and out here…….

62. Use the ***select tool*** and click on the bottom back piece.

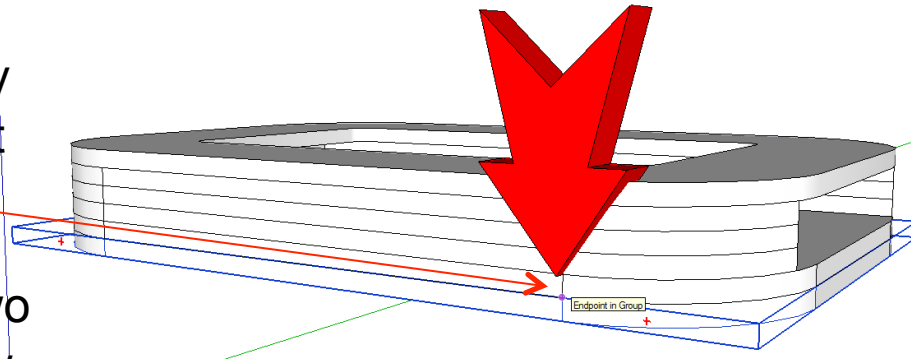


63. Select the ***move tool*** and click on the top of the endpoint shown.

Press Ctrl to copy

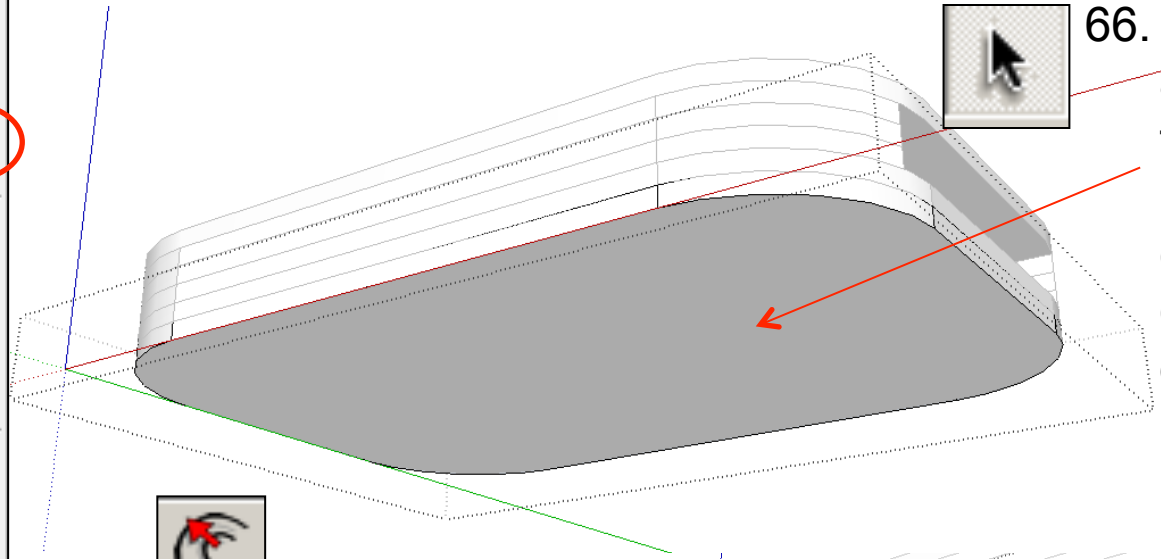


64. Using the ***move tool*** move it directly below onto the next endpoint.

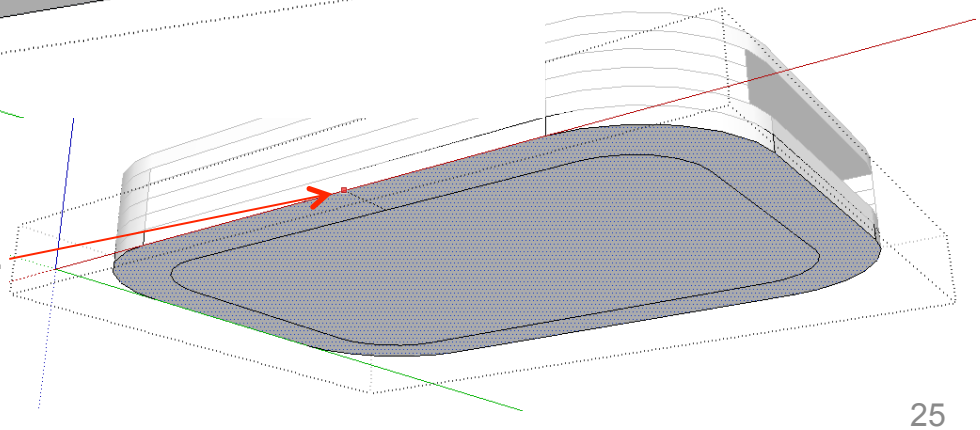


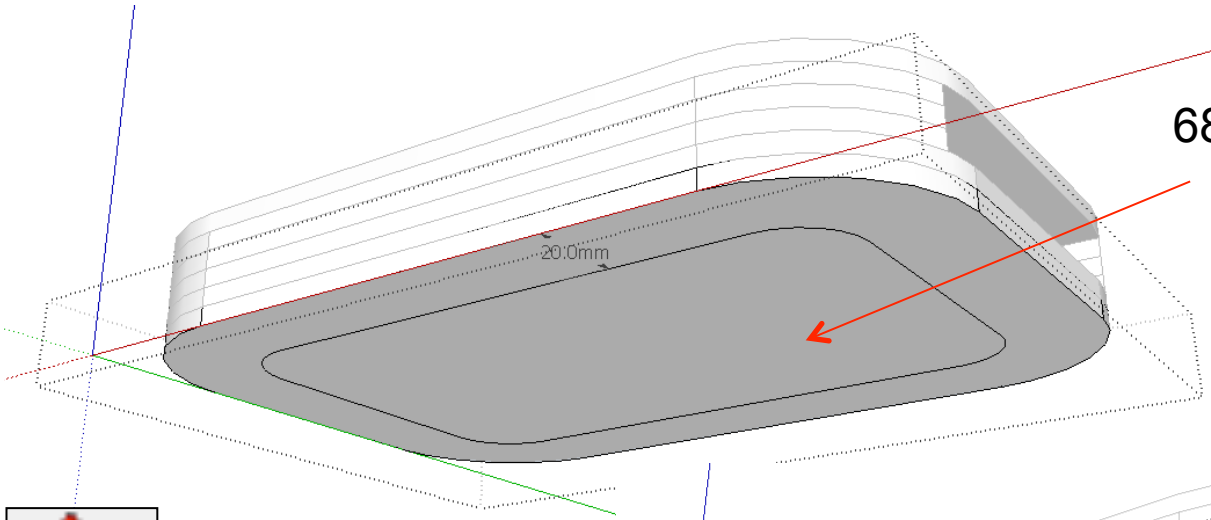
65. You should have two back pieces for now.

66. Use the ***select tool*** and double click on the bottom back piece to be able to edit it. Everything else should be greyed out……..



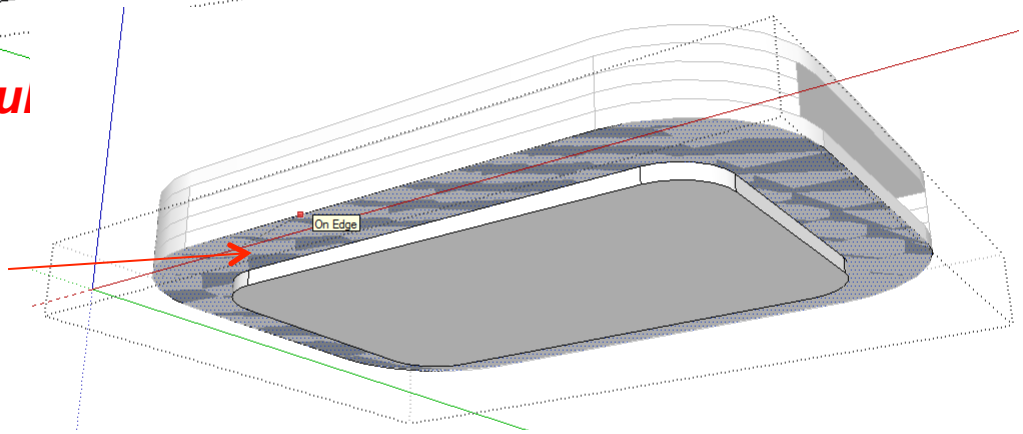
67. Use the ***offset tool*** to select the edge shown. Pull a parallel line inwards as shown.

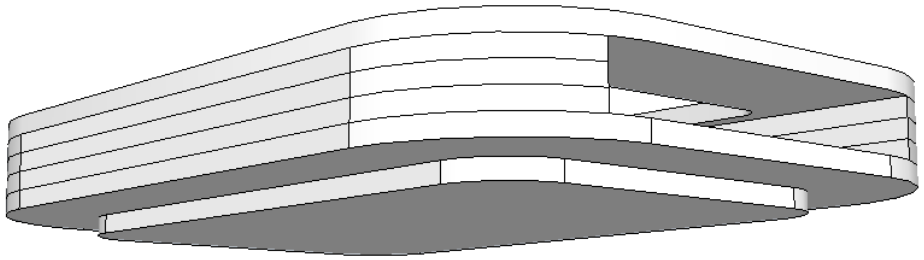




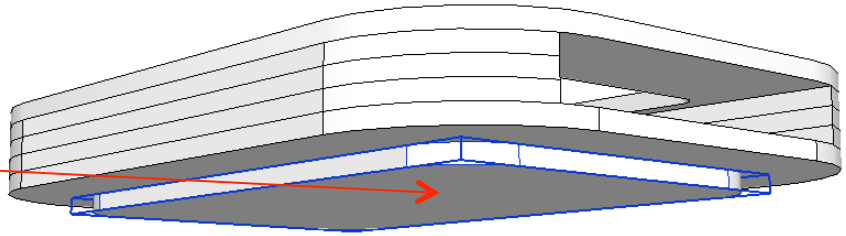
68. ***Type in 20*** and ***press enter*** to set the distance.

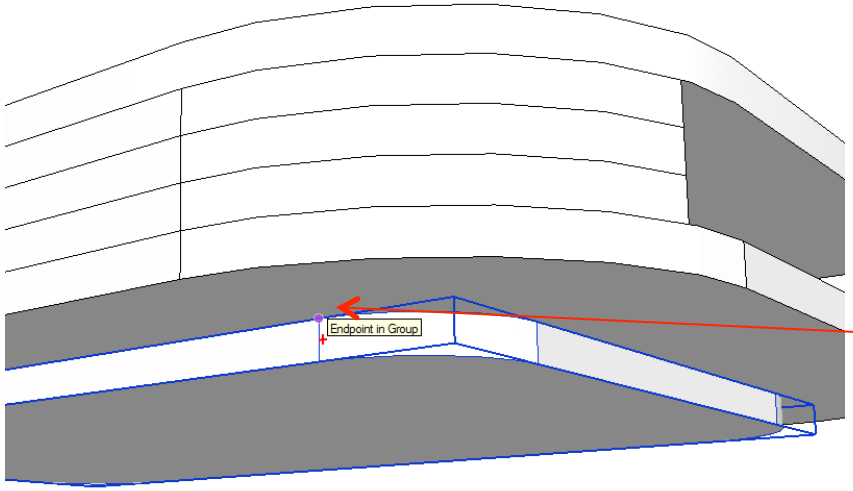
69. Use the ***push pull tool*** to push the edge away. You can push down and type **4** and ***press enter*** and its should





70. Use the ***select tool*** and click on the bottom back piece you have just drawn.

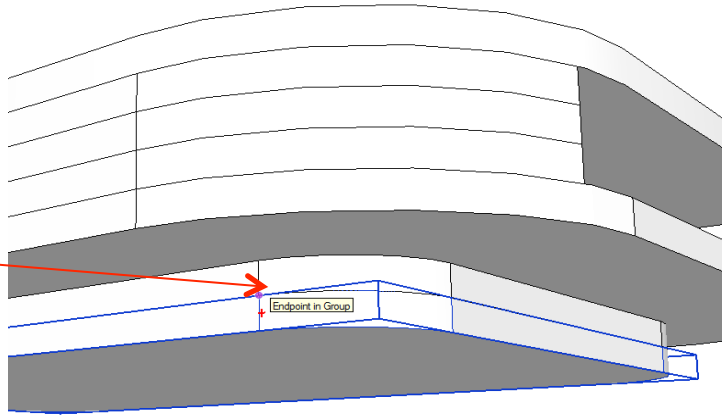


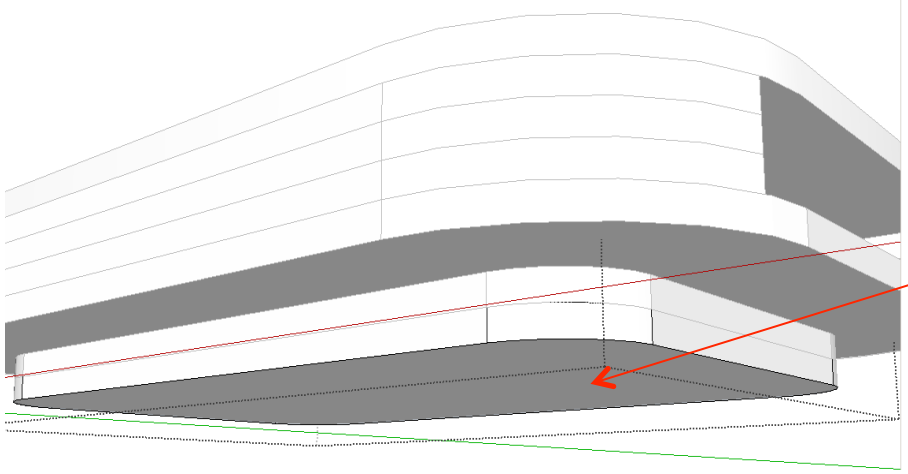


71. Select the ***move tool*** and click on the top of the endpoint shown.

Press Ctrl to copy

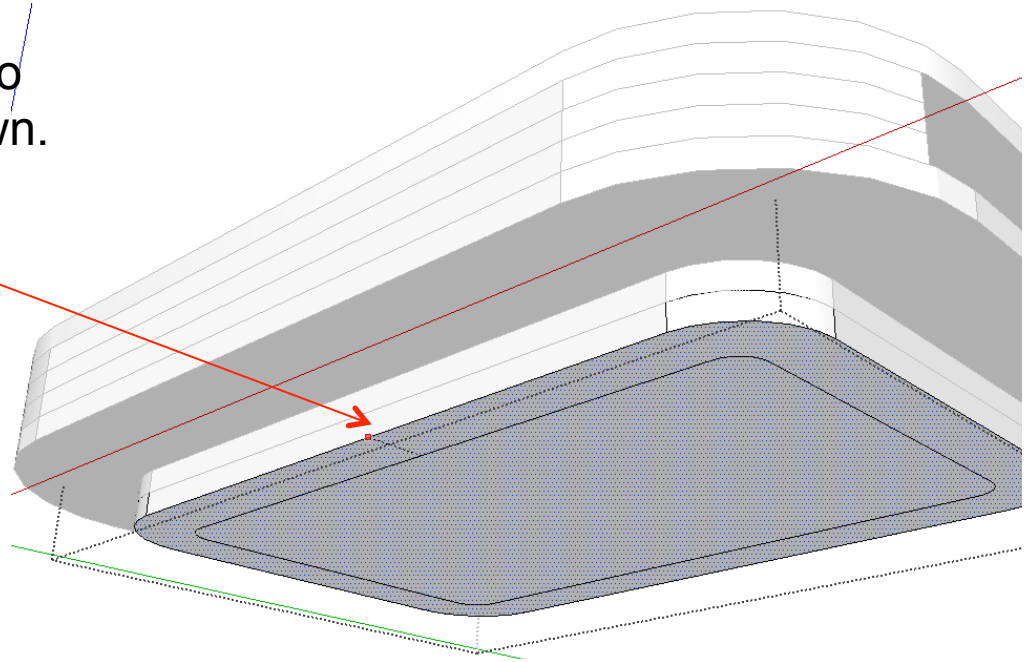
72 Using the ***move tool*** move it directly below onto the next endpoint.



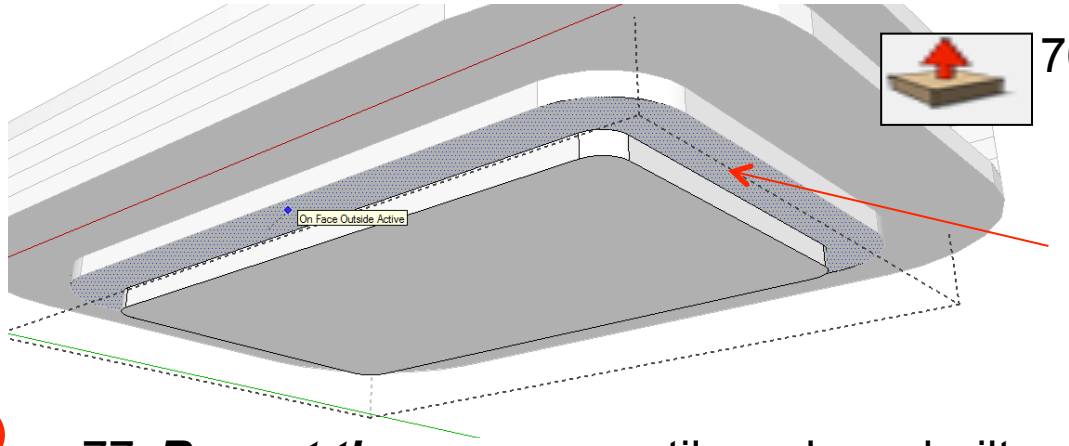


73. Use the ***select tool*** and double click on the bottom back piece to be able to edit it. Everything else should be greyed out……..

74. Use the ***offset tool*** to select the edge shown. Pull a parallel line inwards as shown.

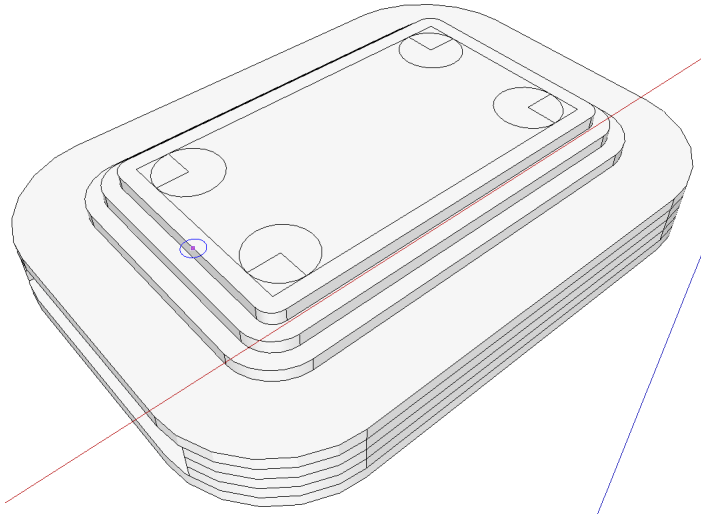


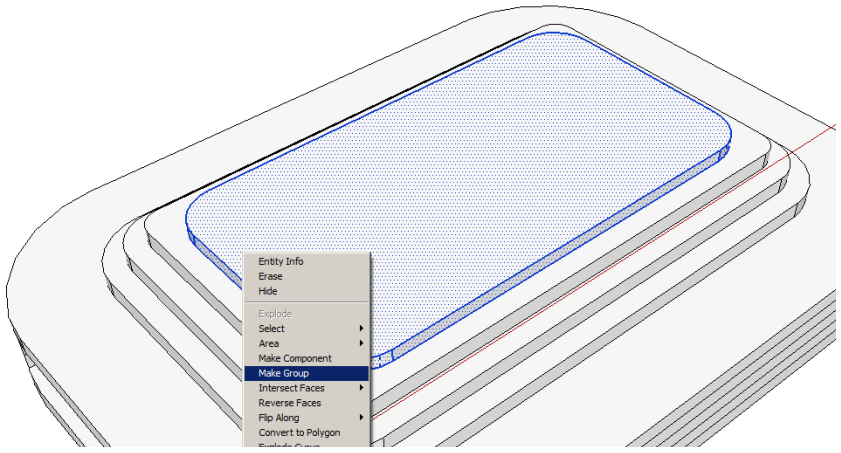
75. ***Type in 10*** and ***press enter*** to set the distance.

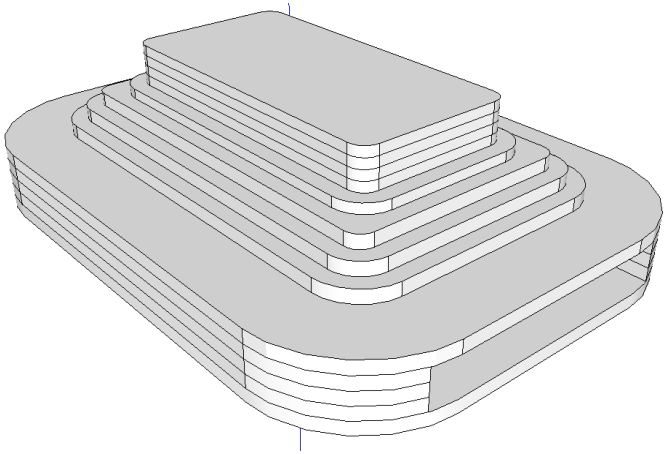


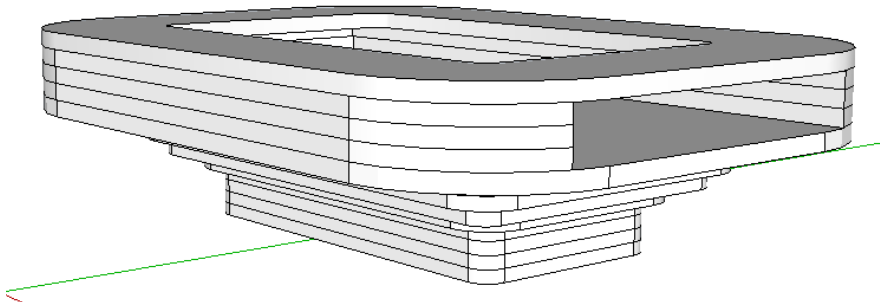
76. Use the ***push pull tool*** to push the edge away. You can push down and type **4** and ***press enter*** and its should disappear.

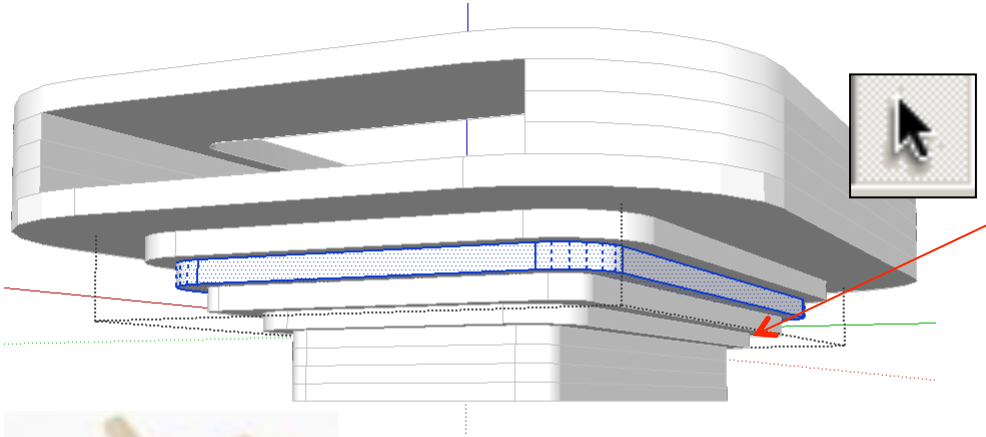
77. ***Repeat the process*** until you have built up the back of the retro TV. Change the distance on the ***offset tool*** from ***10mm to 5mm*** if you wish or less. Draw your own shapes on the back if you are not happy. Remember that the thickness for each piece is 4mm for laser-ply and they should be individually grouped







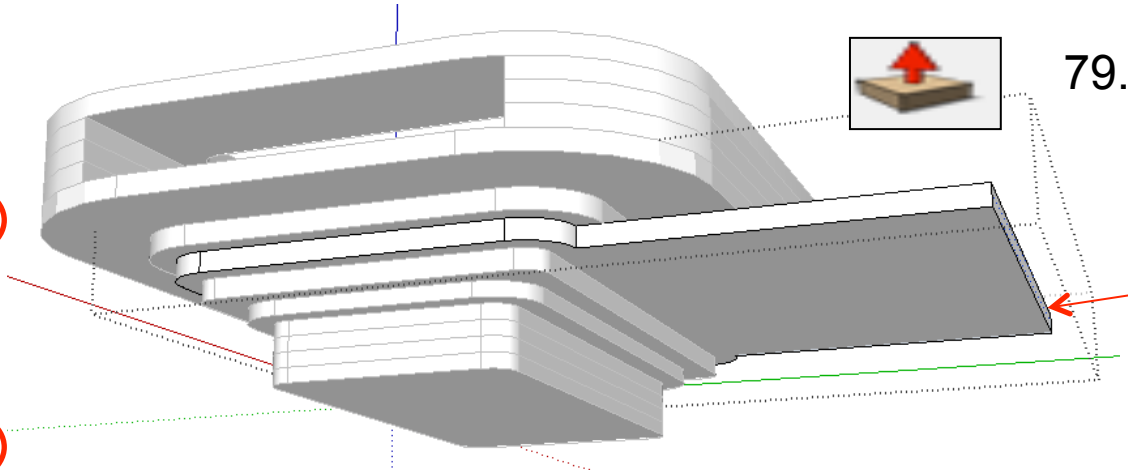




78. Use the ***select tool*** and click on a back piece twice to edit. Leave a space between it and the main part of the TV

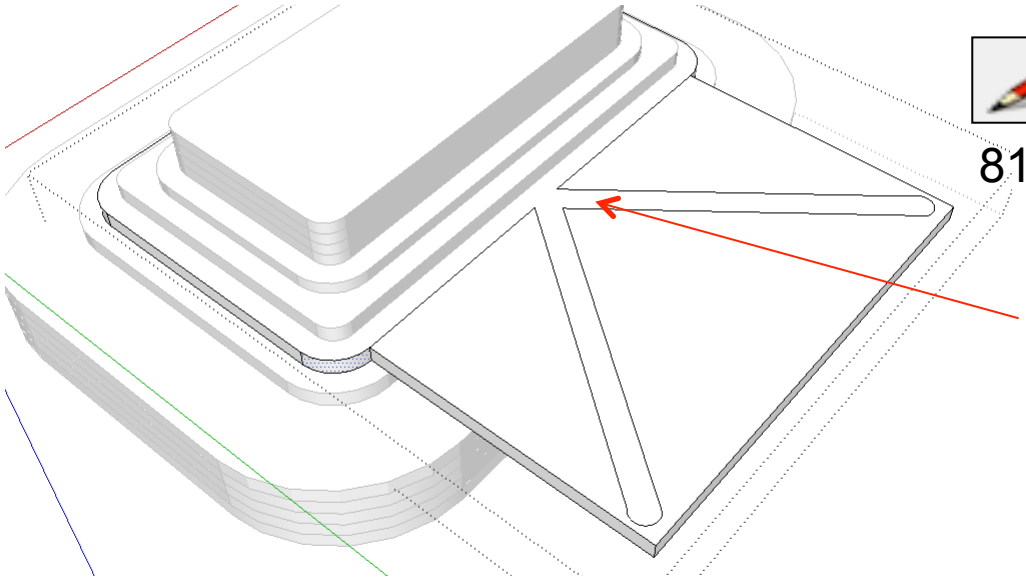
We are going to add

an TV aerial



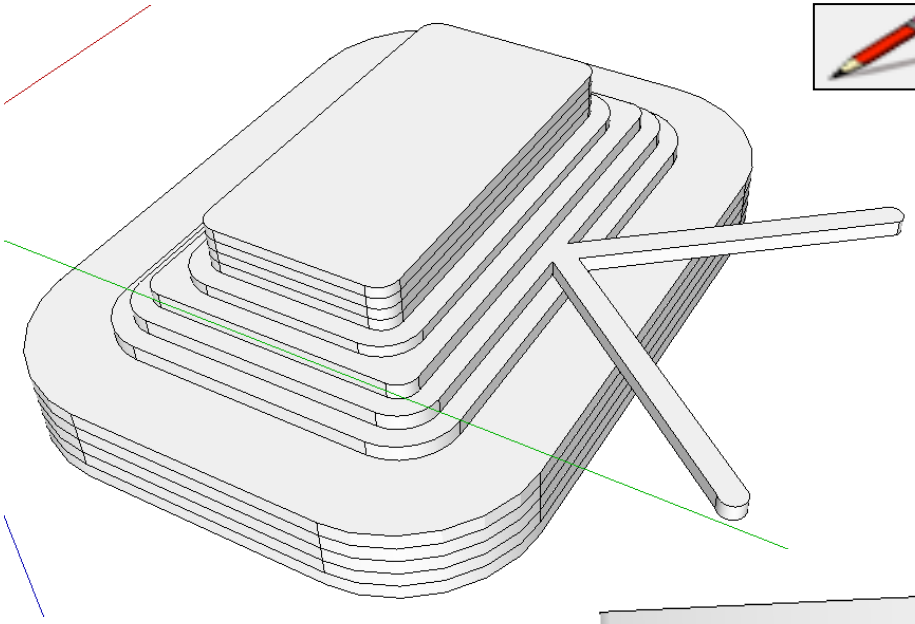
79. Use the ***push pull tool*** to pull the top edge out as shown. ***Type in 70*** and ***press enter.***

80. Type in ***70*** and ***press enter***

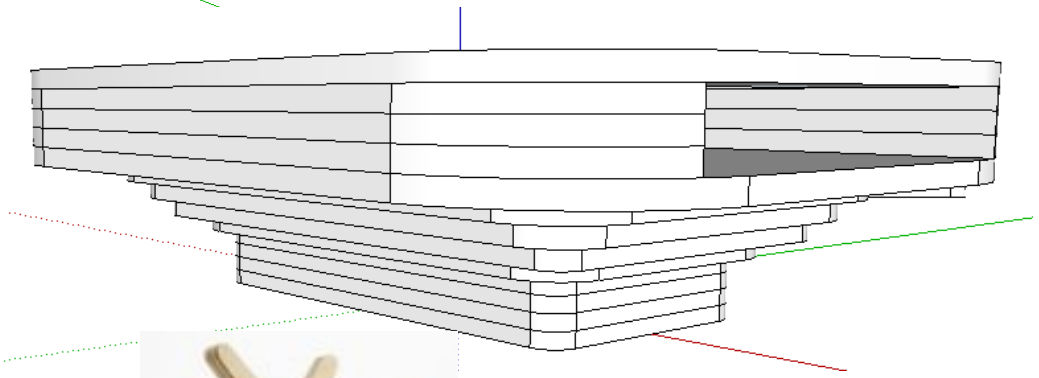


81. Use the ***pencil tool*** and ***arc tool or circle tool*** to draw on the TV antennas.

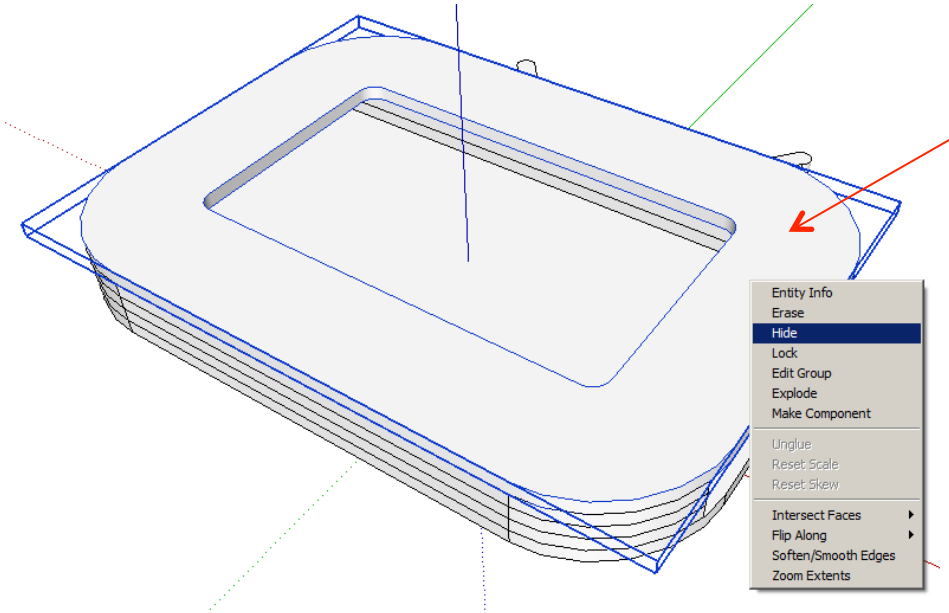
Style them however you wish.



82. Use the ***push pull tool*** to get rid of the excess around the TV antennas



83. Use the ***rotate tool*** and move the TV stand around to the opposite side of the aerial so you can see the underneath. This is where we add the TV feet.



84. Use the ***select tool*** and select the top piece.

Right click and then press hide.

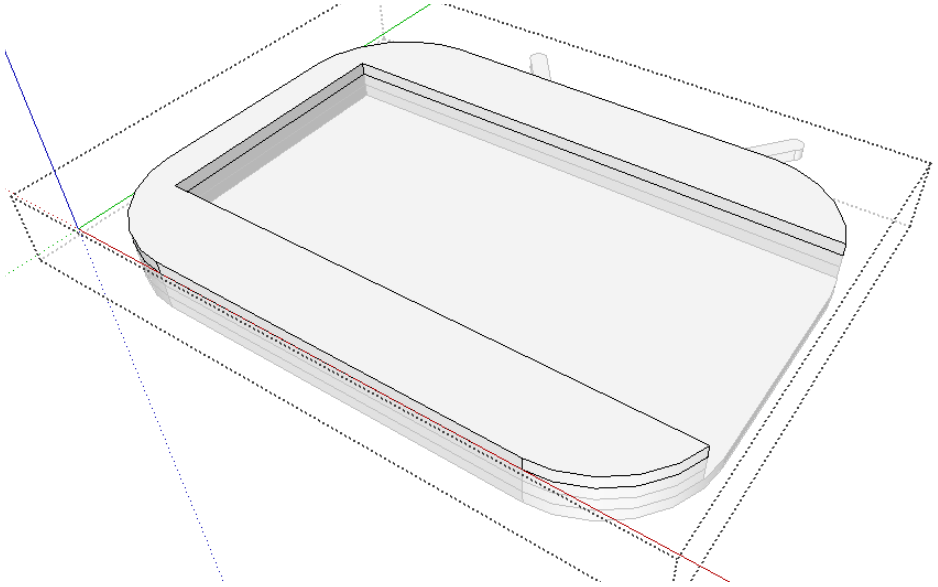
85. Use the ***select tool*** and

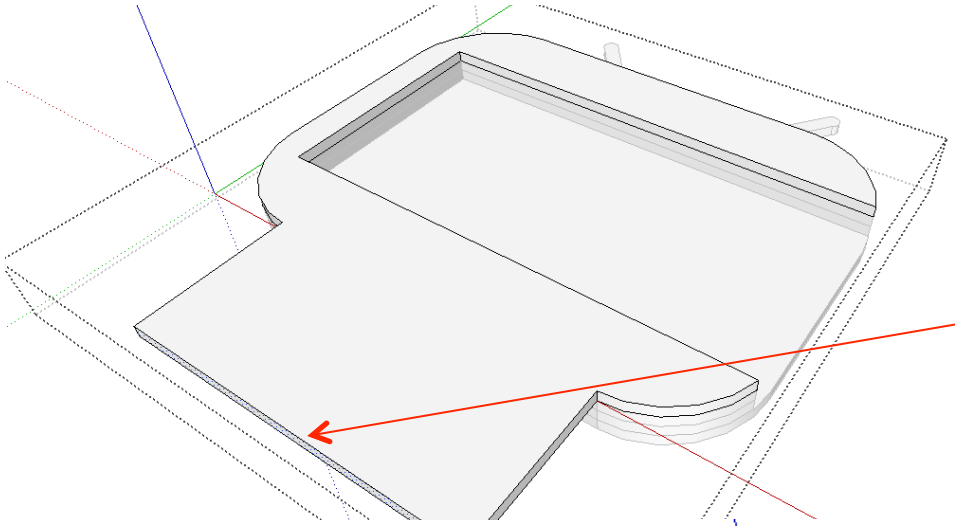
on the next piece down and click twice

to edit it.

Everything else should

be greyed out.

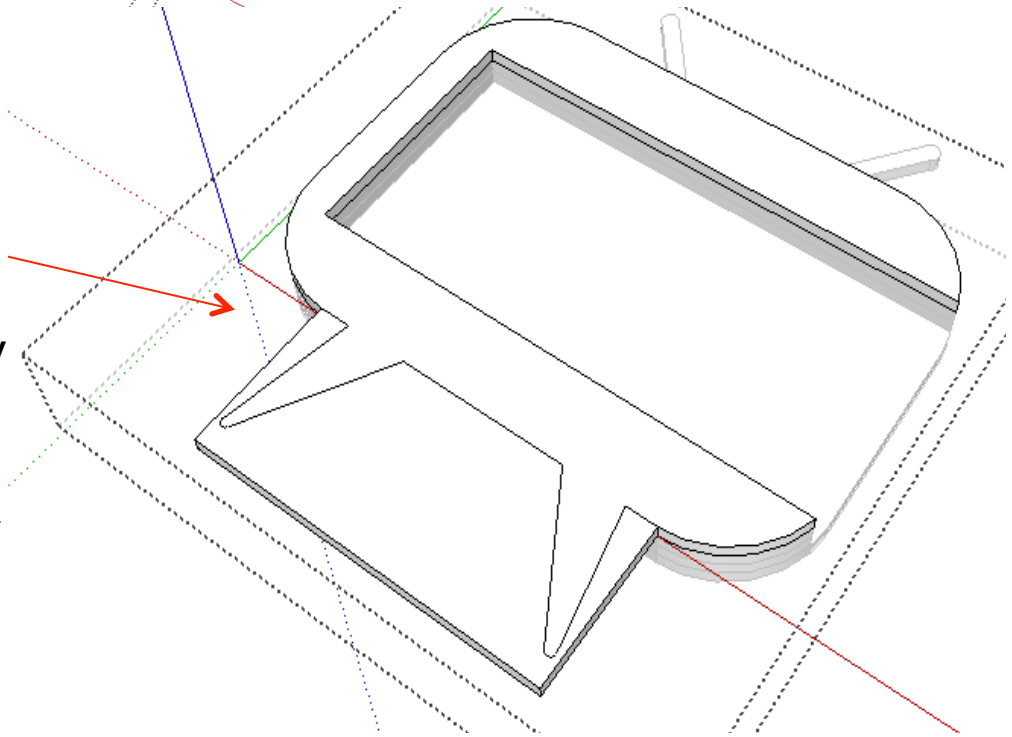




86. Use the ***push pull tool*** to pull the edge out as shown. Type in ***50 and press enter.***

87. Use the ***pencil tool*** and ***arc tool or circle tool*** to draw on the TV feet.

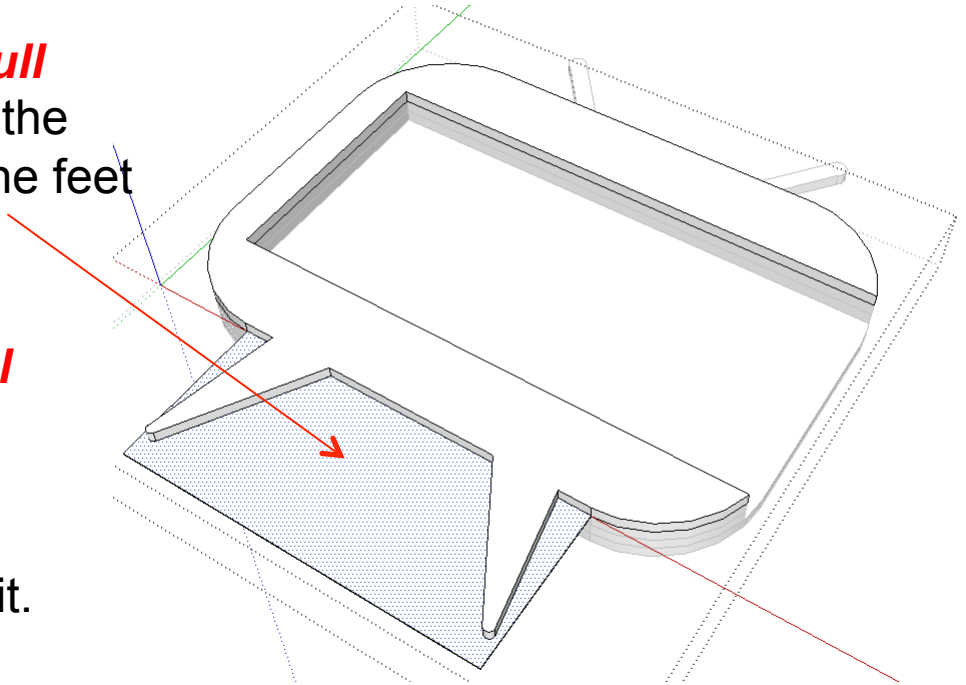
Style them however you wish.

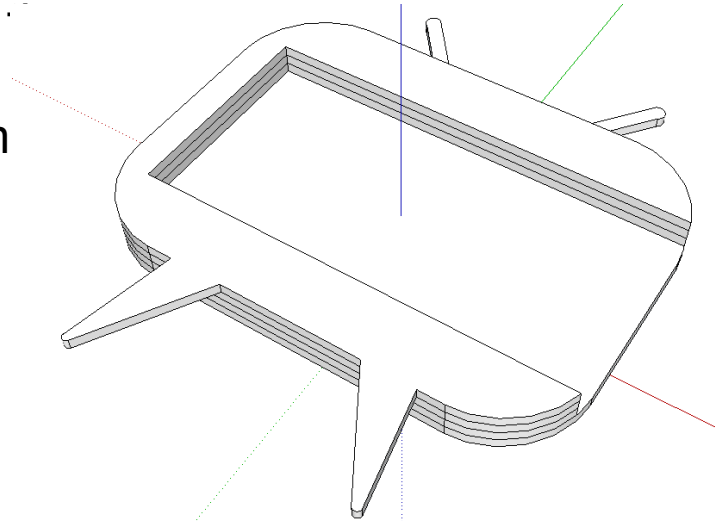


88. Use the ***push pull tool*** to get rid of the excess around the feet

89. Use the ***select tool*** and click anywhere off the object to unselect it.

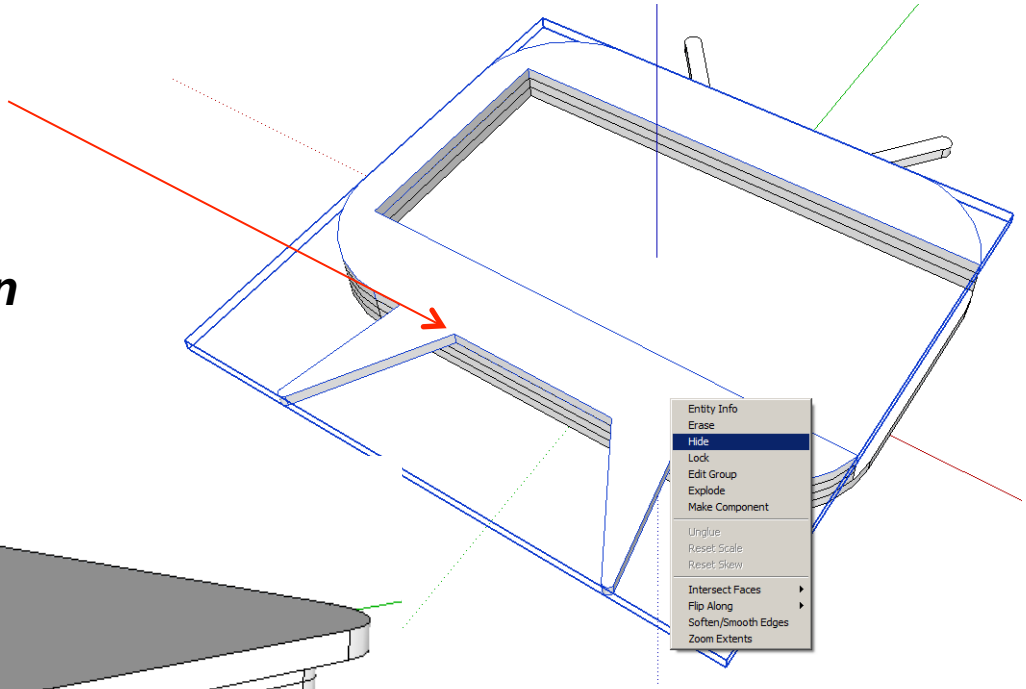
The rest of the object should come into focus.

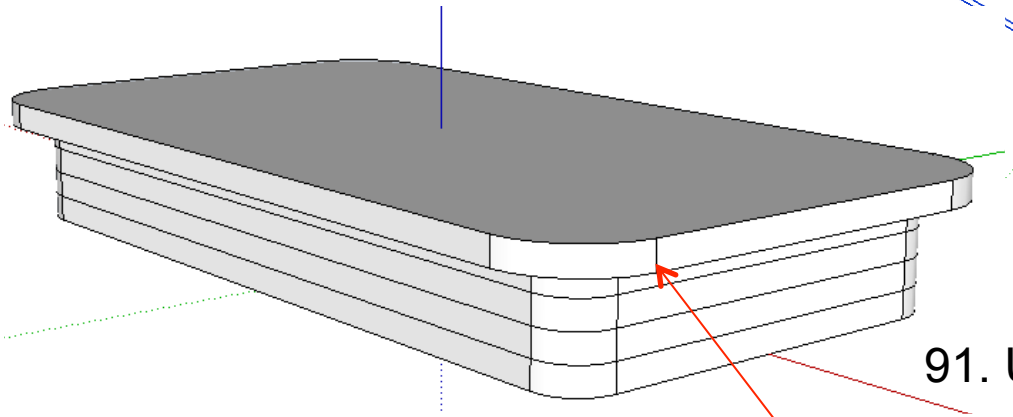




90. Use the ***select tool*** and select the top piece.

Right click and then press hide.

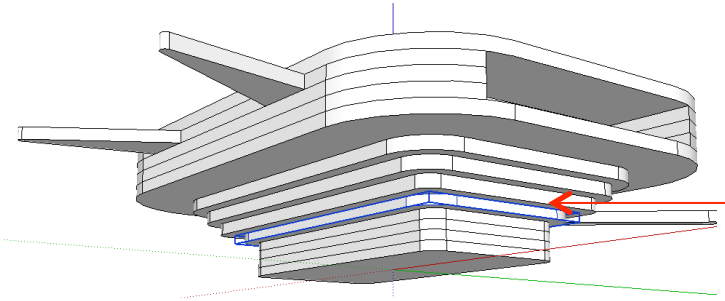


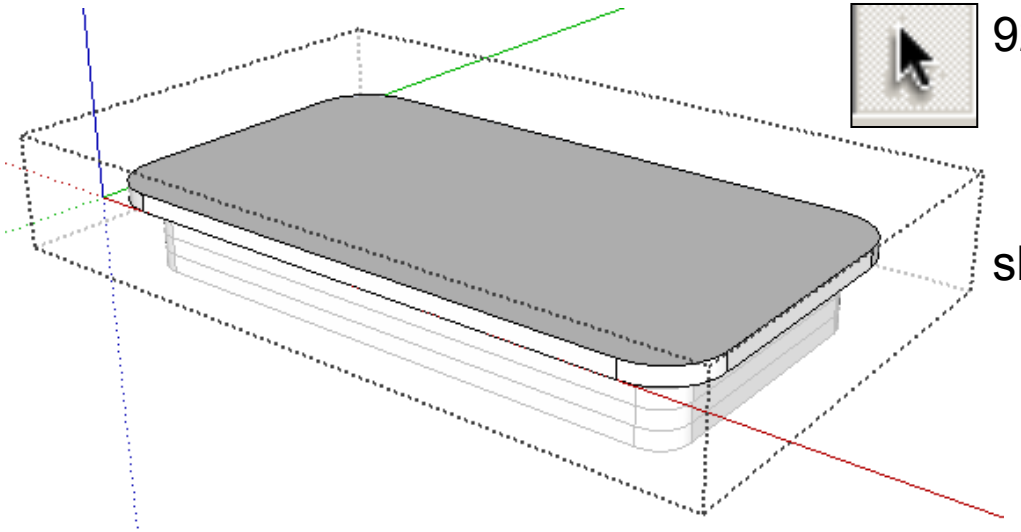


91. Use the ***select tool***

Right click on each of the front pieces in turn and ***press hide.***

Stop when you come to the first smaller back piece

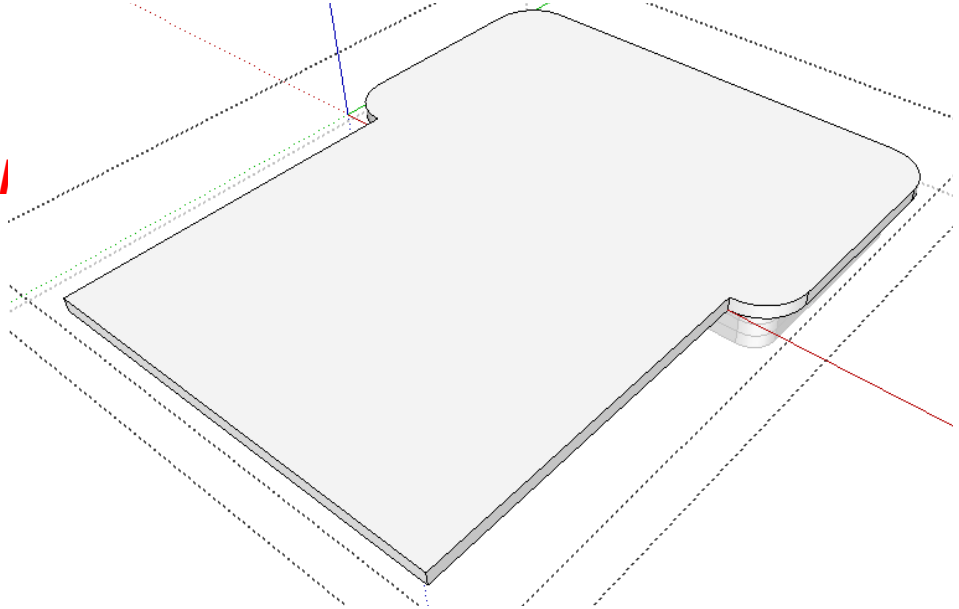




92. Use the ***select tool*** click twice to edit it.

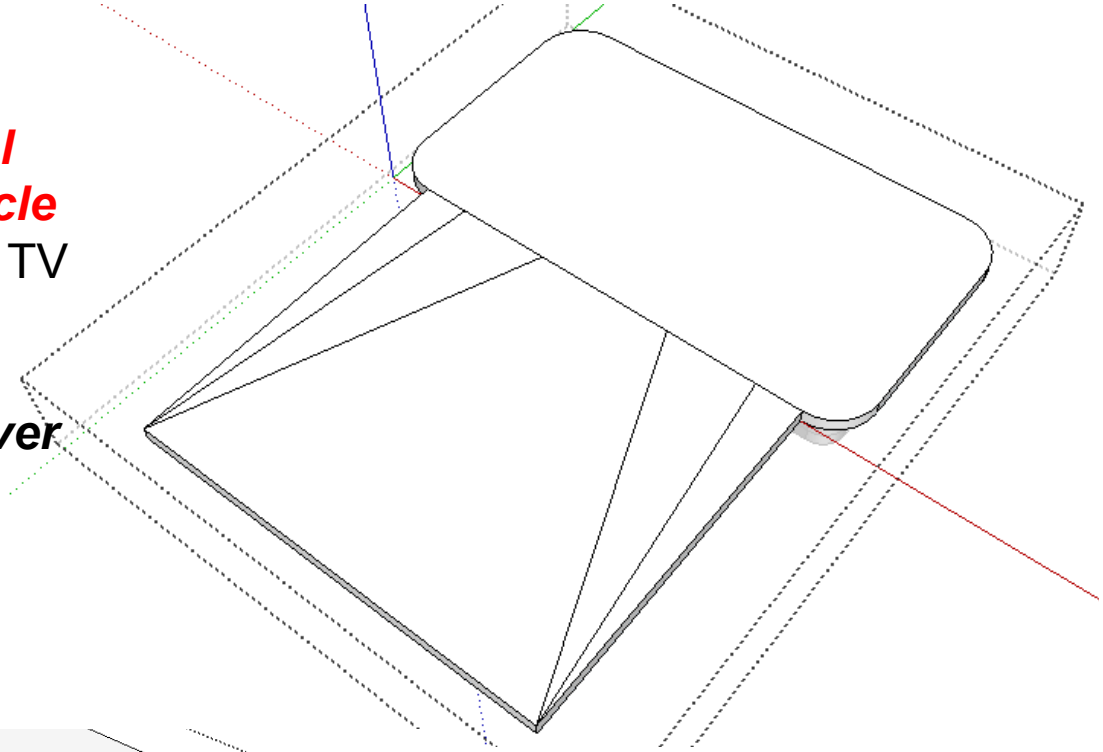
Everything else should be greyed out.

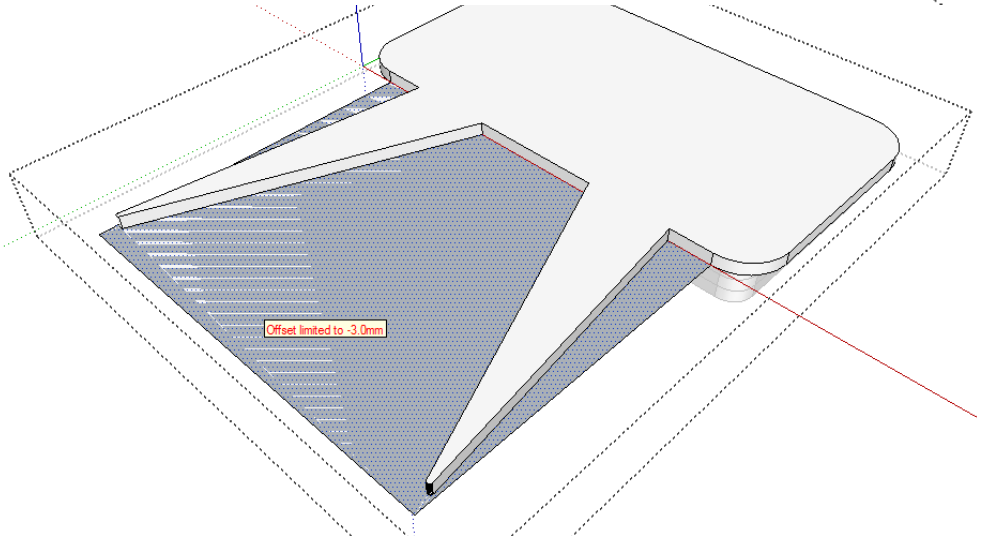
93. Use the ***push pull tool*** to pull the edge out as shown. Type in ***75 and press enter.***



94. Use the ***pencil tool*** and ***arc tool or circle tool*** to draw on the TV feet.

Style them however you wish.





95. Use the ***push pull tool*** to get rid of the excess around the feet

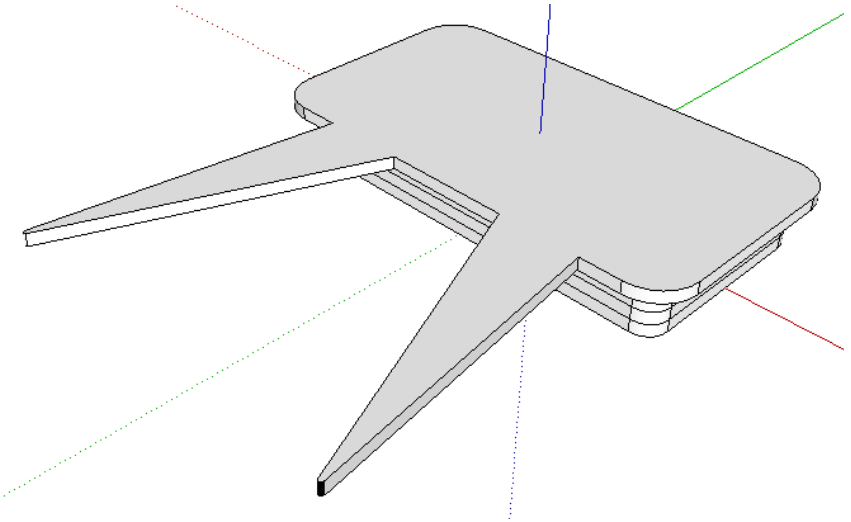
96. Use the ***select tool*** and

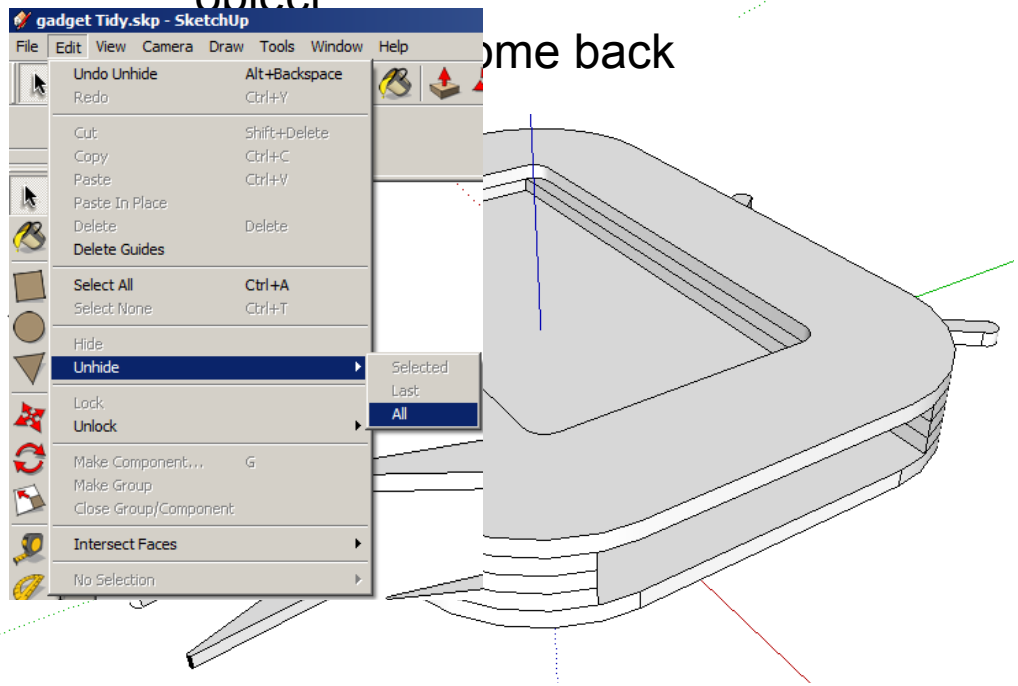
click anywhere off the

object to unselect it.

The rest of the object

ome back



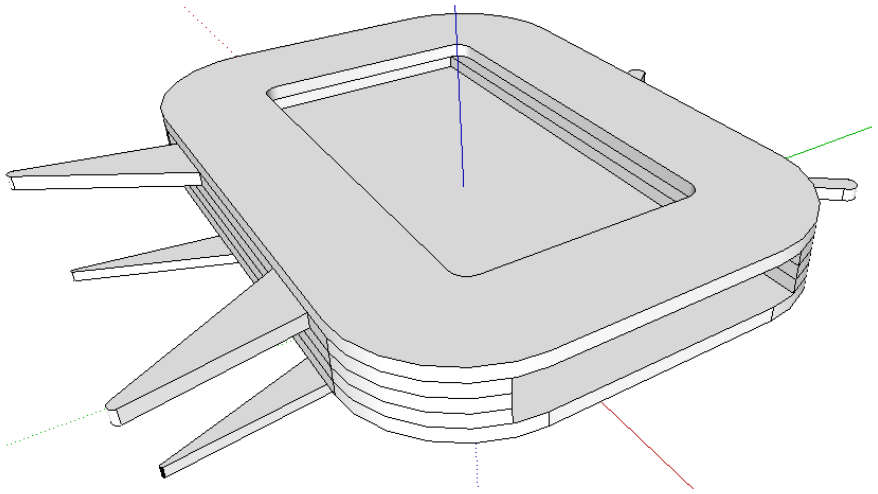


97. Click on the ***edit*** toolbar to bring in the

drop down menu.

Click on ***unhide*** and

then ***all***



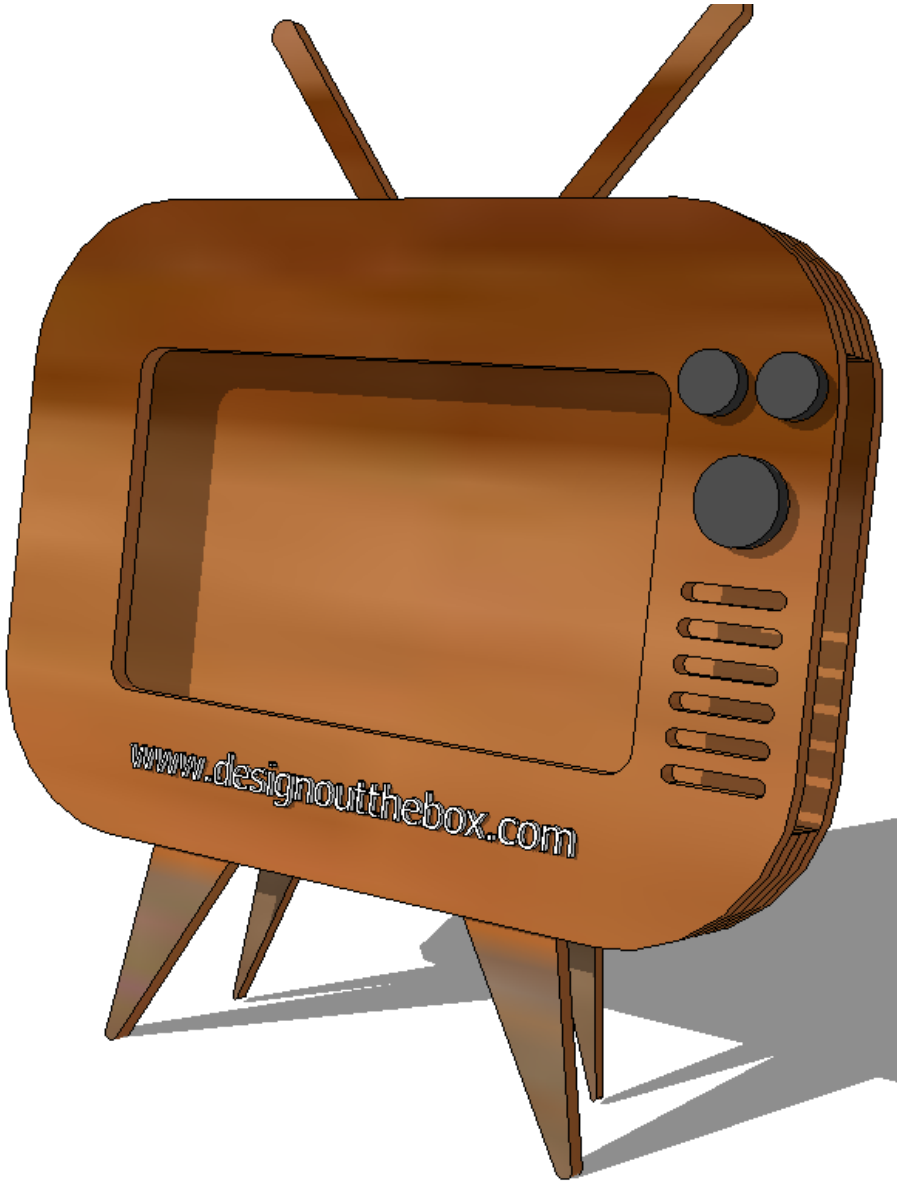
98. The full TV parts that were
    previously hidden should
    could come back into place.

99. Using the skills that you have acquired add your own details to the product.

- ***Speaker holes cut***
- ***Volume Buttons***
- ***On / off Buttons***
- ***Air vents***
- ***Your name***

Remember they will need to be separate pieces and 4mm thick as they will need to be cut from laser-ply.

Rectang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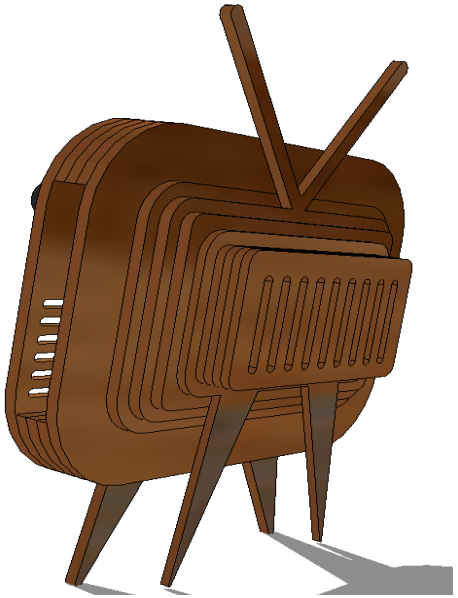

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Rectang

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