



CAD S



CAD Tutorial 8: Gameboy

Level of Difficulty



Time

Approximately 60–80 minutes

Starter Activity

- Design a wooden toy train for young children using CAD



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...**

- Create, Move and Rotate components
- Use the Follow Me tool to make objects
- Apply and position 3D Text on 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	Tape Measure 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.

Learning Styles











Visual : *Presentation*

Auditory: *Video*

Kinaesthetic: *Demonstration*








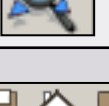

Sketchup Help Guide:

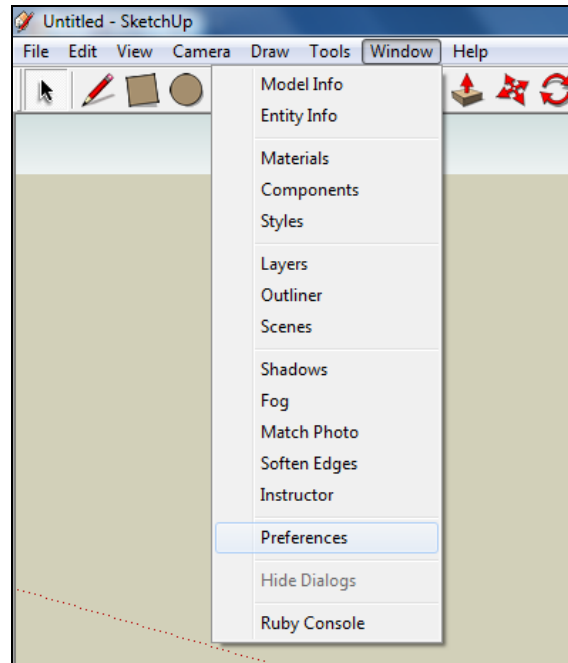
Computer Aided Engineering: 15. Drawing and Modification Commands

Drawing and Modification Tools	image	Description	Advantages
Modifying Tool 1. Pencil tool		used to draw lines in X, Y and Z direction. Can draw simple or complex shapes very quickly.	Advantages: Allows user to draw or modify shapes very quickly and can be used to construct 3D objects faster than traditional hand drawings
Modifying Tool 2. Trim tool		allows the user to remove overlapping elements.	Advantages: Allows user to erase overlapping lines and edges to draw complex 3D shapes very quickly.
Modifying Tool 3. Push/pull		tool used to turn solid objects into 3D objects instantaneously. Typing a size allows a user to extrude or pull an object to a certain size or height	Advantages: Allows user to draw or modify 3D shapes very quickly faster than traditional hand drawings. You can click on a face (plane) and adjust. Can be used to extrude shapes on 3D objects already drawn.
Modifying Tool 4. Move Tool		used to move entire shapes or pull lines on a drawing.	Advantages: Allows user to draw or modify shapes very quickly and can be used to construct unusual 3D shapes quickly
Modifying Tool 5. Dimensions tool		used to show sizes and radius of drawn objects	Advantages: Allows user to draw or modify 3D shapes very quickly faster than traditional hand drawings to correct size if drawn incorrectly. Drawing can be transferred onto the CNC machines directly
Modifying Tool 6 Extrusion Tool (follow me)		allows the user to highlight a path that turns blue. A chosen shape will then follow the chosen path	Advantages: Allows user to draw profiles of shapes and follow the path to draw complex 3D shapes very quickly.
Modifying Tool 7. Arch tool		You can use the arch tool to draw a radius from two given points. Can be used to draw corners etc..	Advantages: Allows user to rotate and position shapes quickly to draw complex 3D shapes very quickly.
Modifying Tool 8. Circle tool		allows the user to draw different sized radius circles and chamfered corners	Advantages: Allows user to draw profiles of shapes and follow the path to draw complex 3D shapes very quickly.
Modifying Tool 9. Orbit tool		You can use the Orbit tool to change the angle that you are viewing your design from. You can do the same by pressing the middle wheel of your mouse	Advantages: Allows user to rotate and see all angles of their design quickly
Modifying Tool 10. Tape measure tool		allows the user to draw guide lines to given sizes and mark out radius etc.	Advantages: Allows user to draw guides of shapes and draw complex 3D shapes very quickly.

Sketchup Help Guide:

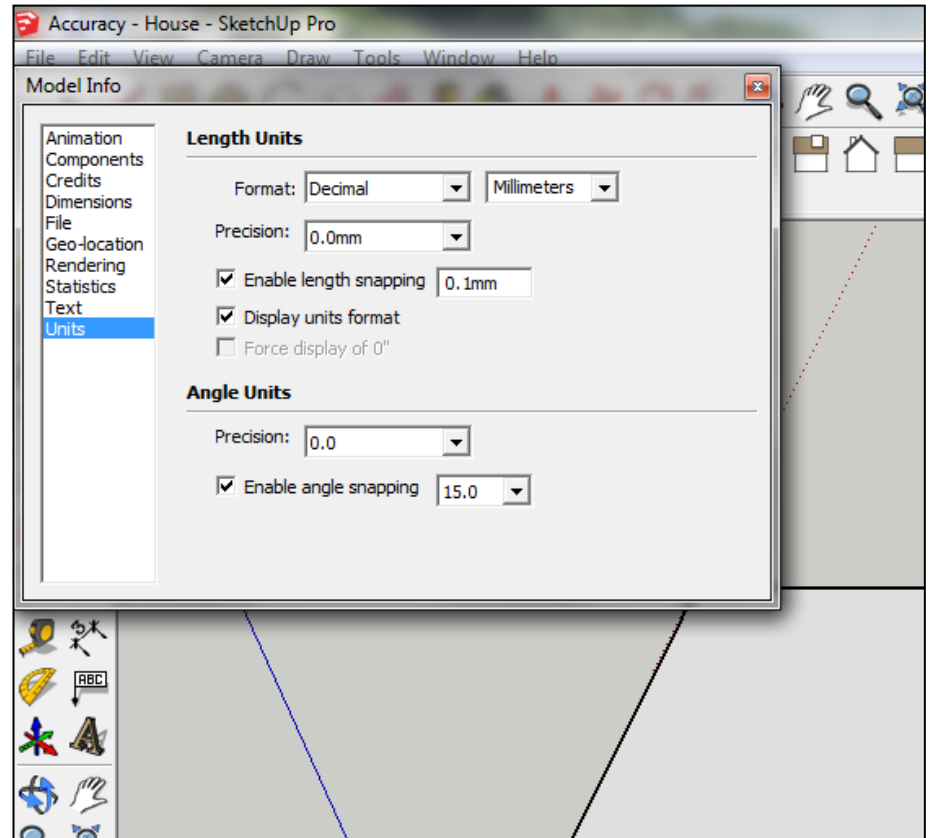
Computer Aided Engineering: 15. Drawing and Modification Commands

Drawing and Modification Tools	image	Description	Advantages
Modifying Tool 11. Square tool		used to draw squares and rectangles.	Advantages: Allows user to draw guides of shapes and draw complex 3D shapes very quickly.
Modifying Tool 12. Offset tool		You can use the contour tool to draw parallel lines or lines within lines.	Advantages: Allows user to draw duplicate lines and position them within shapes quickly to draw complex 3D shapes very quickly.
Modifying Tool 14. Rotate Tool		used to move rotate parts of a shape or entire shapes on x, y and Z co-ordinates.	Advantages: Allows user to draw or modify shapes very quickly and can be used to construct unusual 3D shapes quickly
Modifying Tool 15 Scale Tool		allows the user to select an object or part of an object and increase its size from the base point.	Advantages: Allows user to quickly resize objects to draw complex 3D shapes very quickly.
Modifying Tool 16 Paint Bucket Tool		allows the user to select a colour or materials to produce photo-realistic drawing of their object. Shadows etc. can be added.	Advantages: Allows user to quickly draw objects like using materials, textures etc...
Modifying Tool 17 Pan Tool		You can use the Pan tool to grab and move your object around the screen. Alternatively, you can pan by pressing the Shift key and holding down the mouse's middle wheel.	Advantages: Allows user to move and position their object quickly
Modifying Tool 18 Text Tool		You can use the text tool to add text to your object.	Advantages: Allows user to add 3D text by clicking on the extrude button or 2D text
Modifying Tool 19 Zoom Extents Tool		You can use this tool to automatically zoom into your entire project.	Advantages: Allows user to quickly navigate to the entire drawing if they get lost.
Modifying Tool 20 View Tool		You can use the view tool to quickly look at front side and top views as well as 3D views	Advantages: Allows user to complete working drawings quickly as well as enabling them to show a top view for exporting onto the laser cutter.



1. Open Library /Designoutthebox.com/ CAD Skills/ Lesson 5 / Mobile Phone

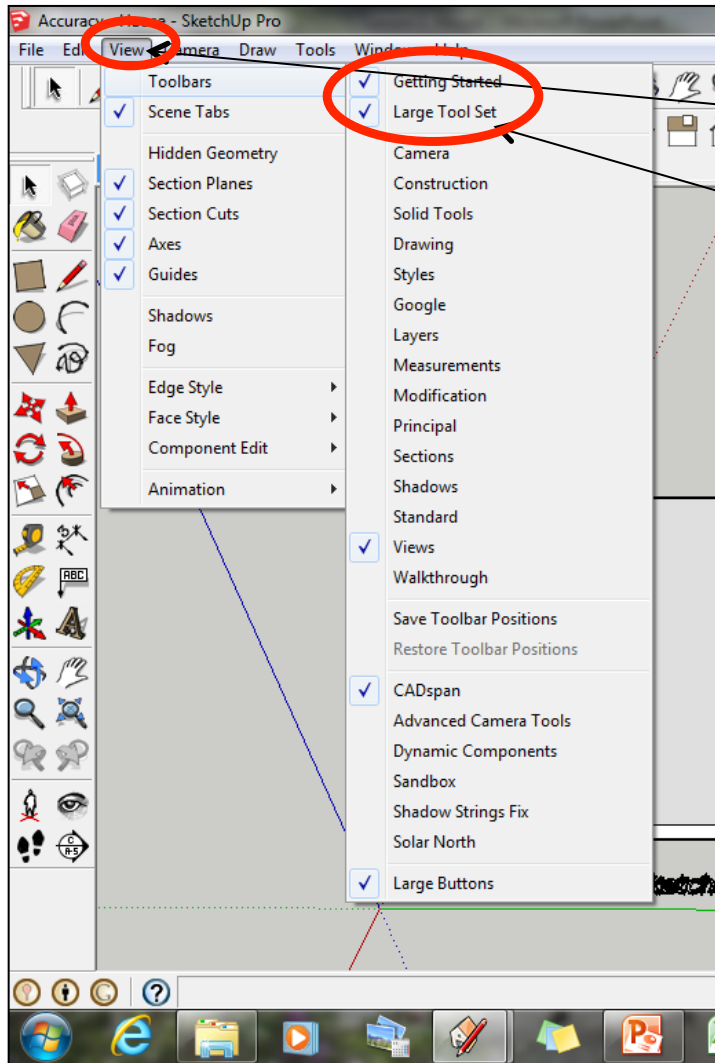
Open the sketch up drawing. Once you have opened SketchUp, go to **Window** and select **Model Info**



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**.

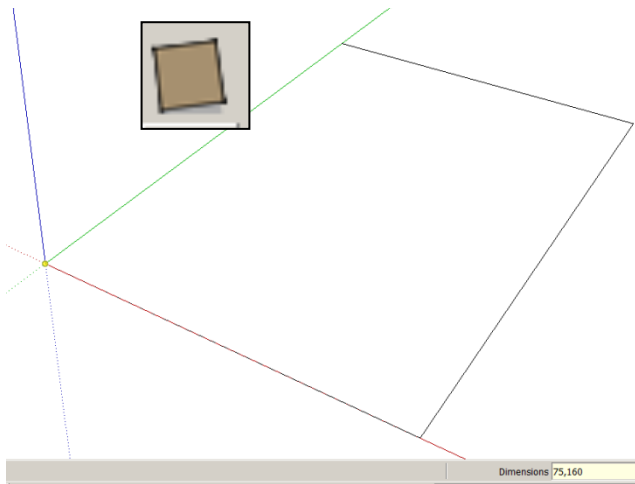
3. Now select the **View** then **toolbars** and ensure **Getting Started** and **Large Tool Set** are ticked



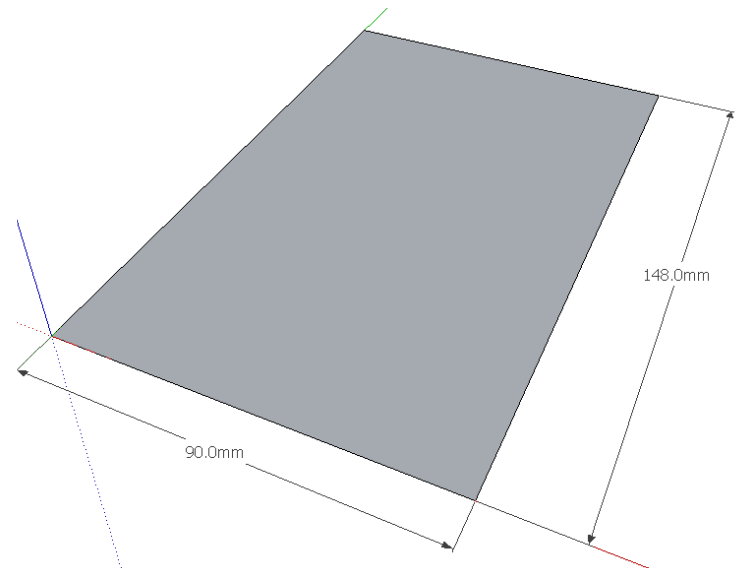
3a Select **View**

3b Tick Getting Started
3c Tick Large Tool Set

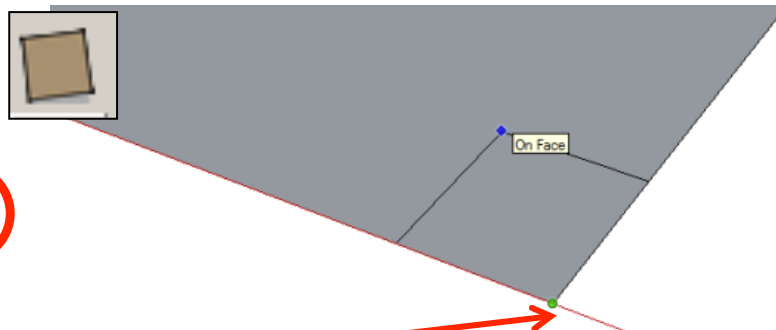
Note: this will place a tool bar across the top (**getting started**) and the side (**Large Tool Set**)



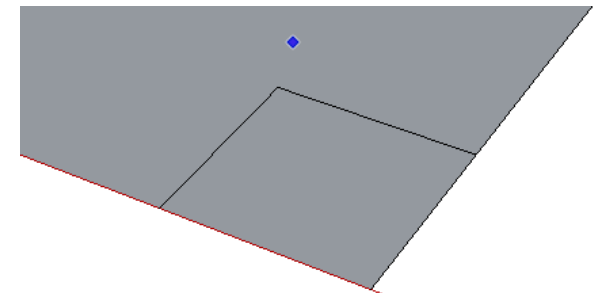
1. Click on the **rectangle tool** . Start drawing a square and type **90, 148**.



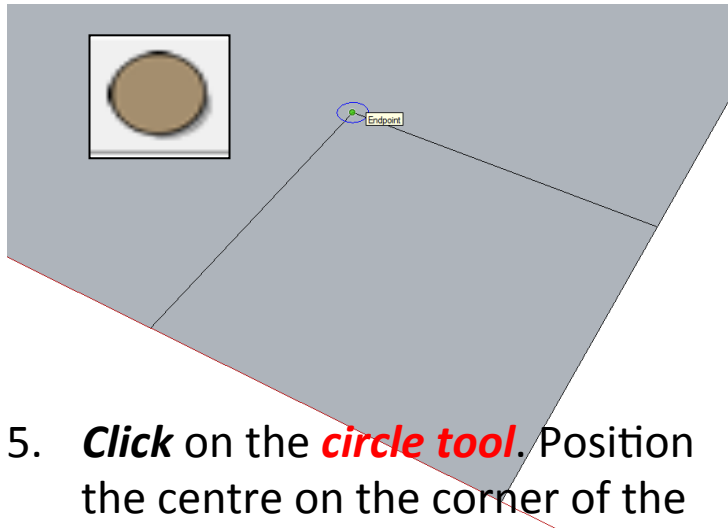
2. Press **Enter** . Click on the **zoom extents symbol**.



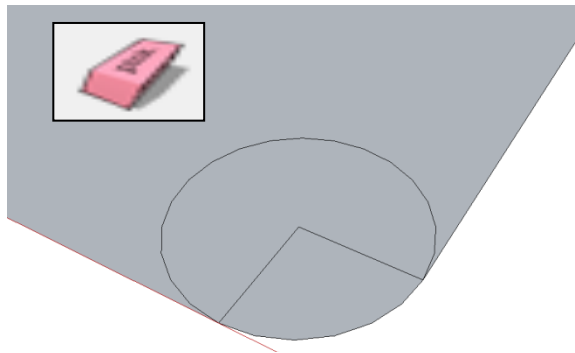
3. Using the **rectangle tool click** on the corner of the rectangle you have just drawn.



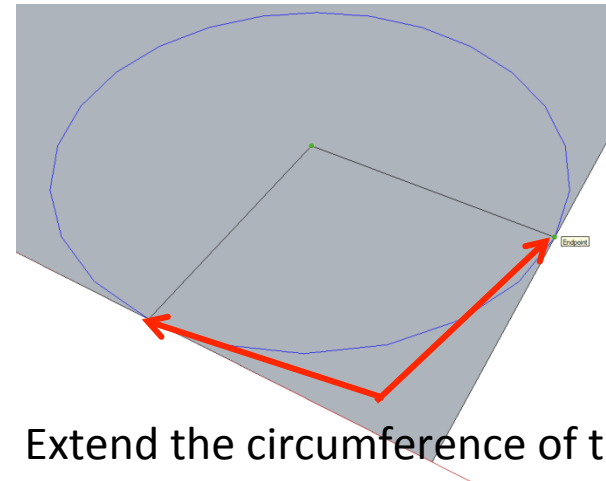
4. Type **20, 20** and press **enter**



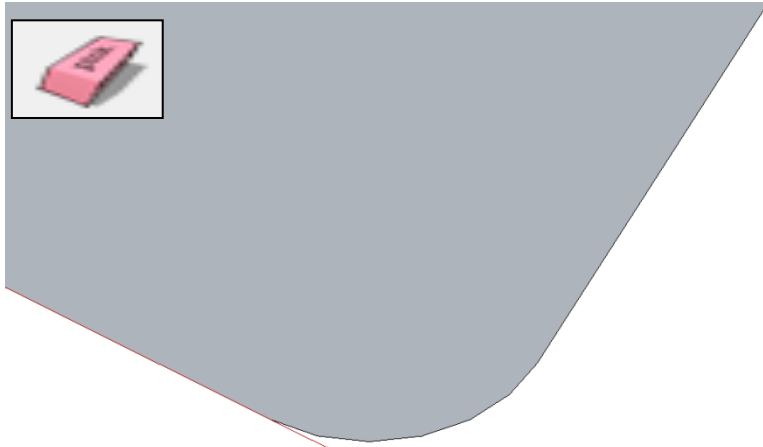
5. **Click** on the **circle tool**. Position the centre on the corner of the square shown above



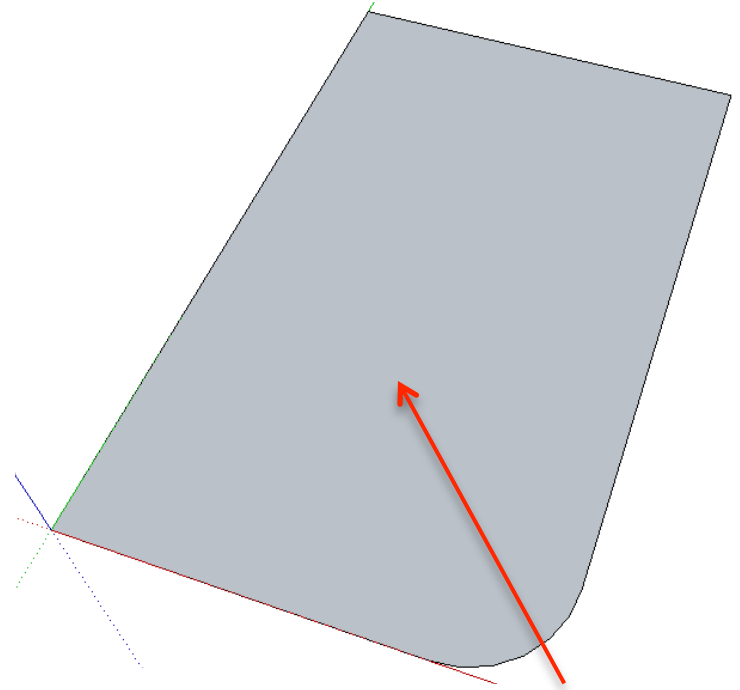
7. Use the **rubber tool** to erase the corners so you are left with a radius as shown



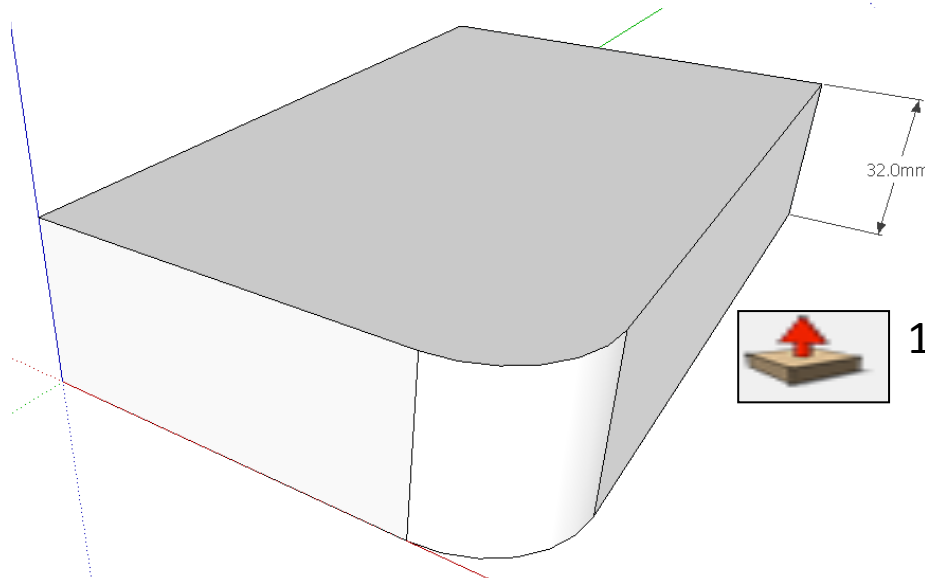
6. Extend the circumference of the circle out until it meets the either corner shown. It will say **endpoint**



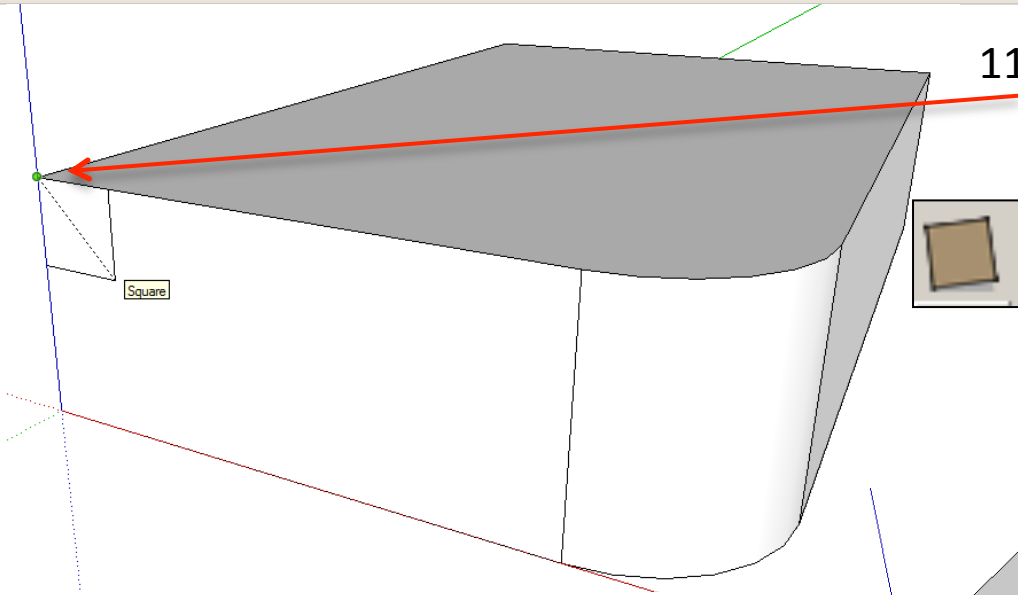
8. **Erase** the remaining parts of the circle.



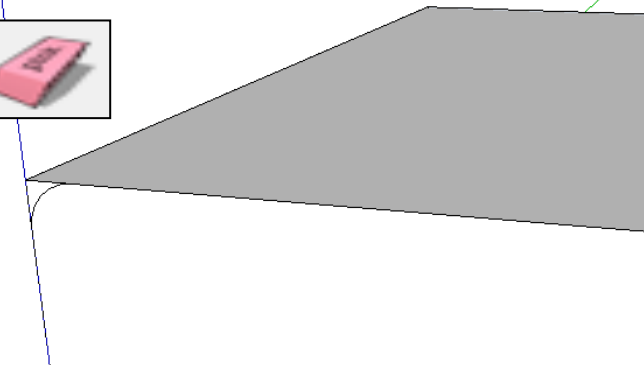
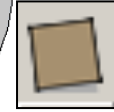
9. It should look like this.



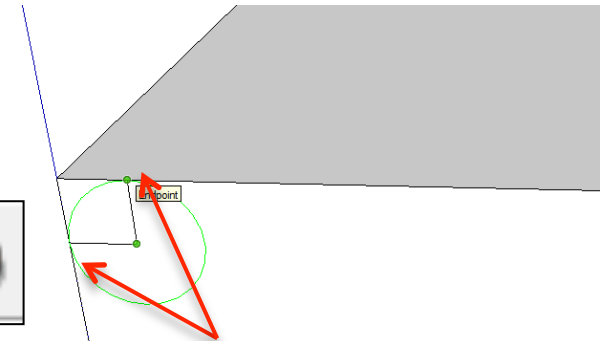
10. Use the **push pull tool** to raise the game boy up. Type **'32'** and press **enter**.



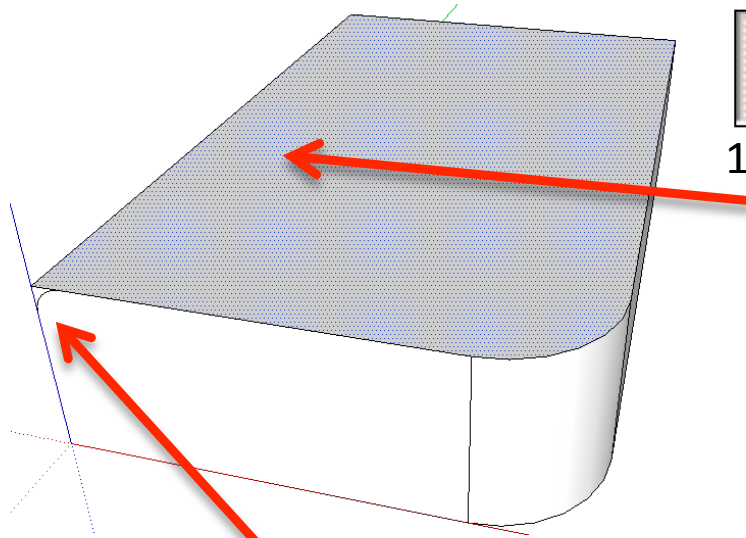
11. Use the **rectangle tool** to draw a square starting from the top left corner. Type '5,5' and press **enter**.



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



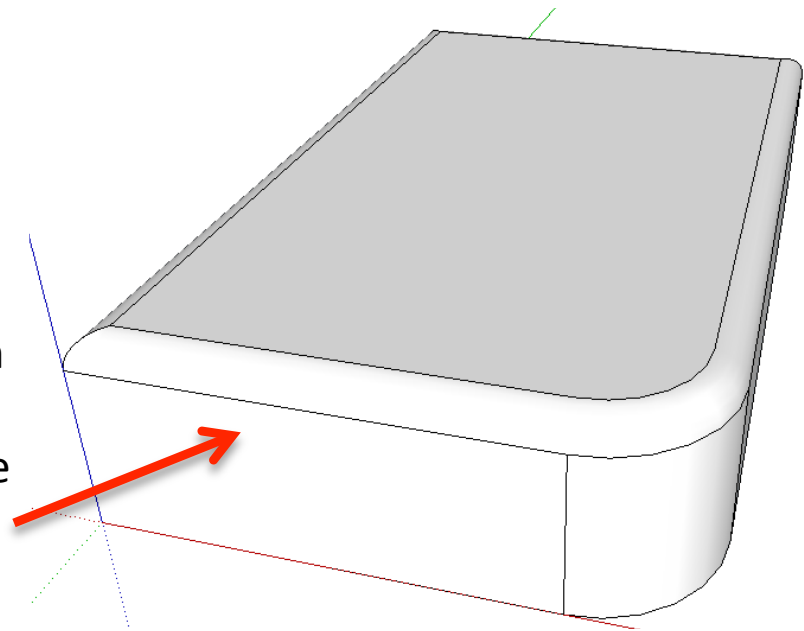
12. Use the **circle tool** to draw a circle with its centre starting from the bottom right hand corner of the square you have just drawn. Extend the circumference of the circle out until it meets the either corner shown. It will say **endpoint**

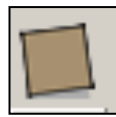
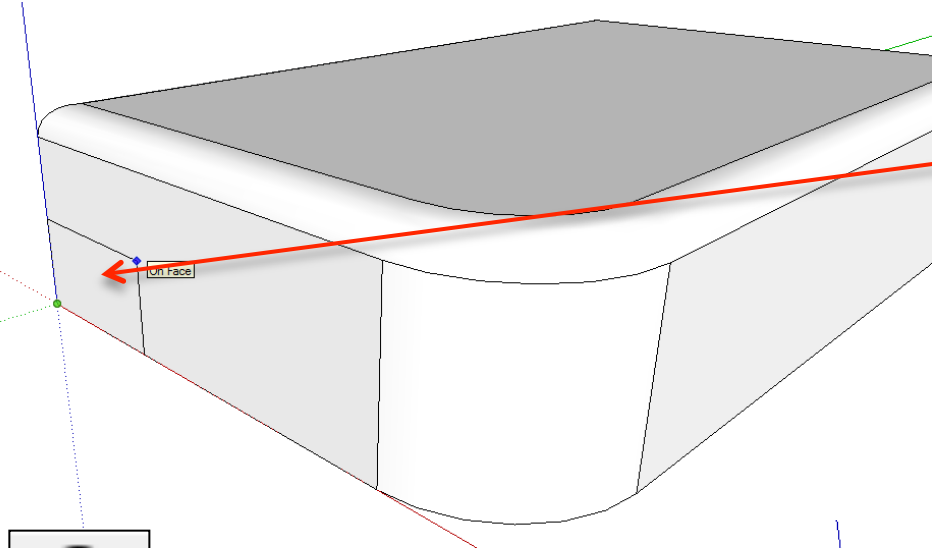


14. Use the Select **tool** and click on the top of shape. It should now be **highlighted in blue dots**.



15. Select the **follow me tool** and click on the edge of **semi circle** on the side. You should have drawn the shape shown opposite.....

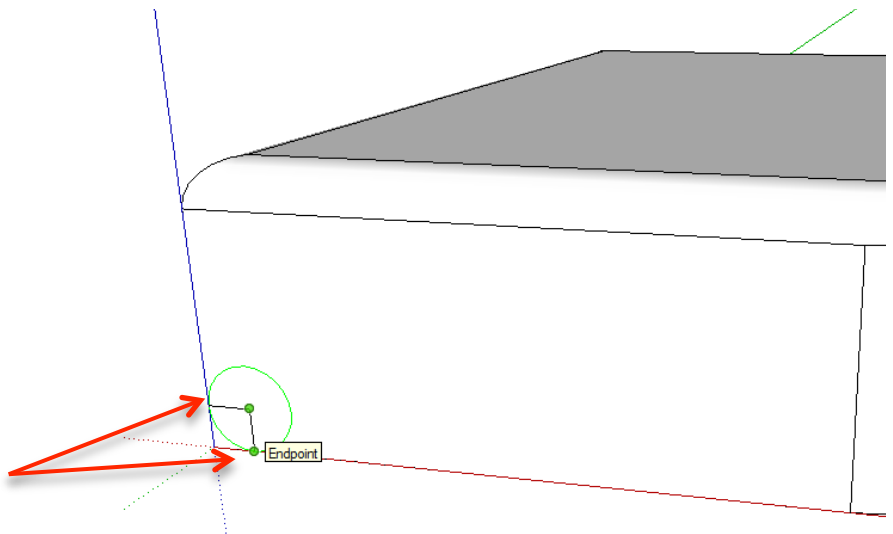


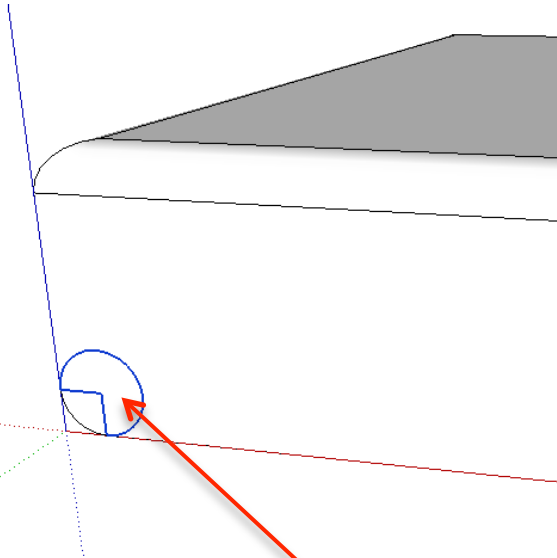


16. Use the **rectangle tool** to draw a square starting from the bottom left corner. Type '**5,5**' and press **enter**.

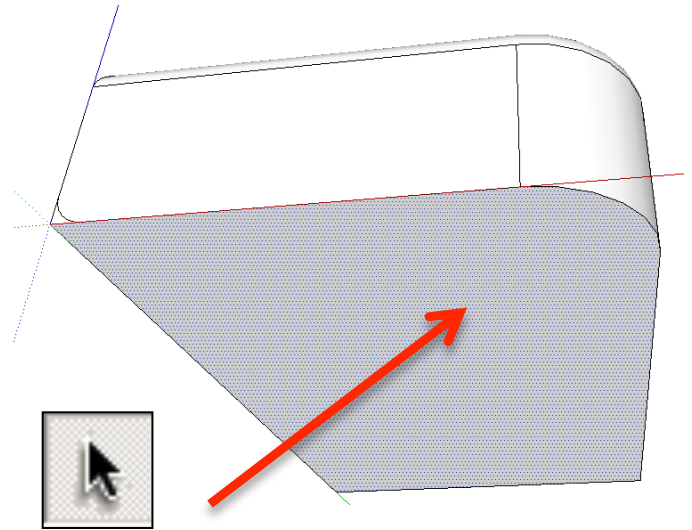
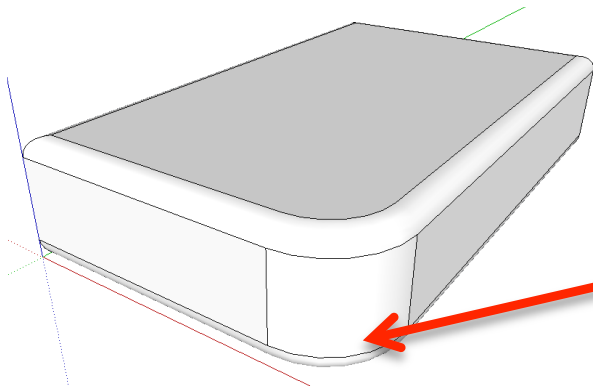


17. Use the **circle tool** to draw a circle with its centre starting from the bottom right hand corner of the square you have just drawn. Extend the circumference of the circle out until it meets the either corner shown. It will say **endpoint**





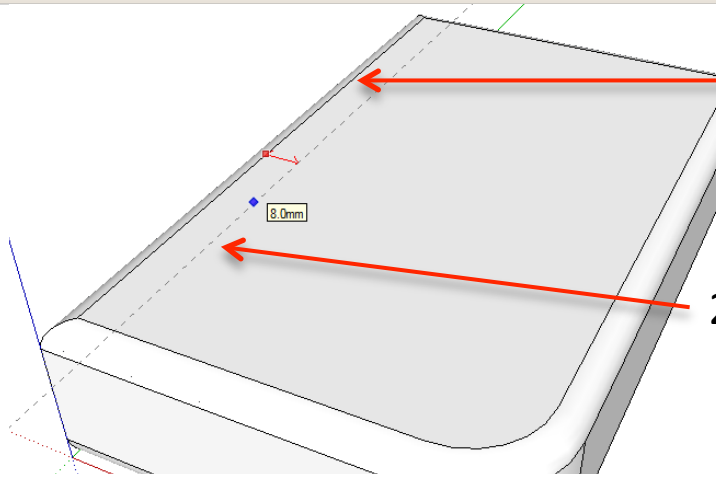
18. Use the **rubber tool** to erase the corners so you are left with a radius as shown




19. Use the Select **tool** and click on the bottom of shape. It should now be **highlighted in blue dots**.



20. Select the **follow me tool** and click on the edge of **semi circle** on the side. You should have drawn the shape shown opposite.....



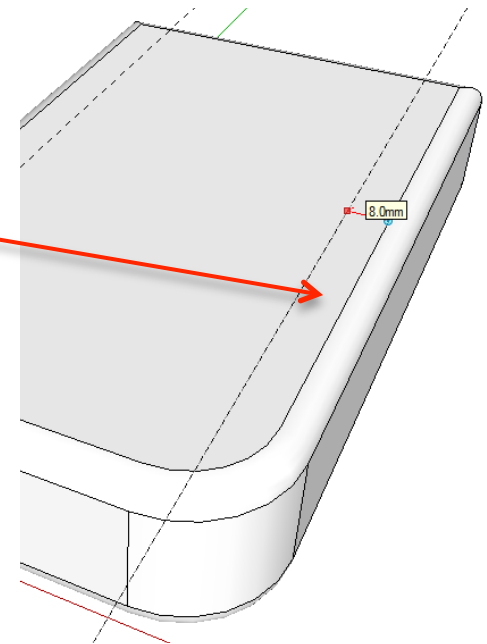
21. Select the **Tape measure tool** and snap to the **side edge** as shown 

22. **Click once** and it will draw a dotted guide line from the edge

23. **Click a second time** to set the guide line and **type 8 and enter**. You will have a guide line **8mm** in from the **side edge**

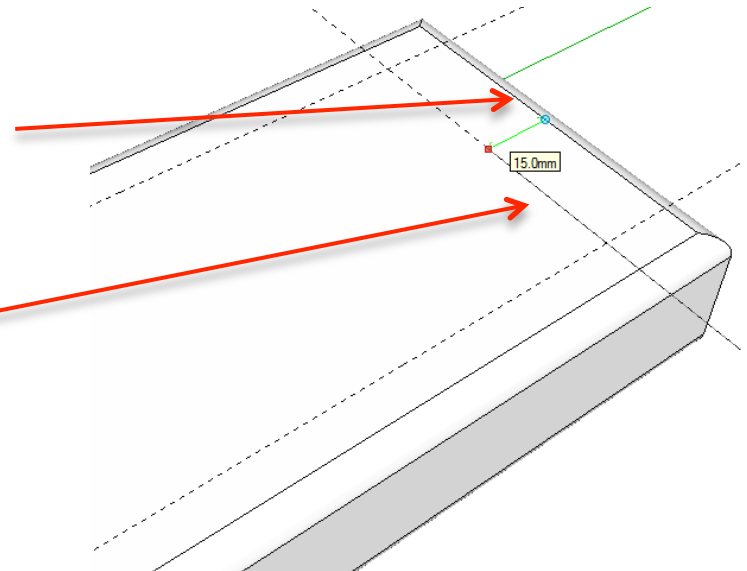


24. **Repeat** the process on the opposite side



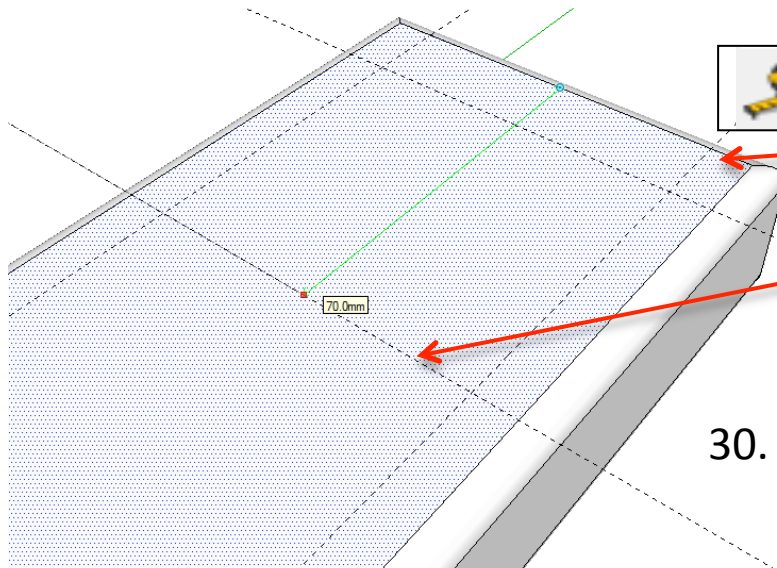


25. Select the **Tape measure tool** and snap to the **top edge** as shown



26. **Click once** and it will draw a dotted guide line from the edge

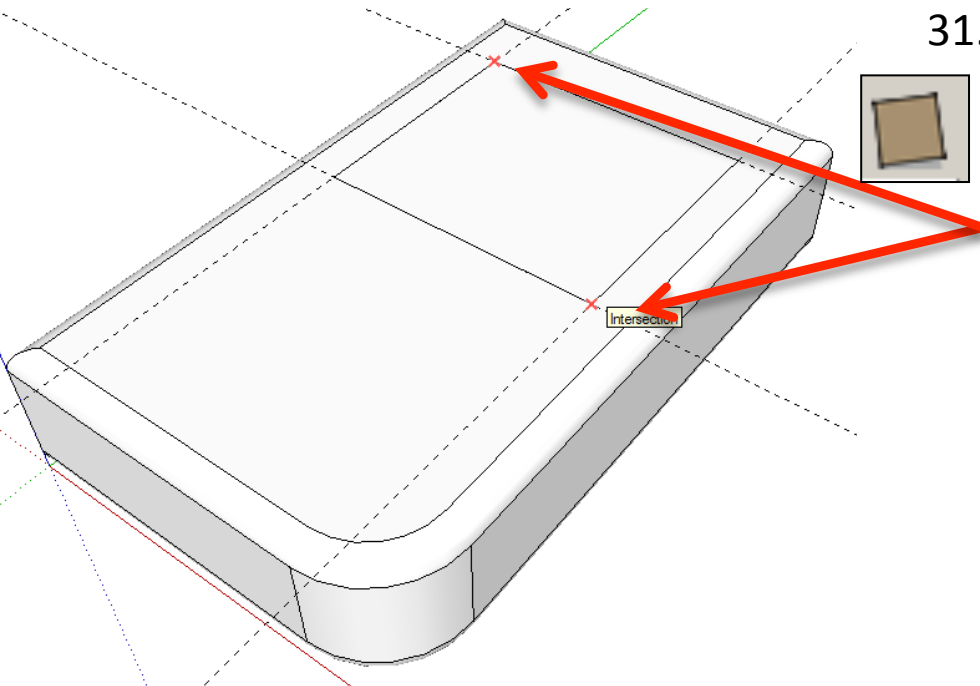
27. **Click a second time** to set the guide line and **type 15 and enter**. You will have a guide line **15mm** in from the **side edge**



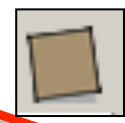
28. Select the **Tape measure tool** and snap to the **top edge** as shown

29. **Click once** and it will draw a dotted guide line from the edge

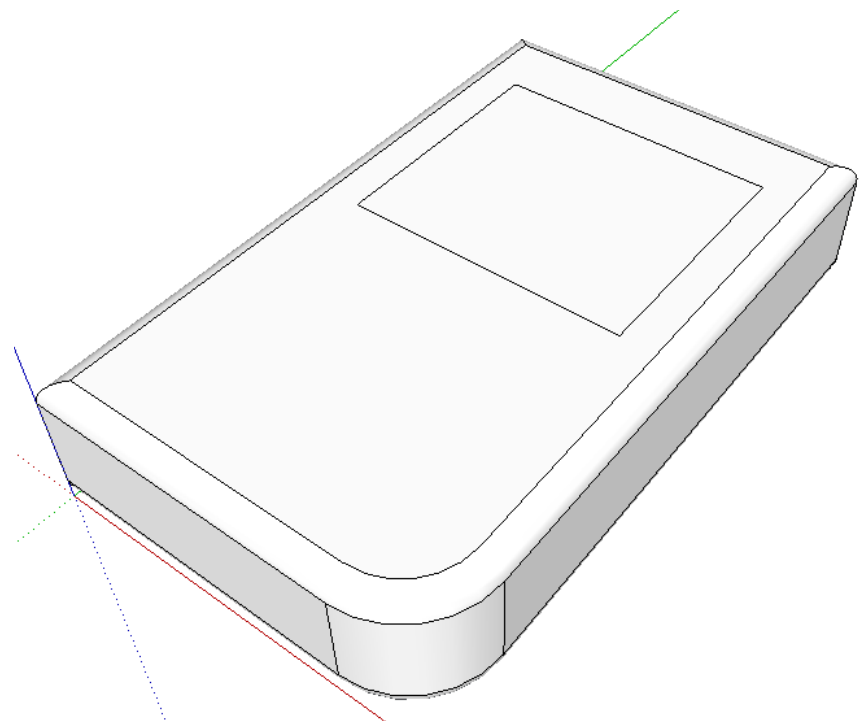
30. **Click a second time** to set the guide line and **type 70 and enter**. You will have a guide line **70mm** in from the **side edge**

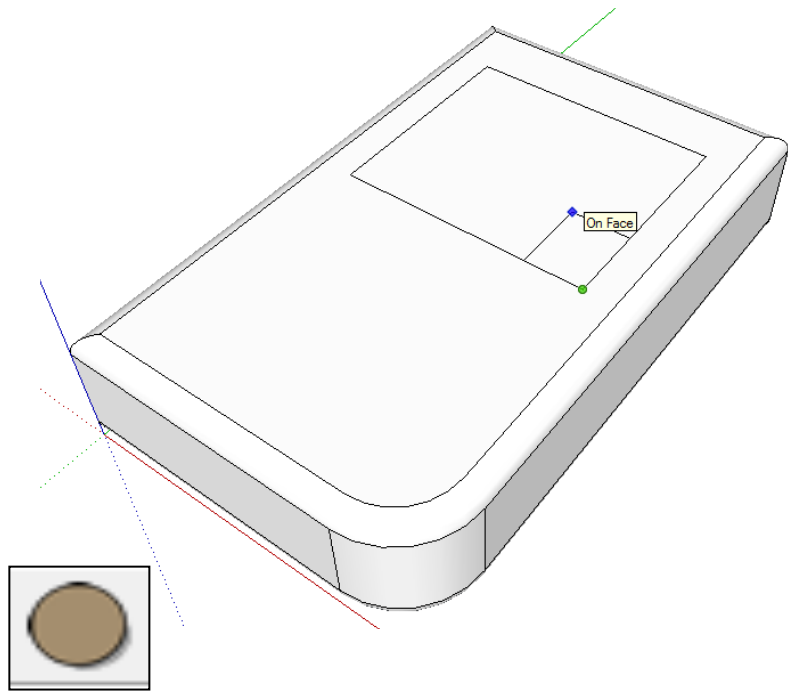


31. Select the **rectangle tool** and snap to the **left corner** as shown and start drawing a square to the bottom right hand intersection as shown for the screen.



32. Use the **rubber tool** to erase the guidelines or alternatively click **View-Guides** and **un-tick**

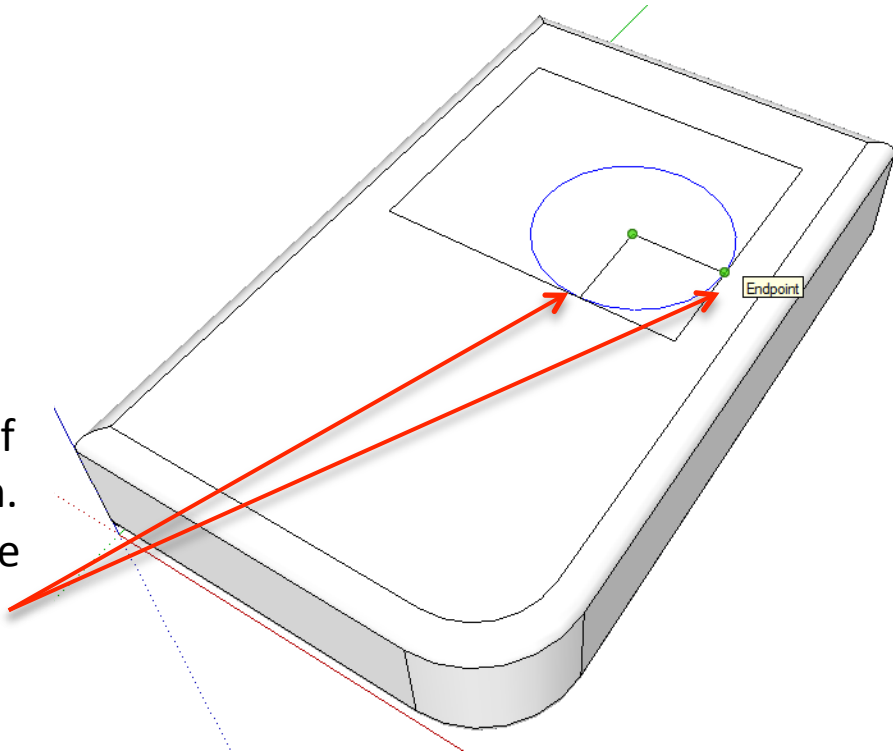


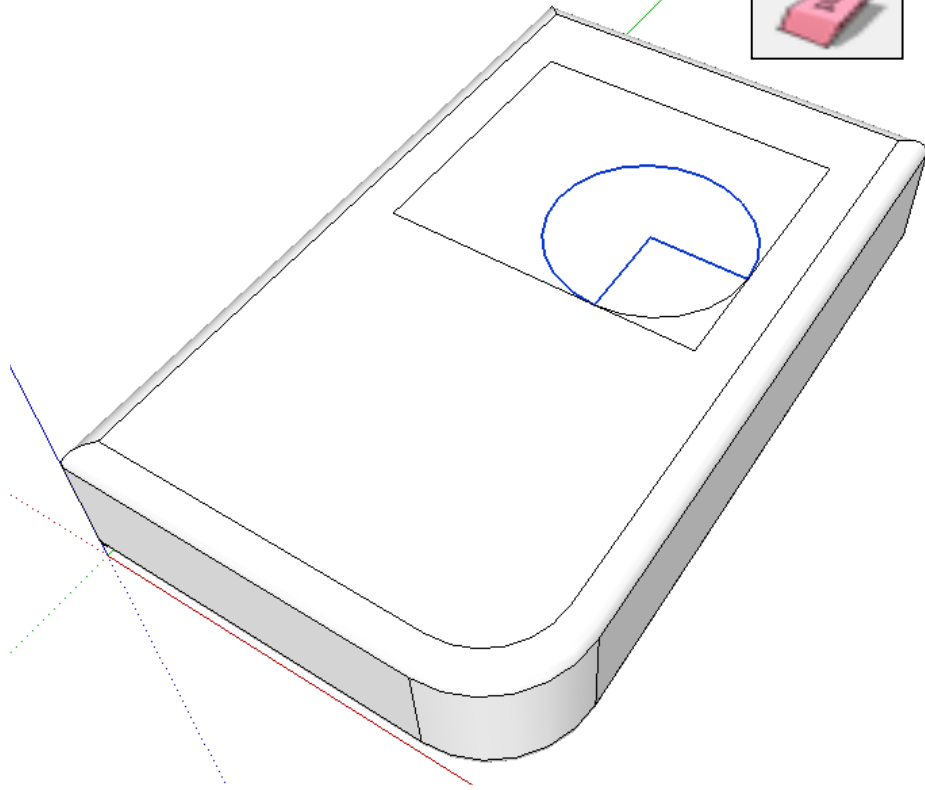


34. Use the **circle tool** to draw a circle with its centre starting from the top left hand corner of the square you have just drawn. Extend the circumference of the circle out until it meets the either corner shown. It will say **endpoint**



33. Use the **rectangle tool** to draw a square starting from the bottom right hand corner of the screen. Type **'20,20'** and press **enter**.

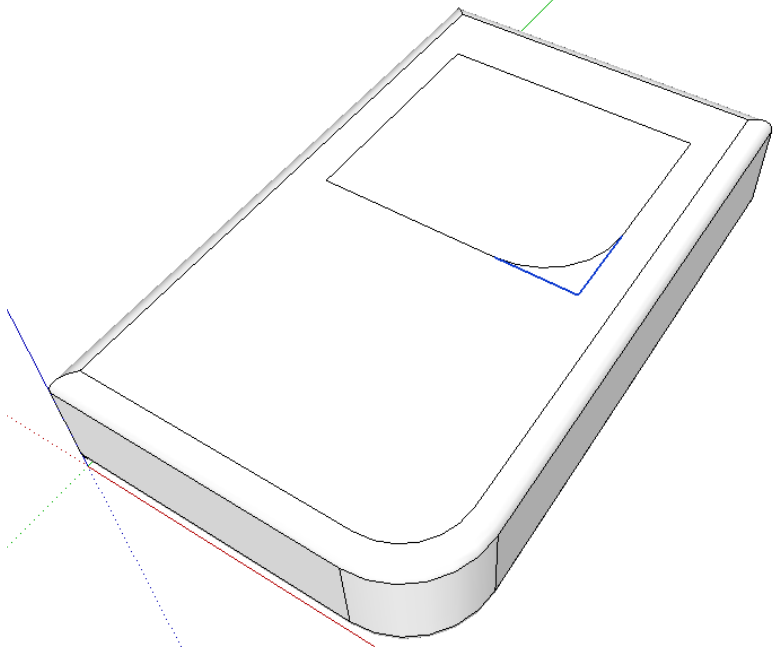


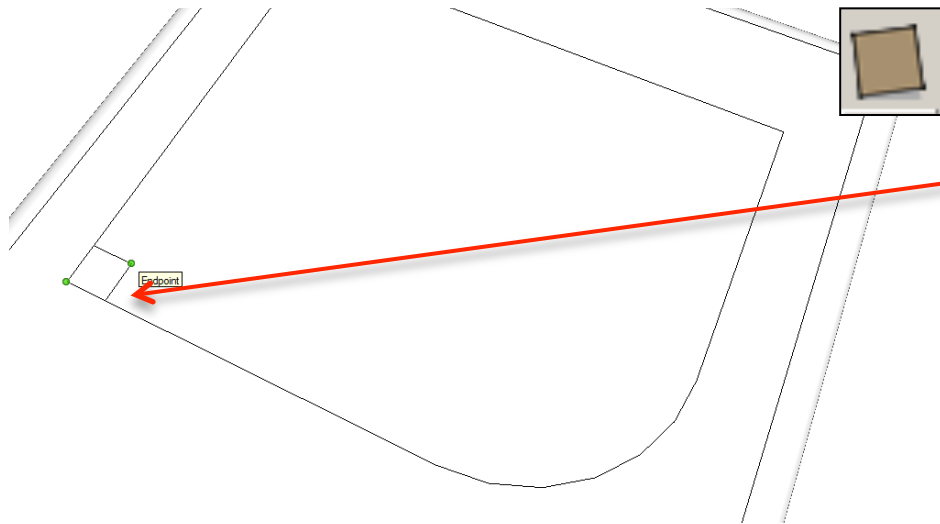


35. Use the **rubber tool** to erase the corners shown in blue.

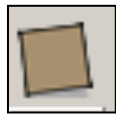


36. Use the **rubber tool** to erase the corners shown in blue.

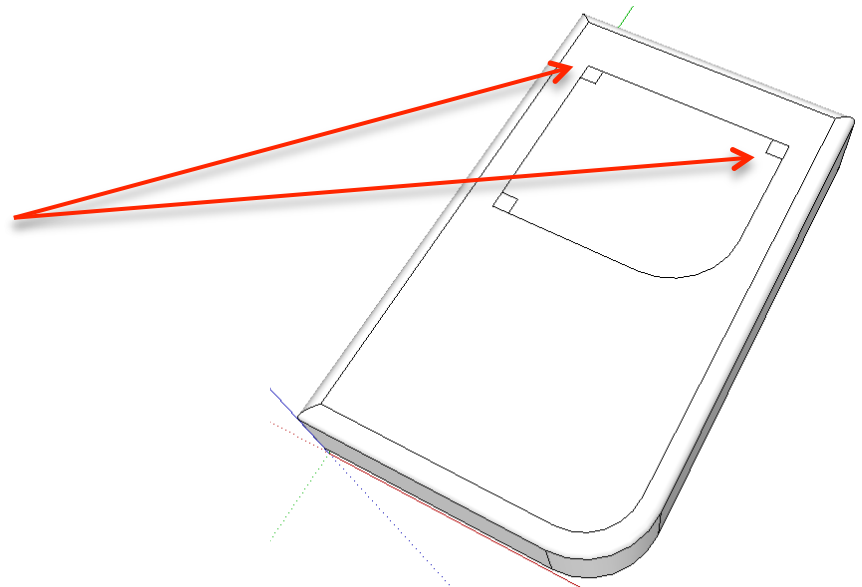


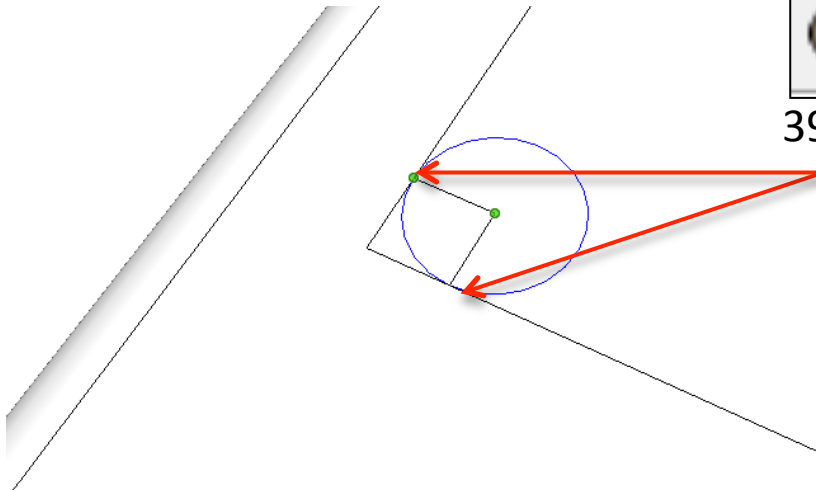


37. Use the **rectangle tool** to draw a square starting from the bottom right hand corner of the screen. Type '**5,5**' and press **enter**.



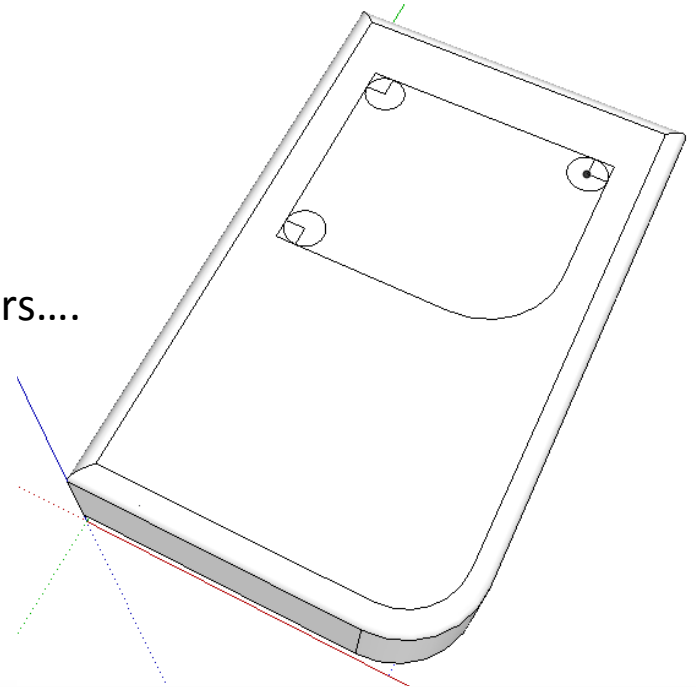
38. Repeat in the other three corners....

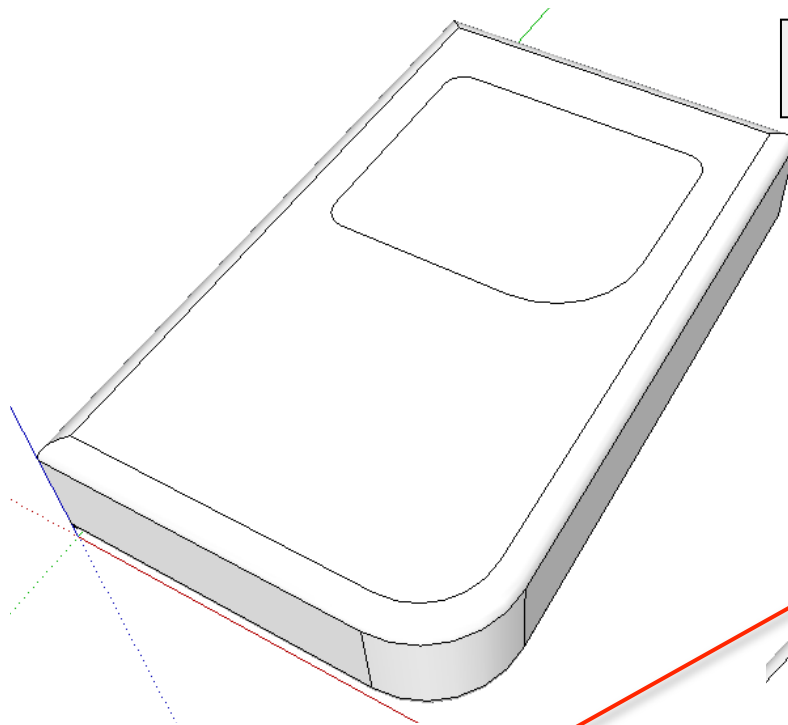




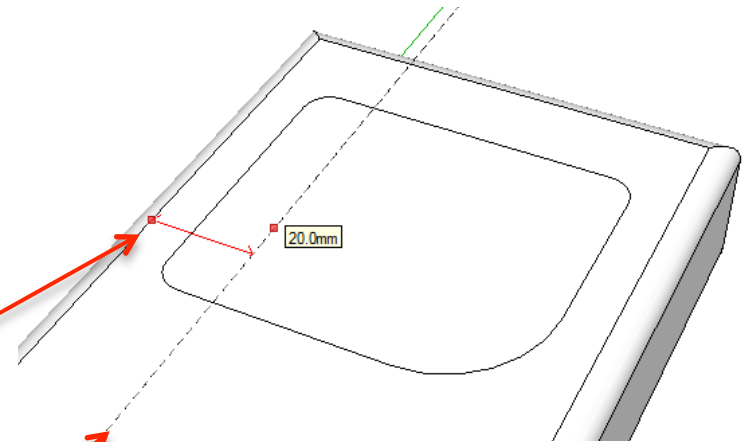
39. Use the **circle tool** to draw a circle with its centre starting from the top right hand corner of the square you have just drawn. Extend the circumference of the circle out until it meets the either corner shown. It will say **endpoint**

40. Repeat in the other three corners....





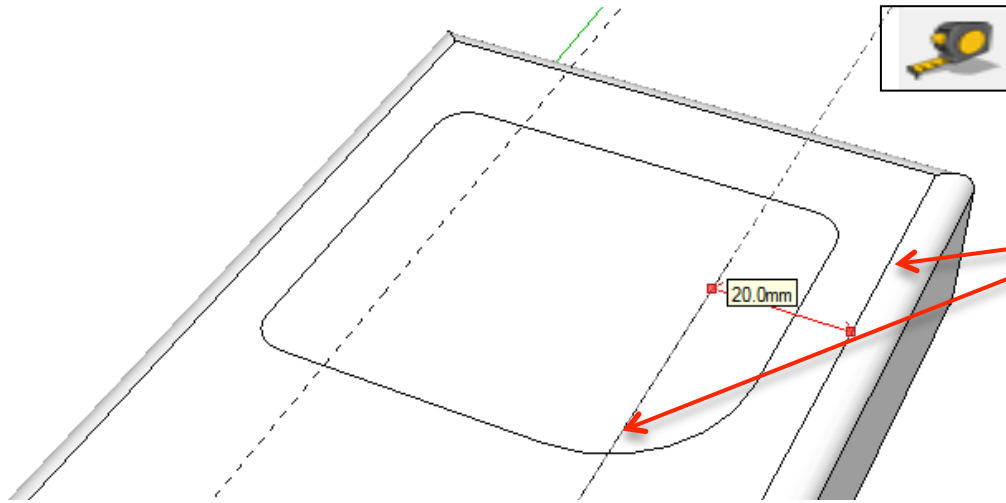
41. Use the **rubber tool** to erase the corners shown to leave a curved screen.



42. Select the **Tape measure tool** and snap to the **side edge** as shown

43. **Click once** and it will draw a dotted guide line from the edge

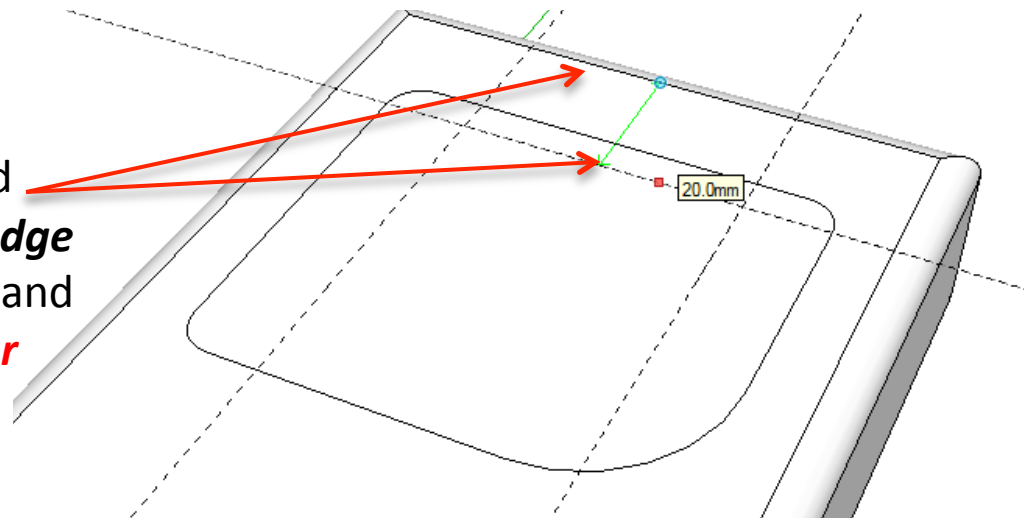
44. **Click a second time** to set the guide line and **type 20 and enter**. You will have a guide line **20mm** in from the **side edge**



45. Select the **Tape measure tool** and snap to the opposite **side edge** as shown. Pull in and **type 20 and enter**

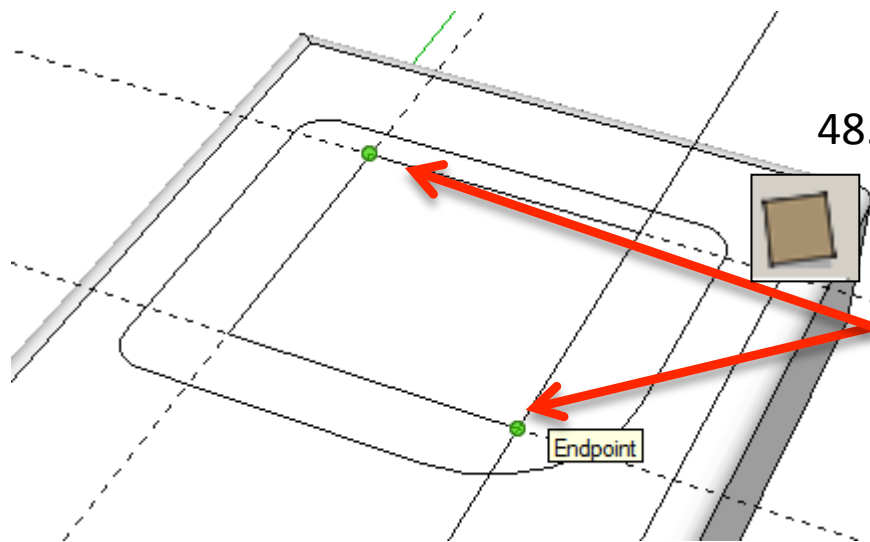
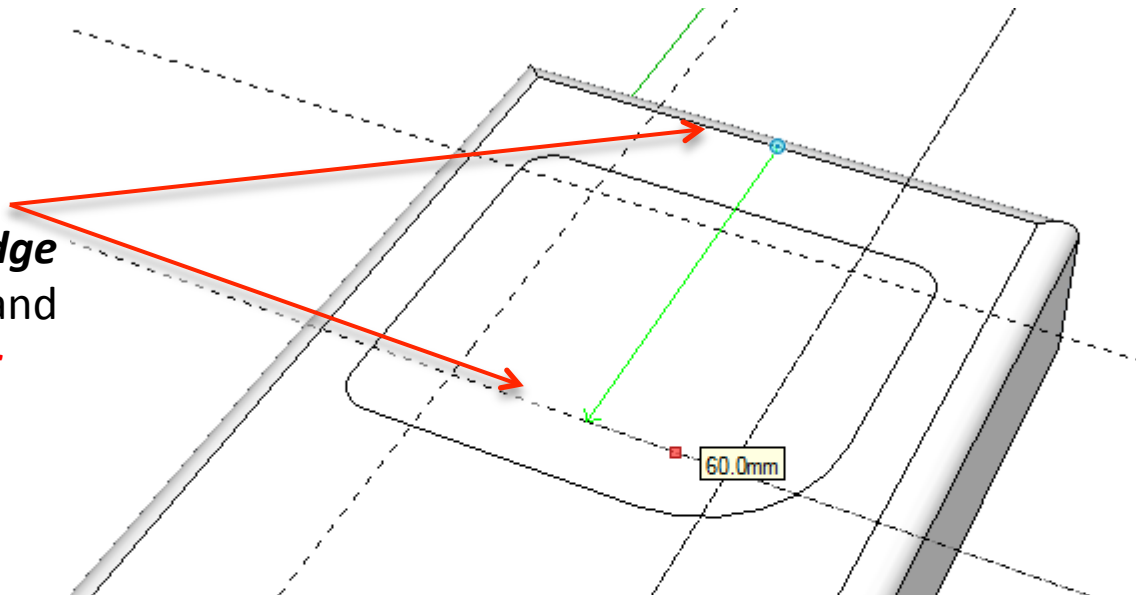


46. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 20 and enter**

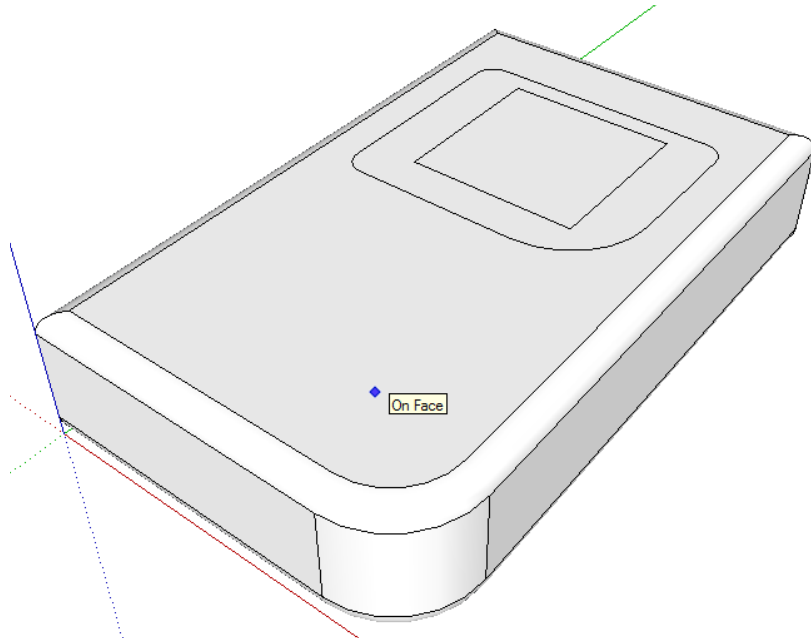




47. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 50 and enter**



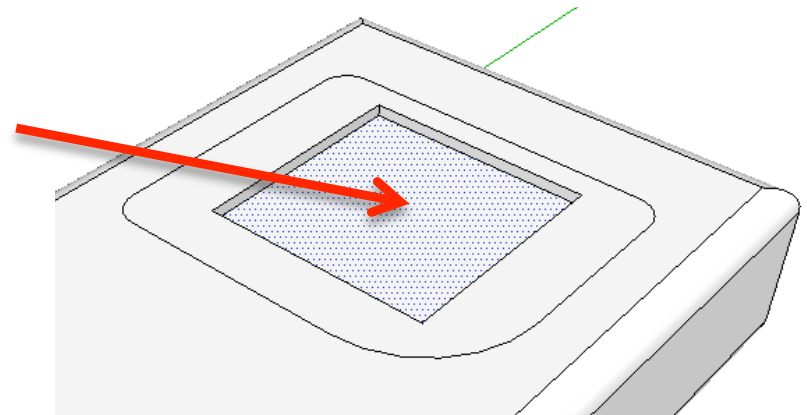
48. Select the **rectangle tool** and snap to the **left corner** as shown and start drawing a square to the bottom right hand intersection as shown for the screen.

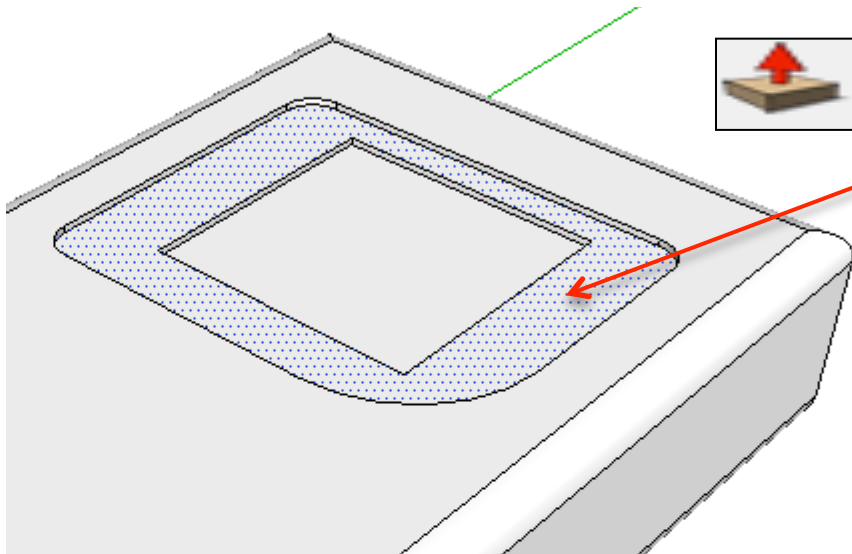


49. Use the **rubber tool** to erase the guidelines or alternatively click **View-Guides** and **un-tick**



50. Use the **push pull tool** to lower the screen down. Type in '2' and **press enter**



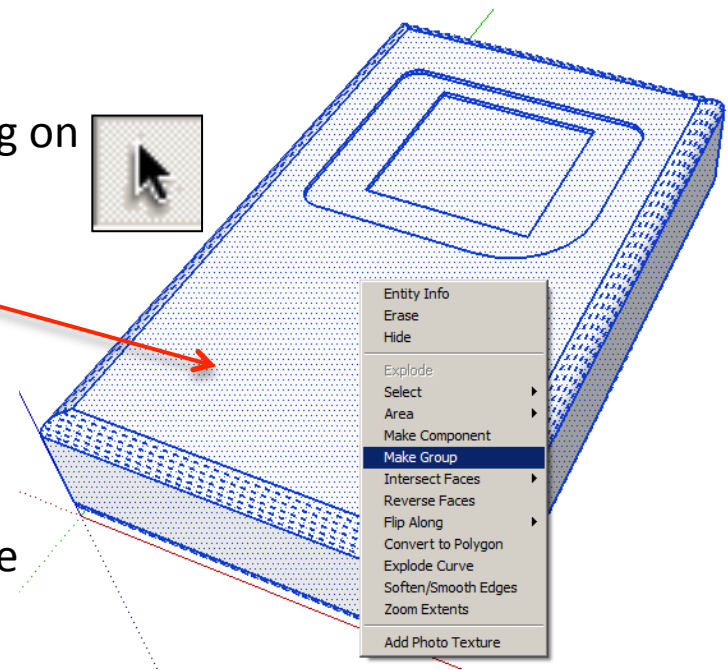


50. Use the **push pull tool** to lower the edge of the screen down. Type in **'1'** and **press enter**

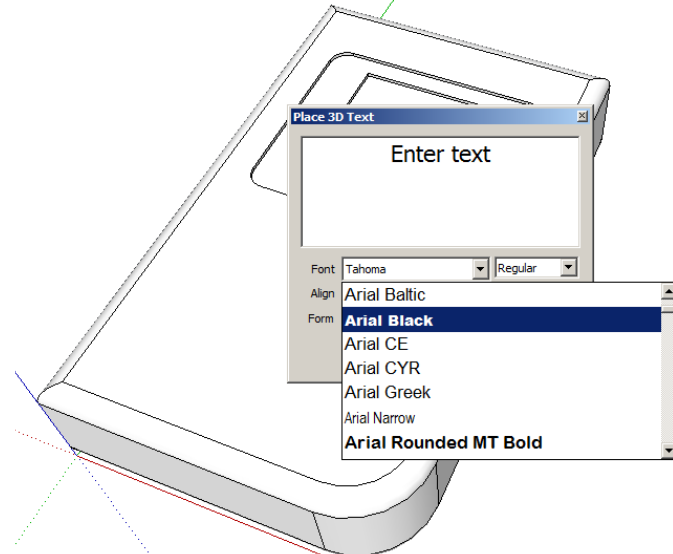
51 Use the **select tool** and keep clicking on the phone until it is all selected and highlighted in blue.



52. **Right click** on the mouse to produce the menu shown above and **click** on **make group**



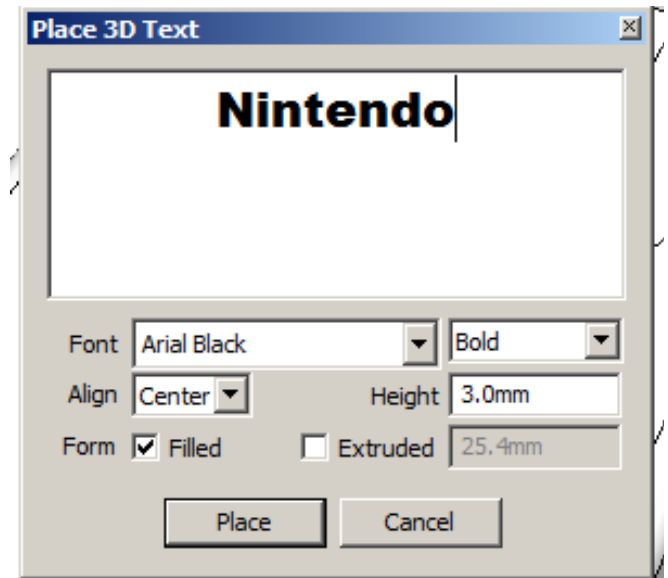
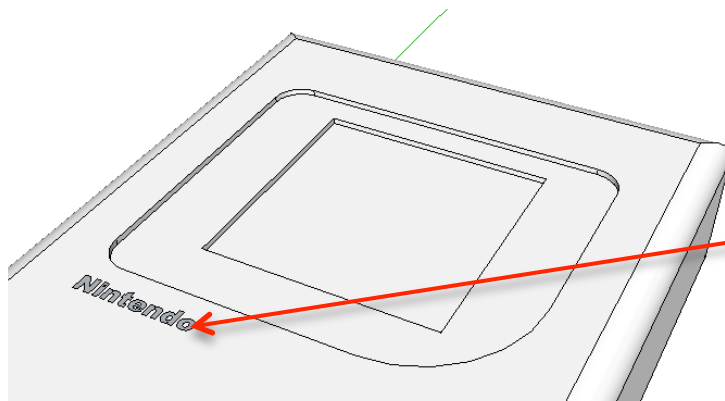
- Entity Info
- Erase
- Hide
- Explode
- Select
- Area
- Make Component
- Make Group**
- Intersect Faces
- Reverse Faces
- Flip Along
- Convert to Polygon
- Explode Curve
- Soften/Smooth Edges
- Zoom Extents
- Add Photo Texture



53 Next you are going to select the **text tool**.



54 Change the Font to **Arial Black**



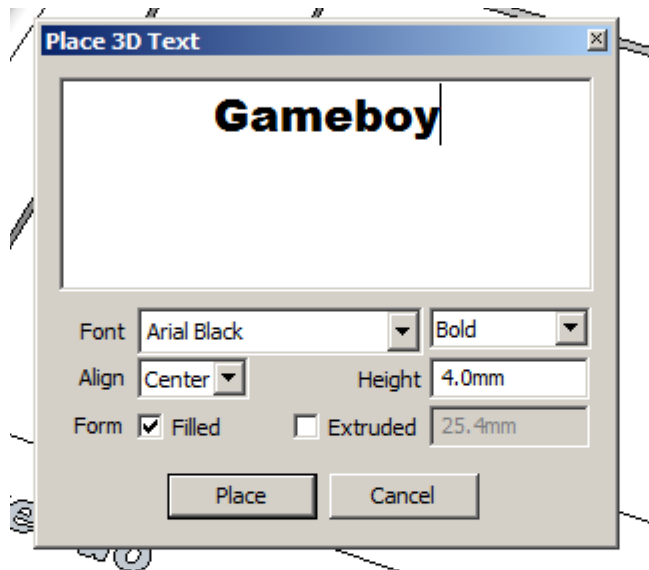
55 Type in '**Nintendo**'.

56 For the **height** type in **3.00mm**

57 Un-tick **extruded**

58 Position as shown





59 Select the **text tool**.

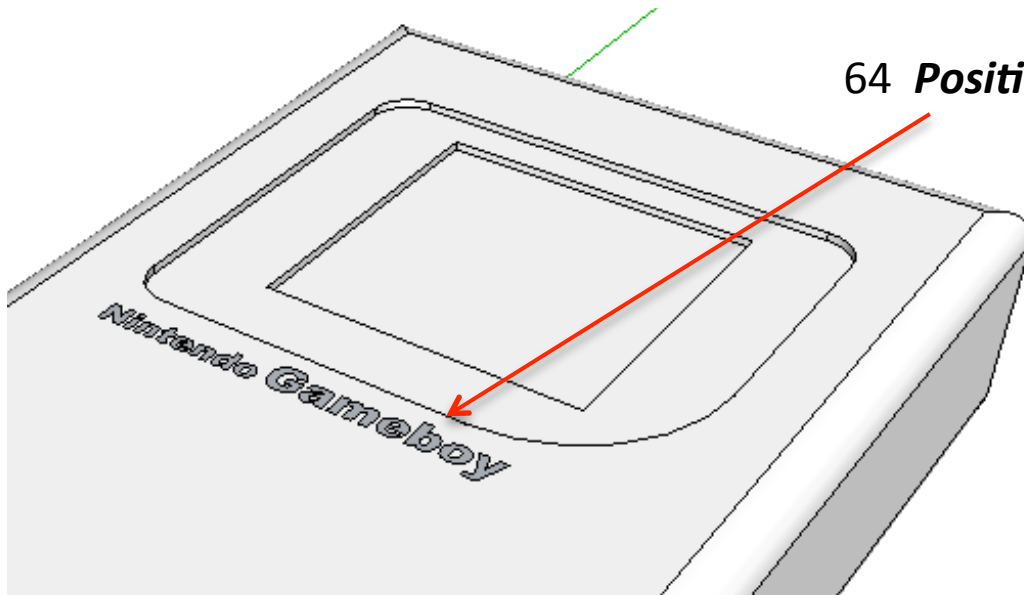
60 Change the Font to **Arial Black**

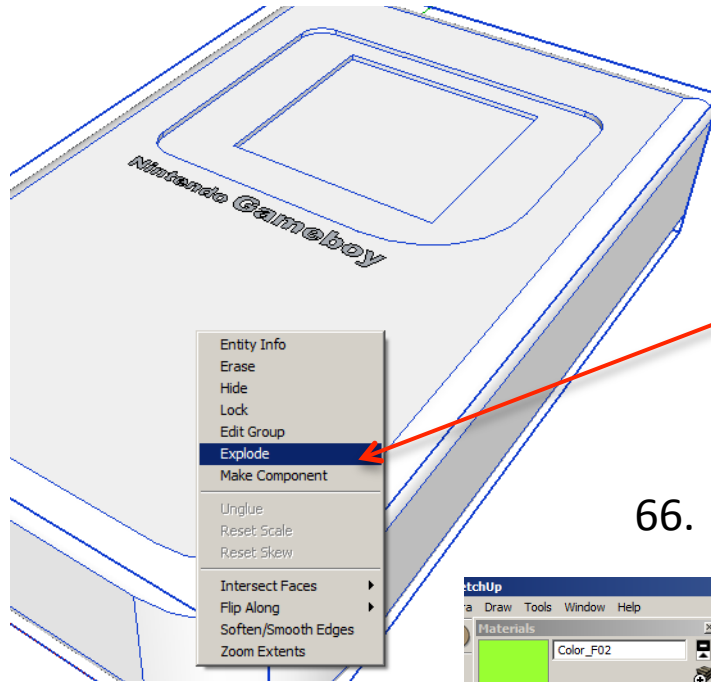
61 Type in '**Nintendo**'.

62 For the **height** type in **4.00mm**

63 Un-tick **extruded**

64 **Position** as shown



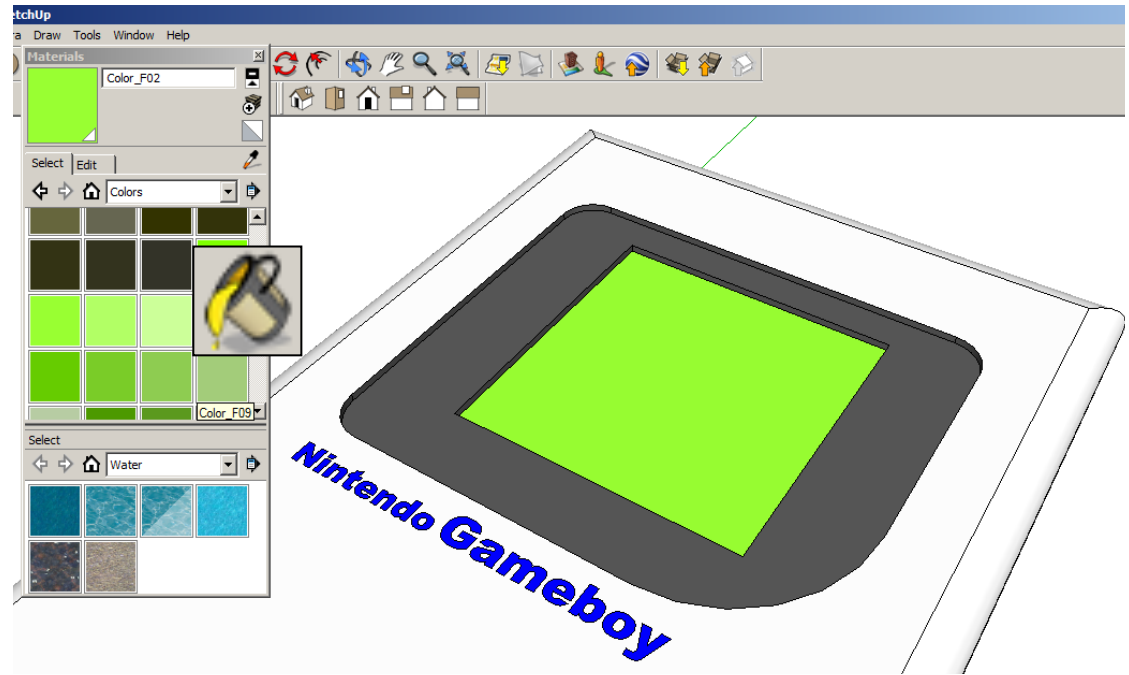


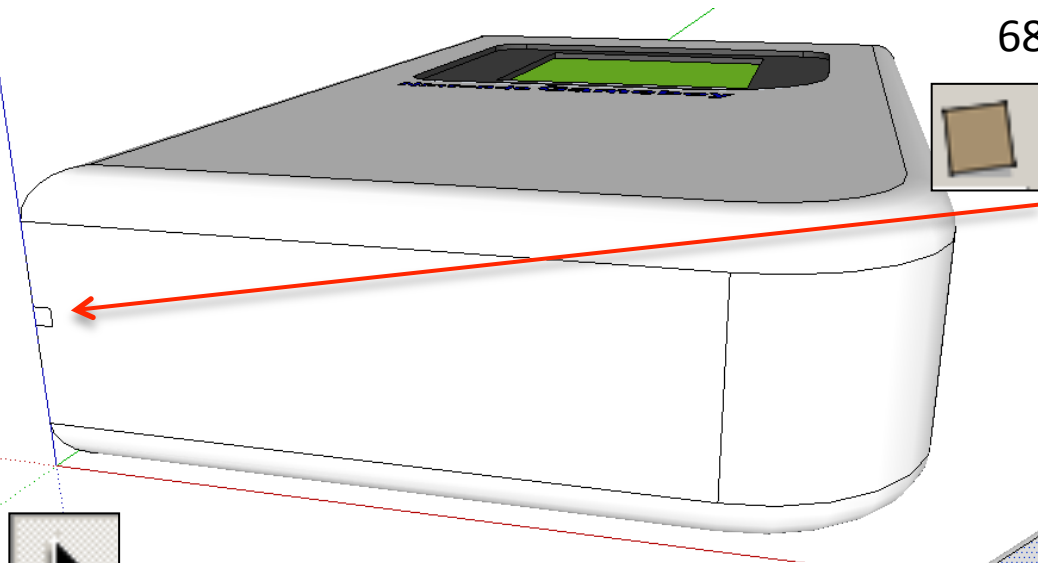
65. **Right click** on the mouse to produce the menu shown above and **click** on **explode**.

66. Click on the **colour bucket tool**

67. Click on the **drop down menu**. You will find a range of colours and textures here.

Colour your screen and writing as shown





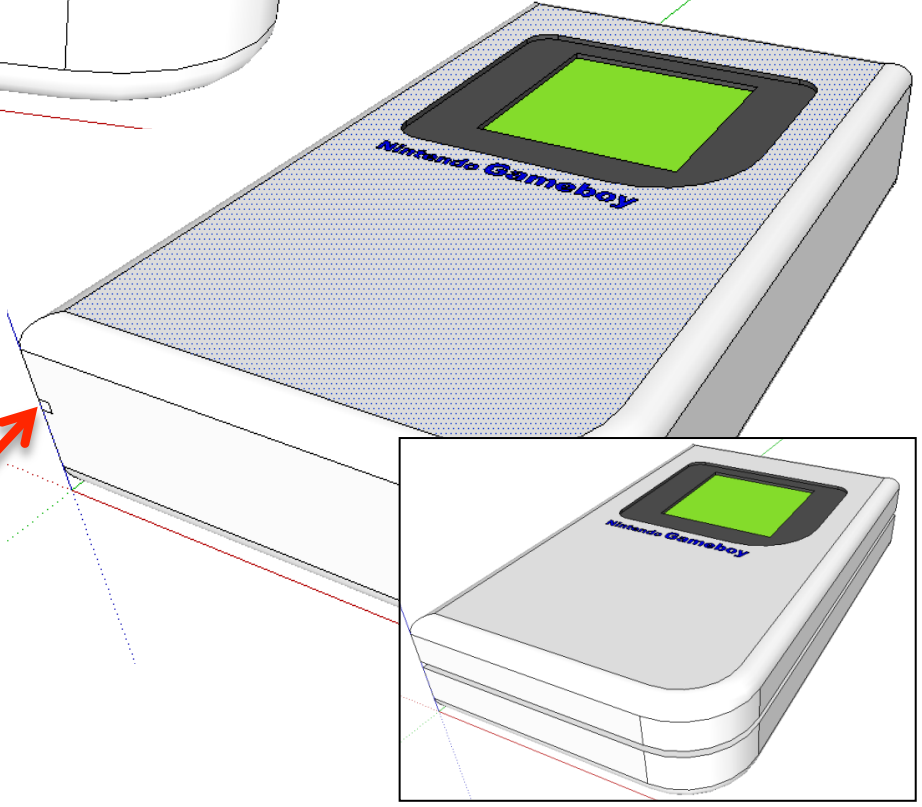
68. Select the **rectangle tool** and snap to the midpoint and draw a small square as shown, Size is up to you.....

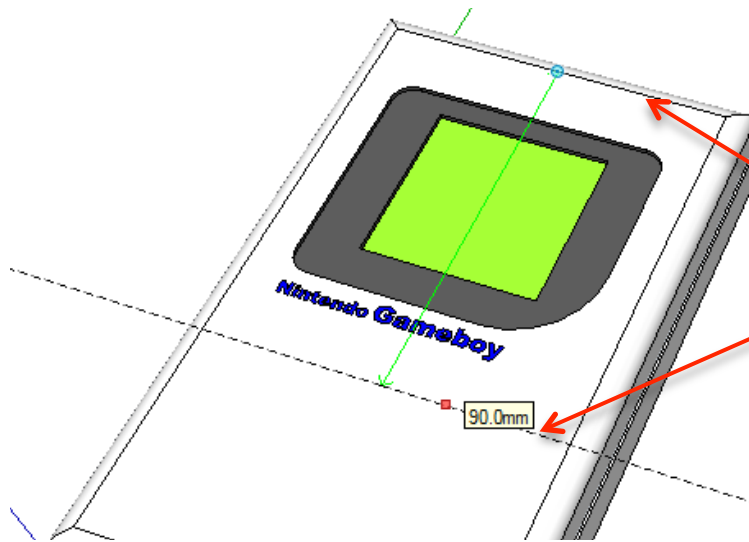


69. Use the Select **tool** and click on the top of shape. It should now be **highlighted in blue dots**.



70. Select the **follow me tool** and click on the inside of the small **square** on the side you have just drawn.

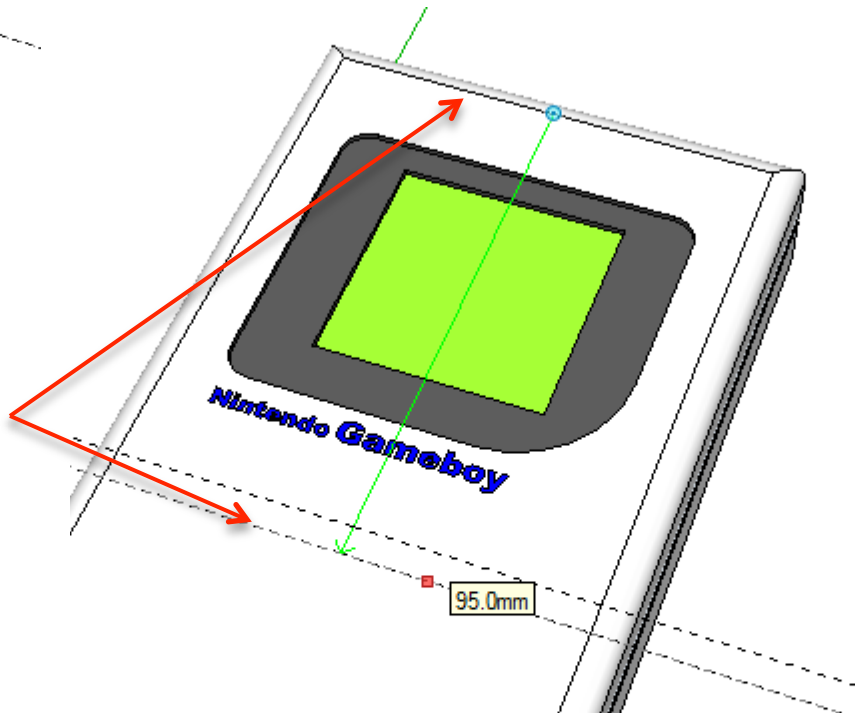


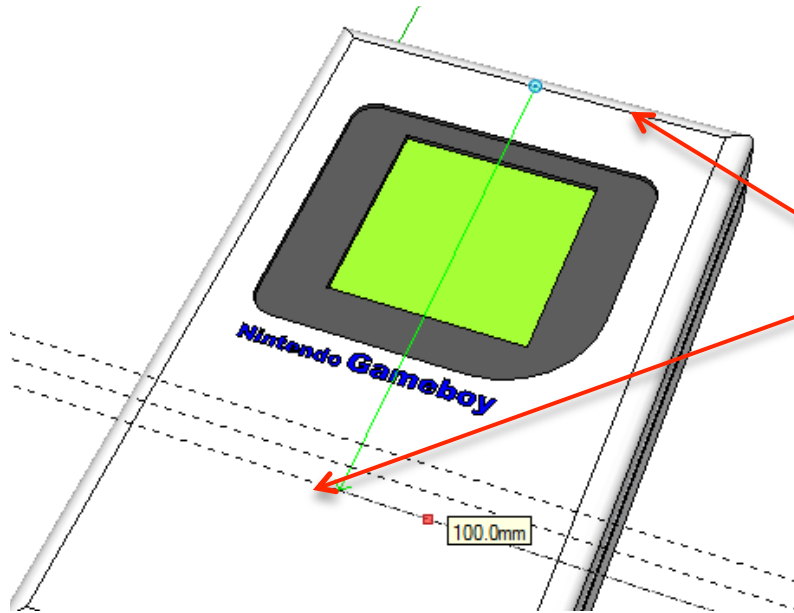


71. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 90 and enter**



72. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 95 and enter**

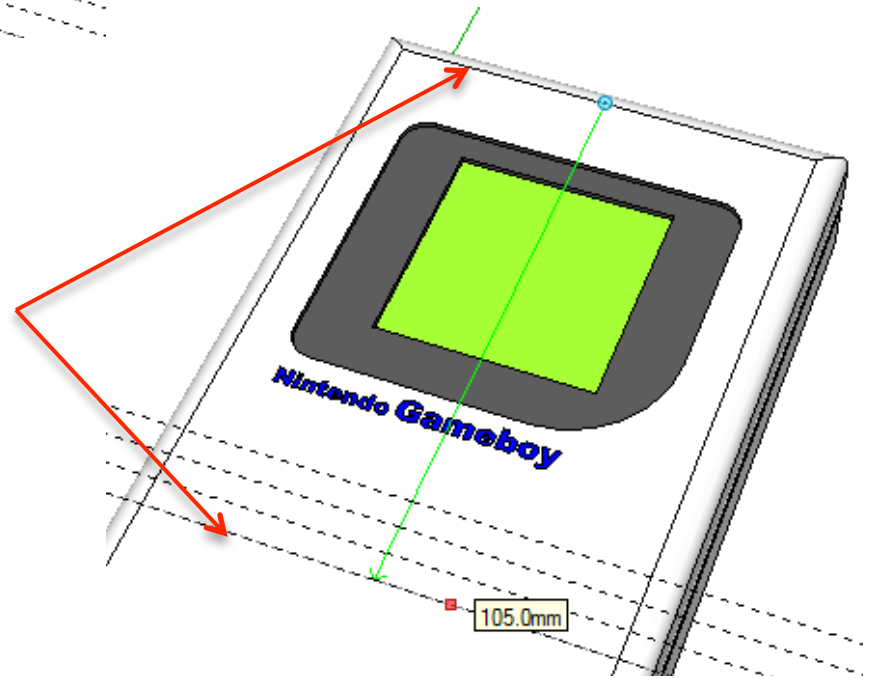


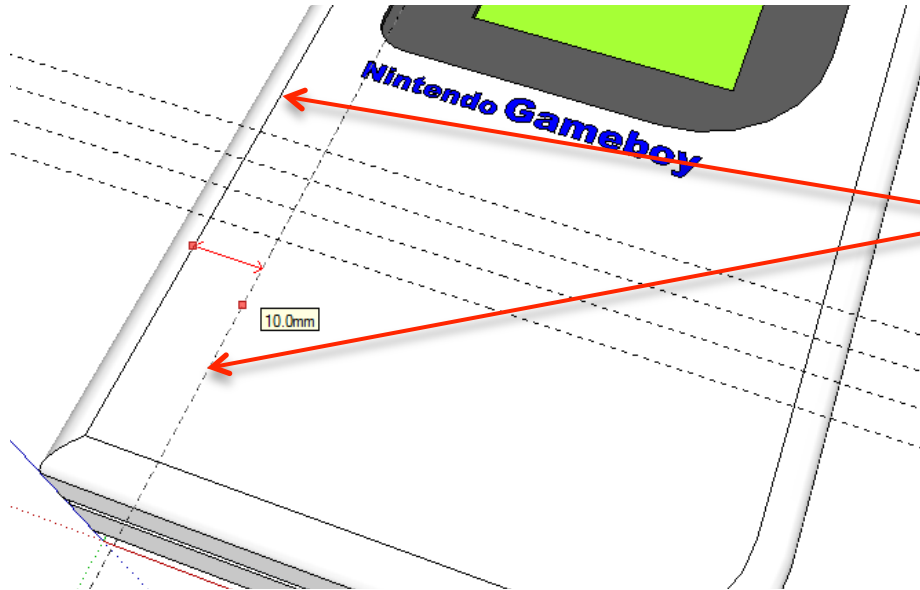


73. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 100 and enter**



74. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 105 and enter**

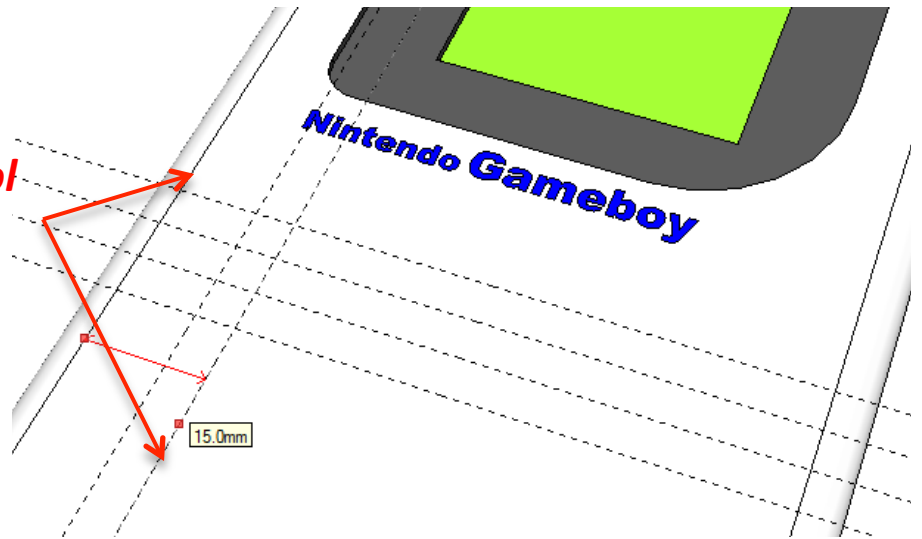


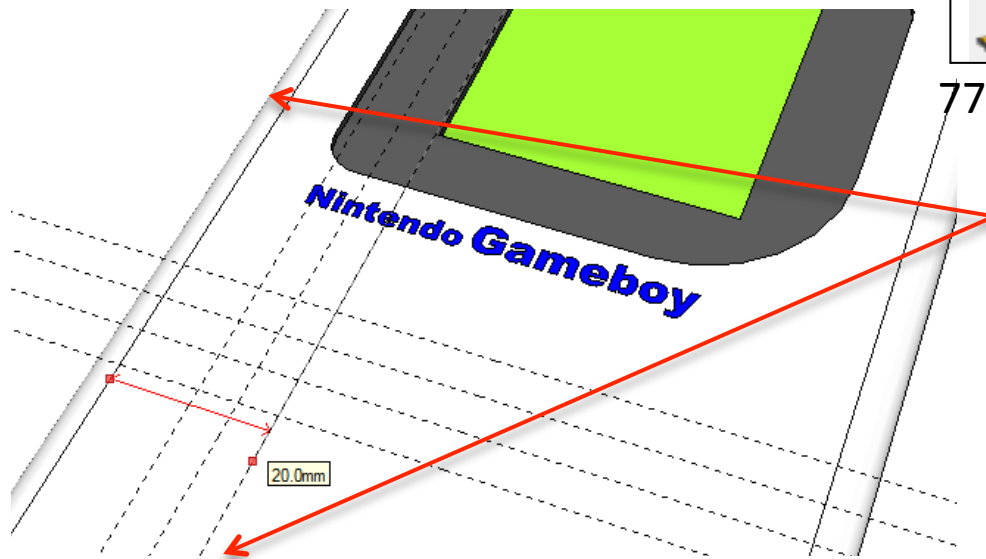


75. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull in and **type 10 and enter**



76. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull in and **type 15 and enter**

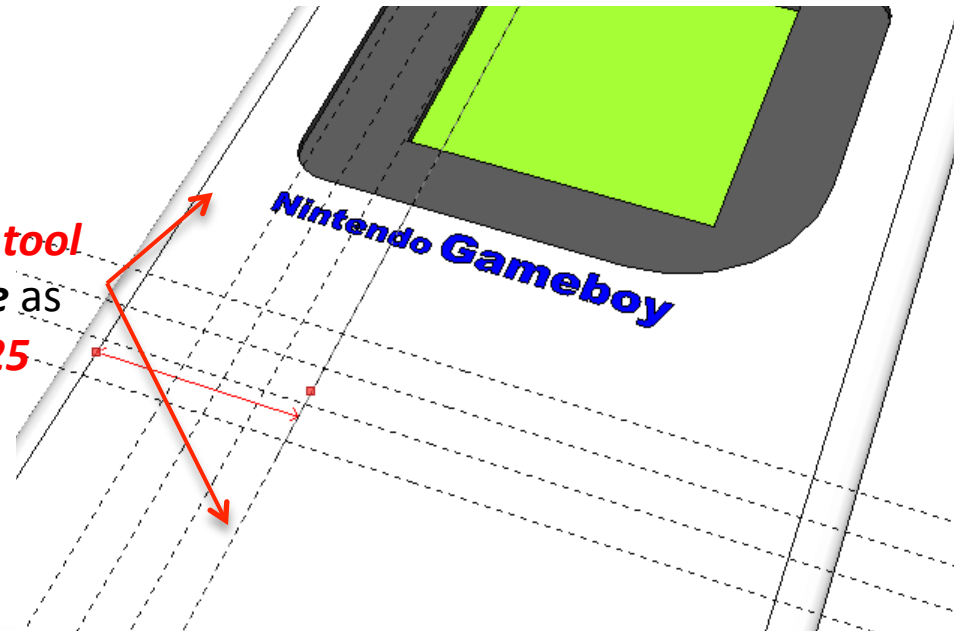




77. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull in and **type 20 and enter**



78. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull in and **type 25 and enter**





Nintendo Gameboy

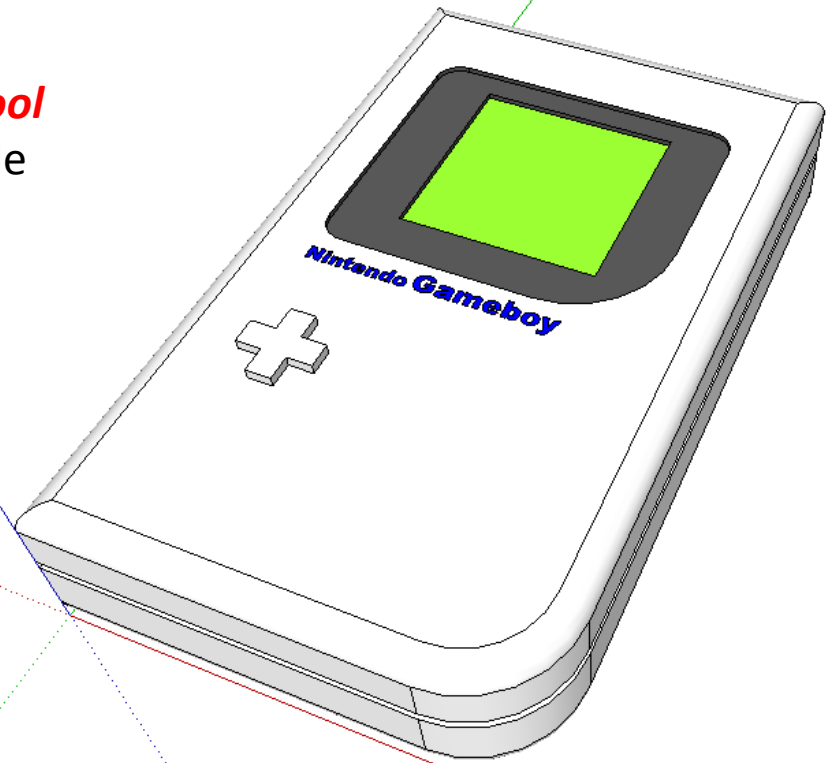
79. Select the **line tool** and snap to the **side guides** shown and draw the cross shape.

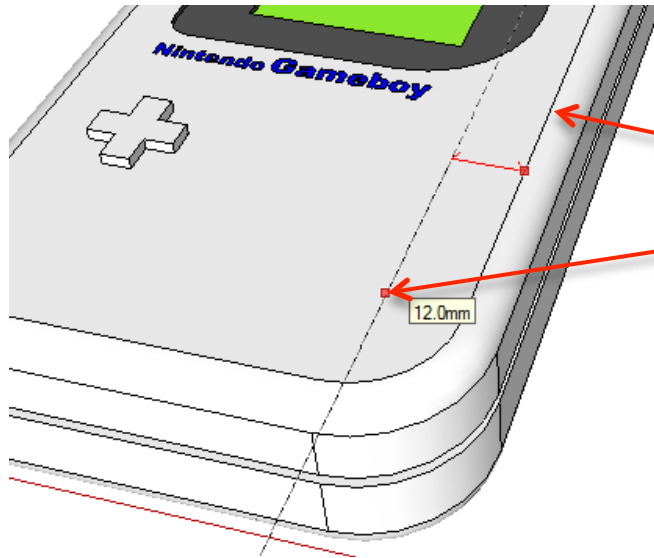


80. Select the **eraser tool** and delete the guide lines.



81. Select the **push/pull tool** and raise the cross. Type in '2' and press **enter**

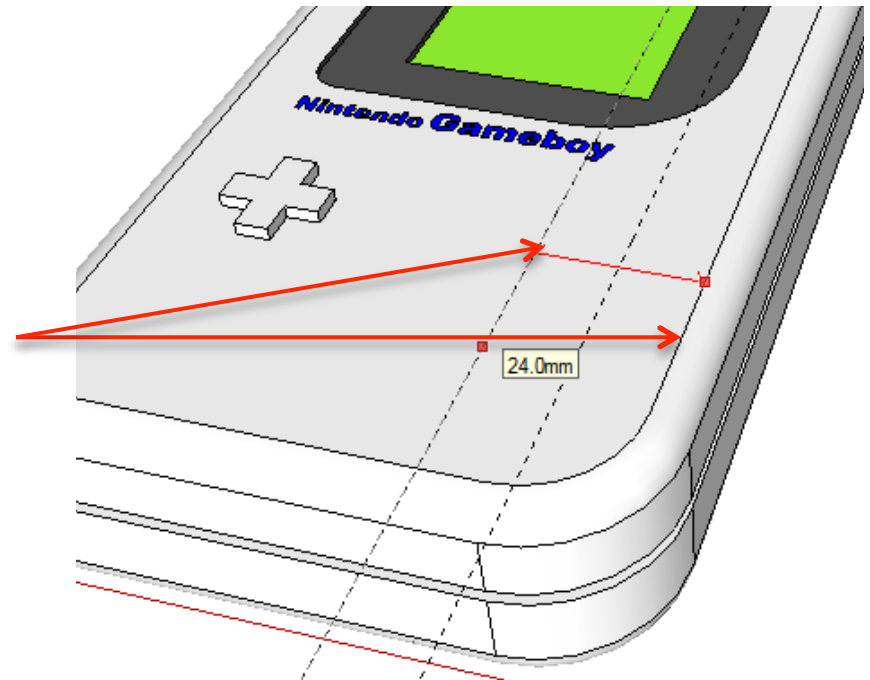


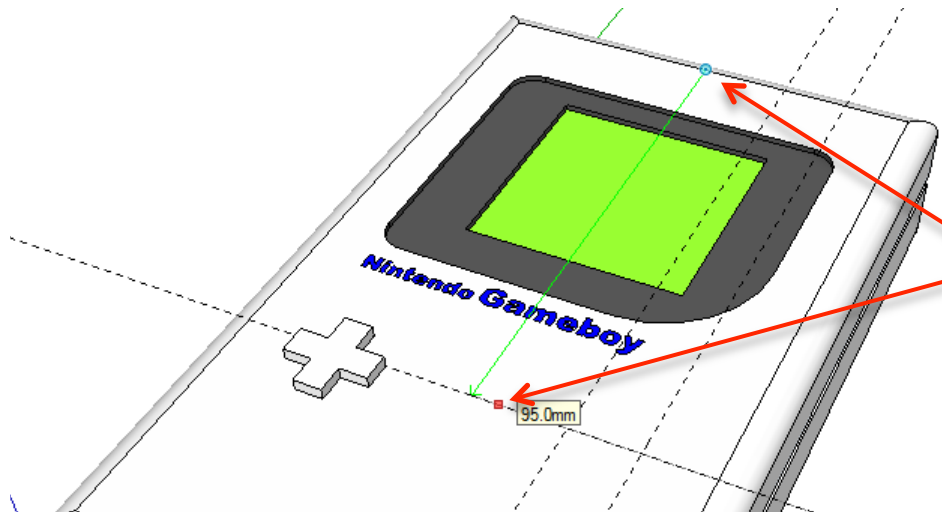


82. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull in and **type 12 and enter**



83. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull in and **type 24 and enter**

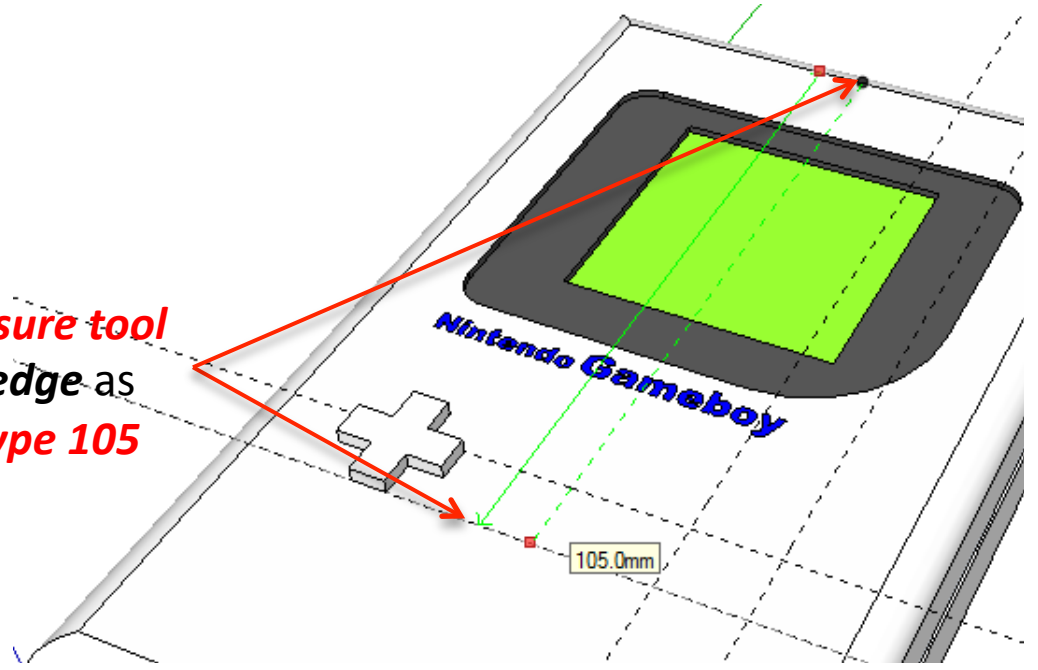


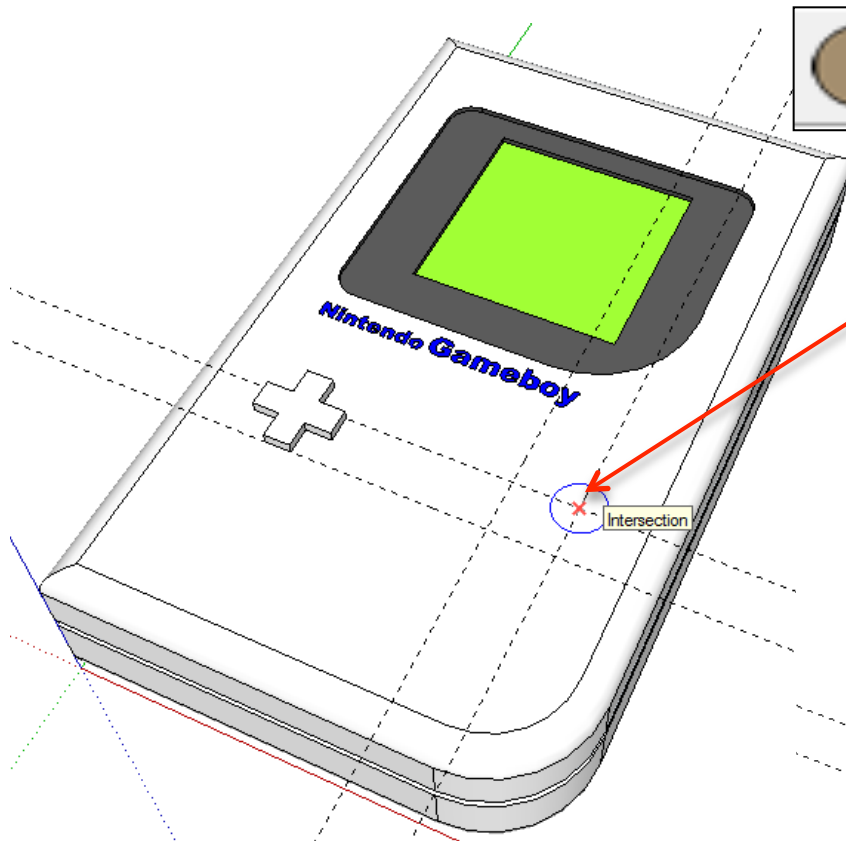


84. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 95 and enter**

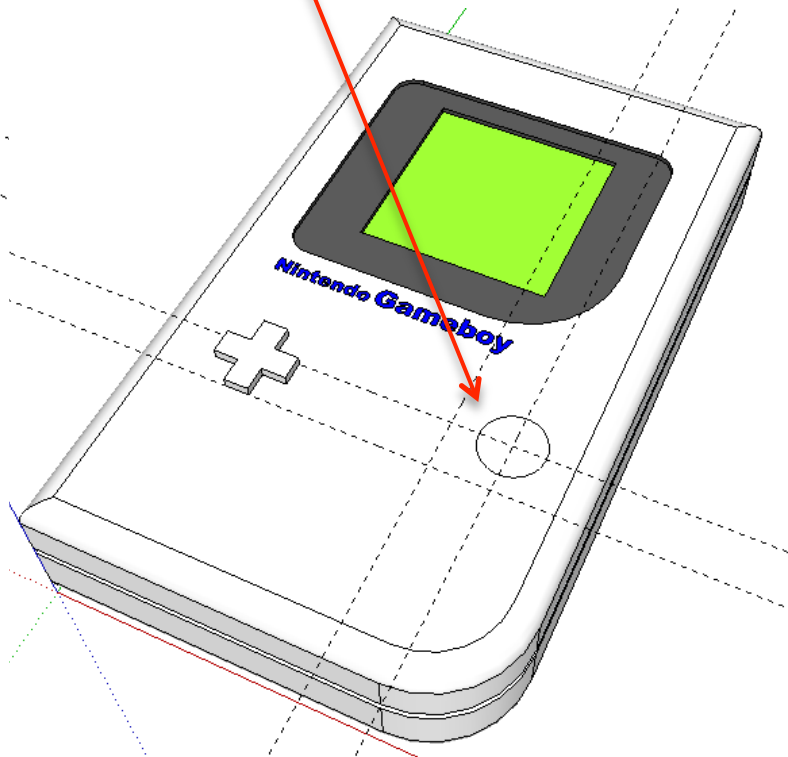


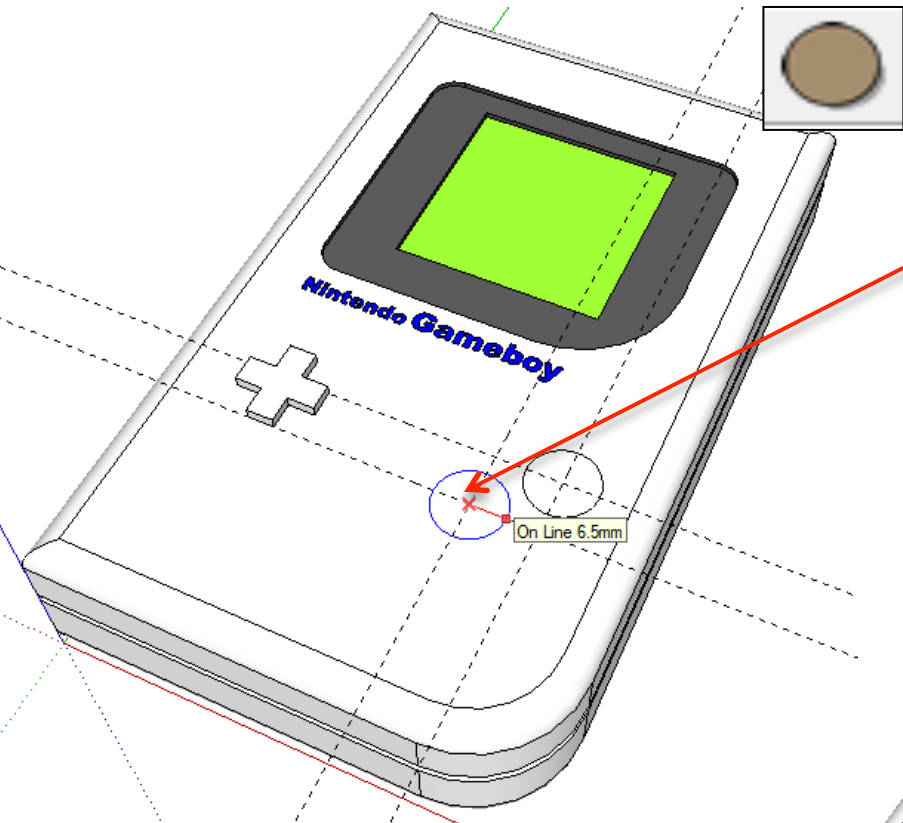
85. Select the **Tape measure tool** and snap to the **top edge** as shown. Pull in and **type 105 and enter**





86. Select the **circle tool** snap to the **intersection** as shown. Pull out and **type 6.5 and enter.**

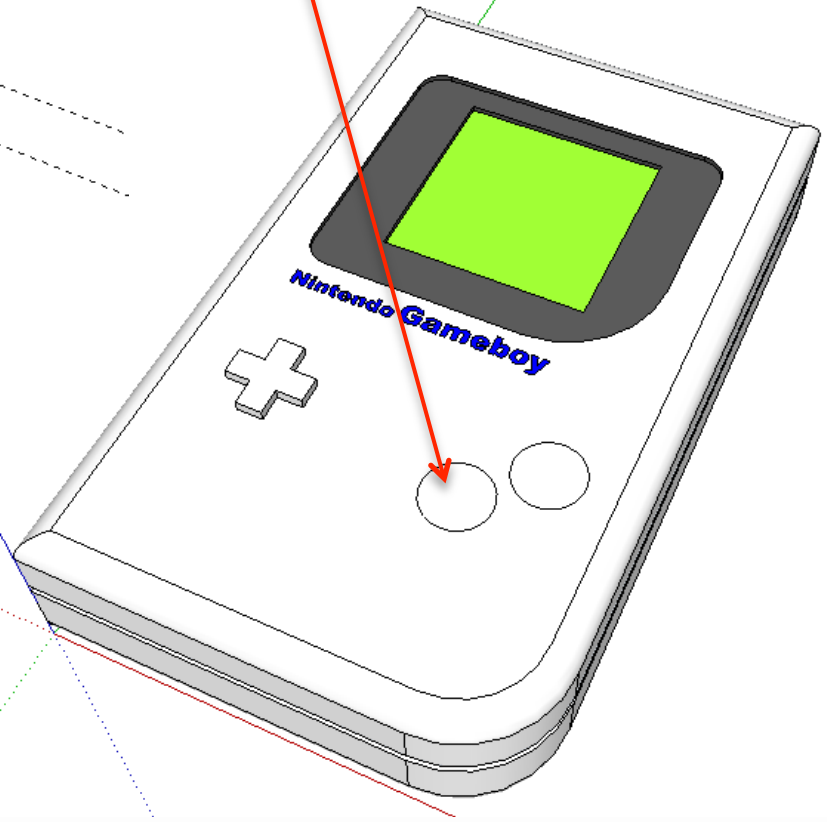


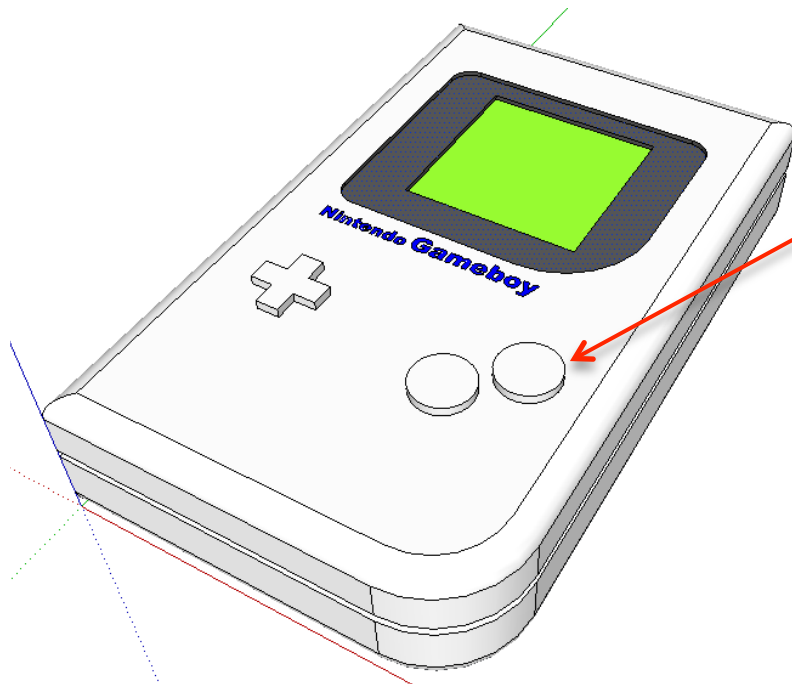


87. Select the **circle tool** snap to the **intersection** as shown. Pull out and **type 6.5 and enter.**

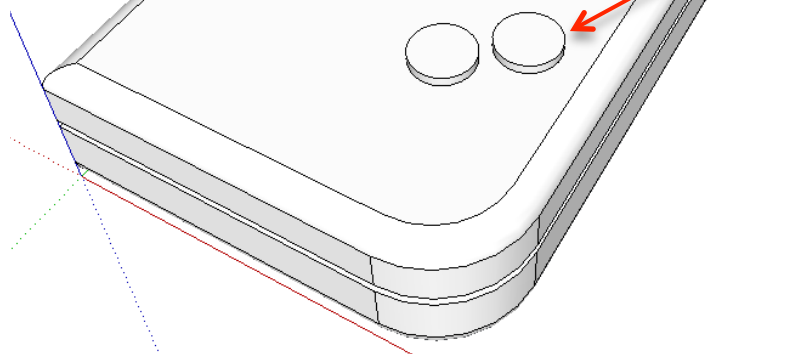


88. Select the **eraser tool** and delete the guide lines.





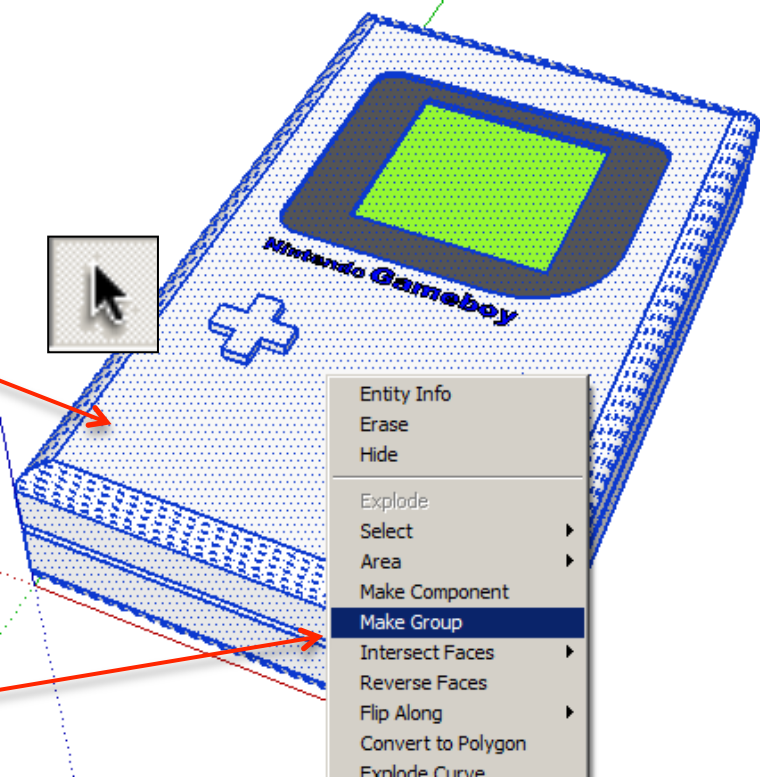
89. Select the **push/pull tool** and raise the circles. Type in '2' and press **enter**



90 Use the **select tool** and keep clicking on the phone until it is all selected and highlighted in blue.



91. **Right click** on the mouse to produce the menu shown above and **click on make group**



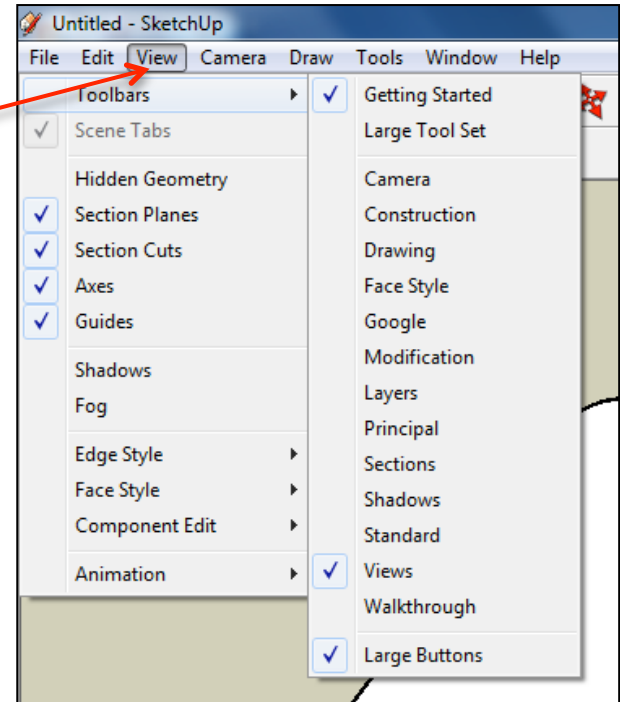
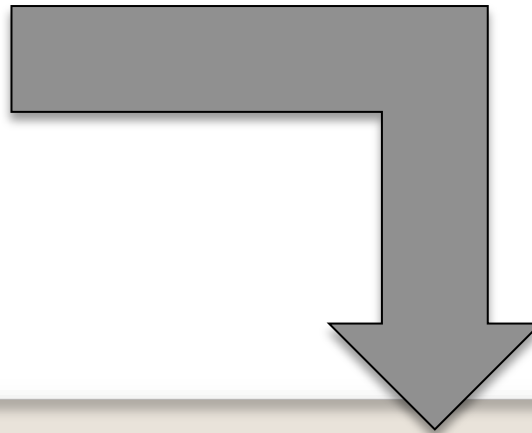
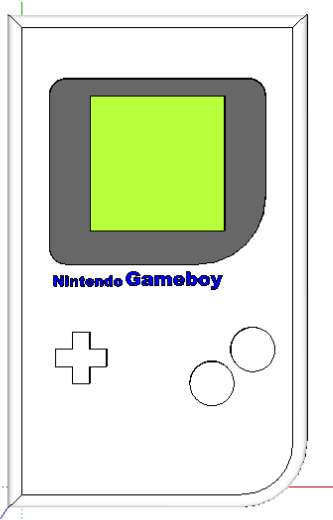


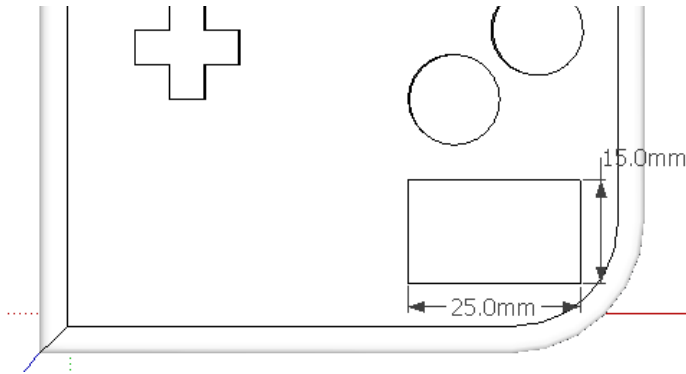
92. Now you want to be able to view your object *from the top*. To do this you are going to use the **View** toolbar.

Go to **View**, select **Toolbars** and then click on **Views**; this new set of tools will like this.....

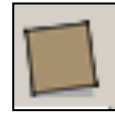


93. Click on this icon and you should see a top view of your iPod.

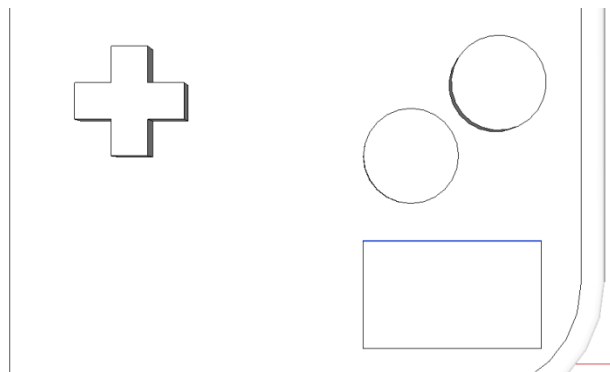




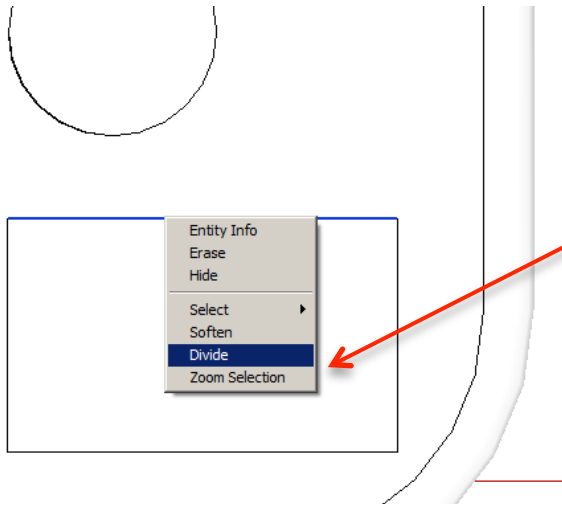
94. Select the **rectangle tool** and snap to the **left corner** as shown and start drawing a square to the bottom right hand corner of the Gameboy as shown. **Type in 15, 25** and press **enter**.



95. Select the **move tool** and move the square to the appropriate place if needed.

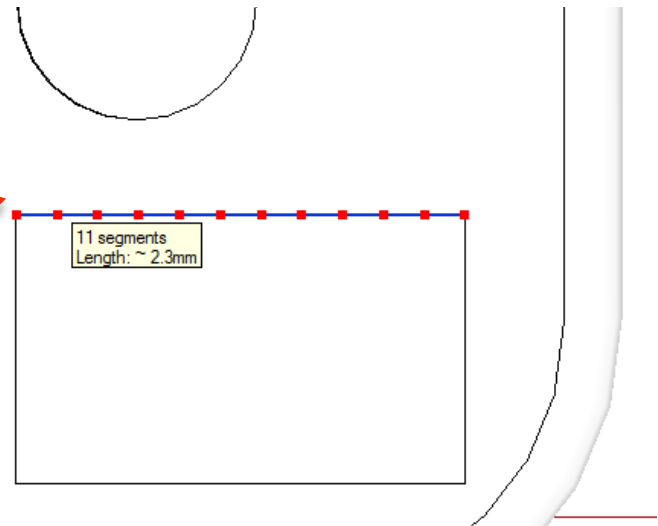


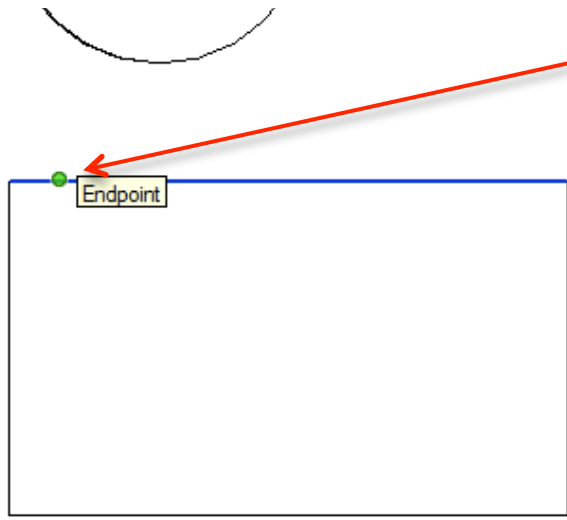
96. Use the Select **tool** and click on the top of rectangle shape. The top line should be **highlighted in blue**.



97. **Right click** on the mouse whilst on the **blue line** to produce the menu shown left and **click** on **divide**

98. **Move the** mouse whilst on the **blue line** move it right or left. You are looking to **divide** it by **11 segments**. You can also type in **'11'** and **enter**.

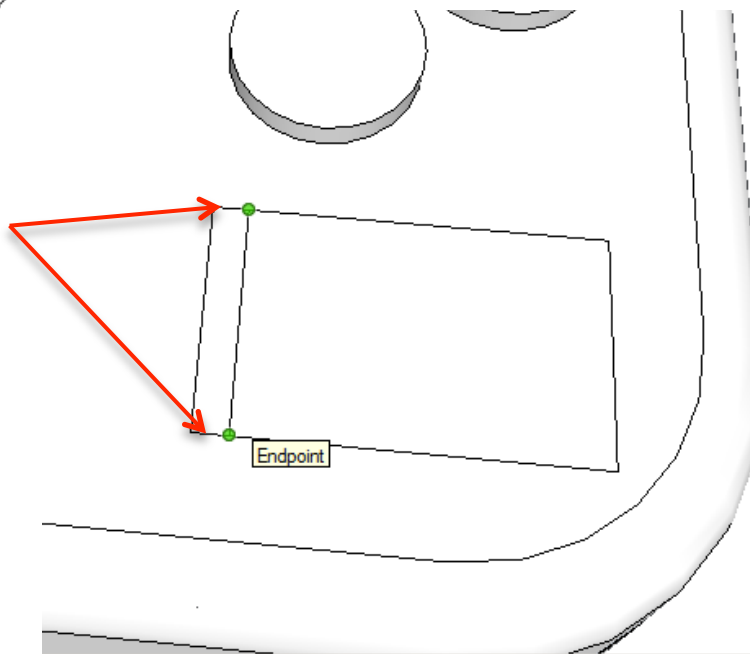


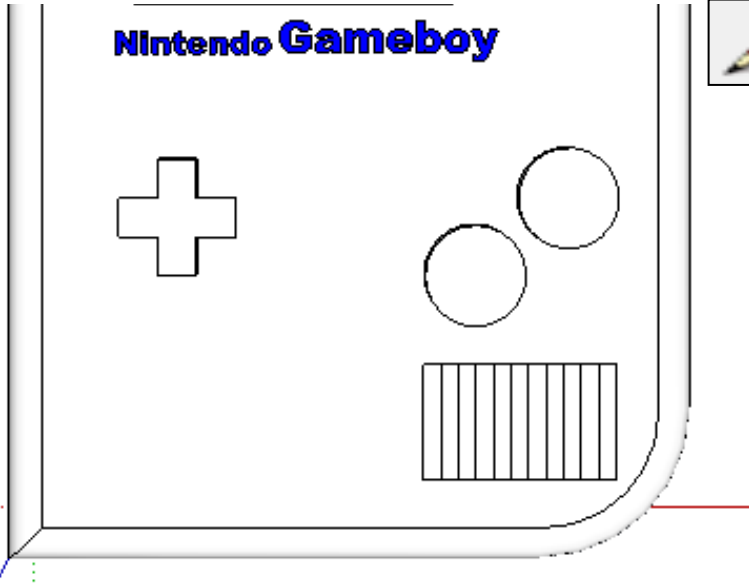


99. Using the **line tool**. Run it along the top of the blue line you have just **divided**.



100. Using the **line tool**. When you come to the **endpoint**. Draw a line down to the **opposite endpoint**.

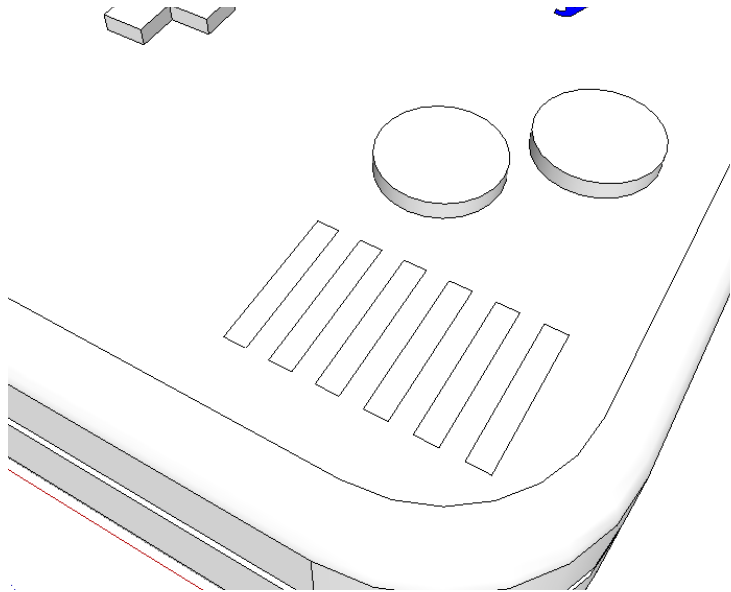


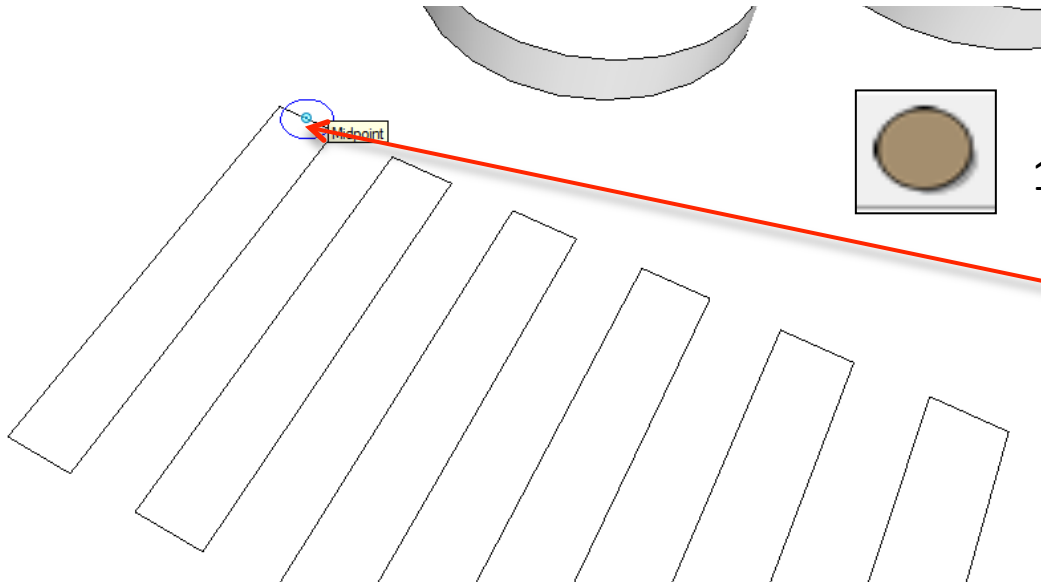


101. Using the **line tool**. When you come to the **endpoint**. Draw a line down to the **opposite endpoint along the rest of the line as shown**.



102. Using the **eraser tool**. Delete every other rectangle to be left with the vents shown.

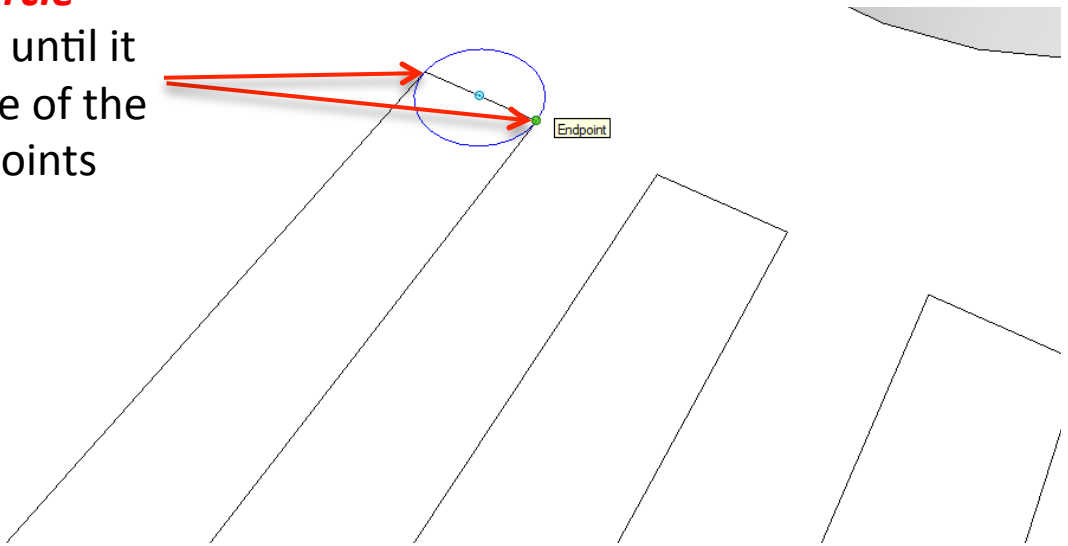


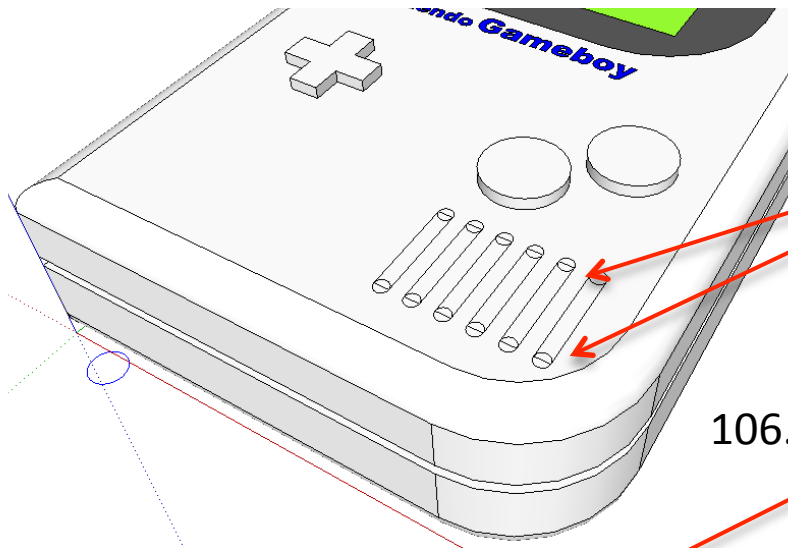


103. Select the **circle tool** snap to the **midpoint** at the top of one of the rectangles

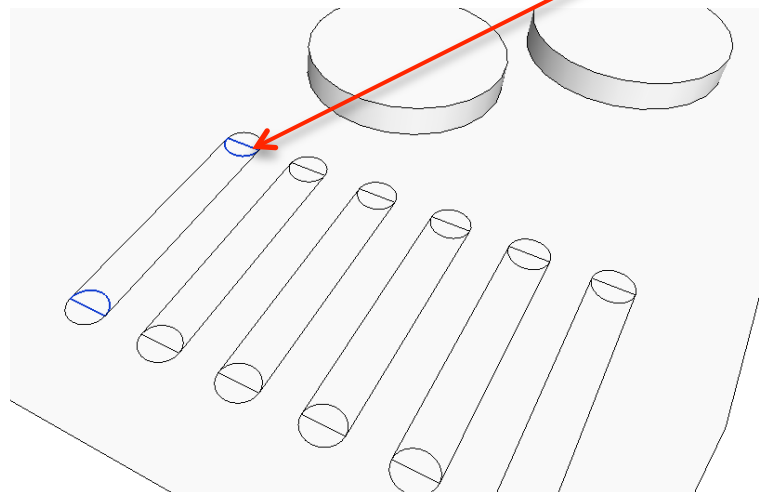


104. Pull the **circle** outwards until it meets one of the two endpoints shown.

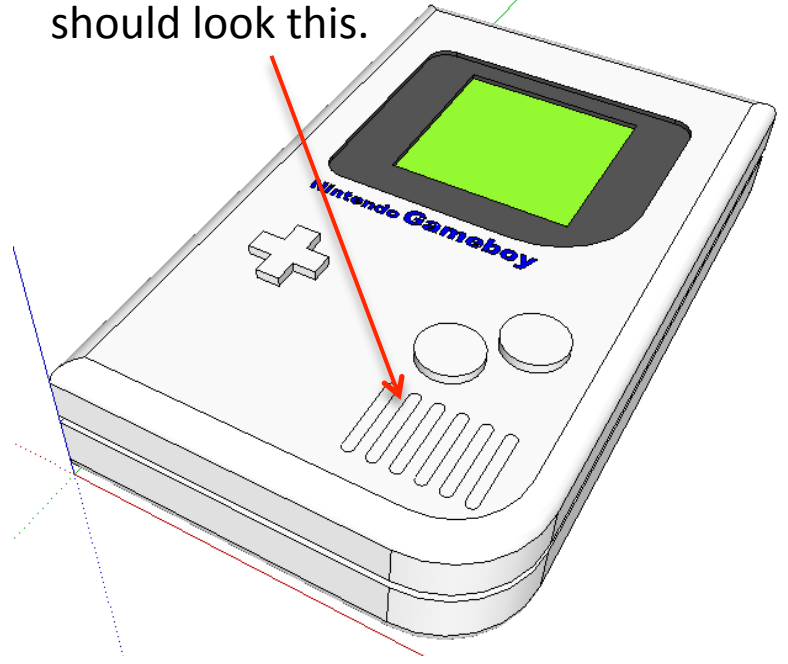


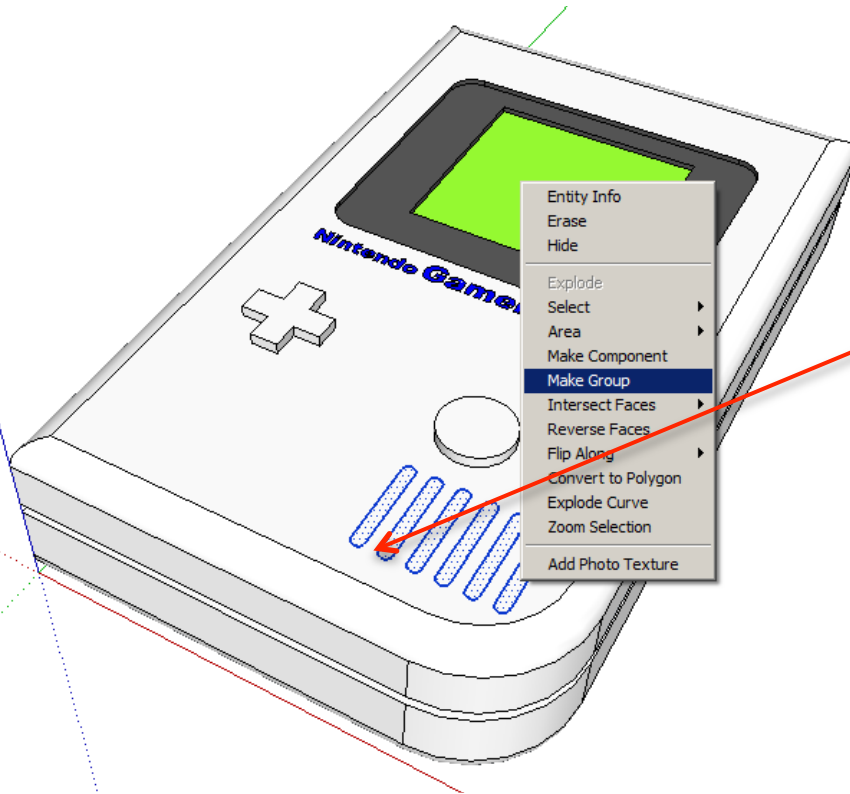


105. Using the **circle tool**. **Repeat** the process for the remainder of the rectangles at the **top** and **bottom**.



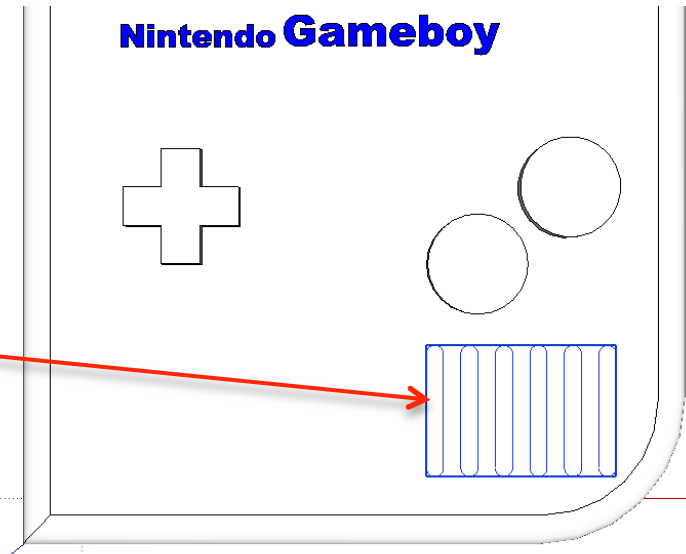
106. Using the **Eraser tool**. **Delete** the lines shown in blue. Your should look this.





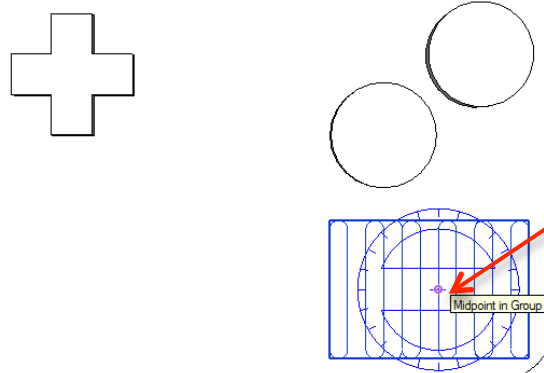
107 Use the **select tool** drag it over the vents until they are all selected and highlighted in blue.

108. **Right click** on the mouse to produce the menu shown above and **click** on **make group**





Nintendo Gameboy

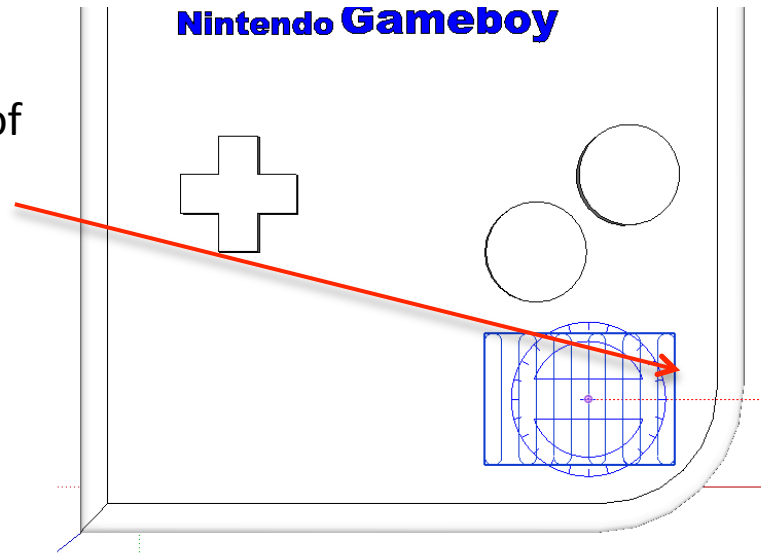


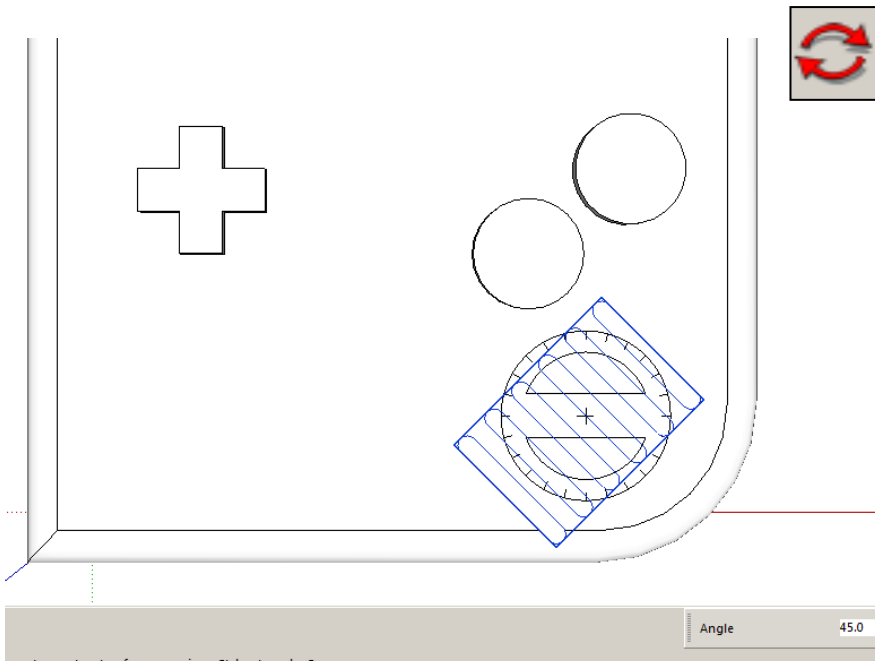
109. Click on **rotate tool bar**. Move it to the centre of the square and click to set it in place. The rotate protractor must be **BLUE** when you click it into place.



110 To start the rotate move the line coming out of the protractor to the **right hand** of the vents, the **line should be red**. **Click** to start rotating

Nintendo Gameboy

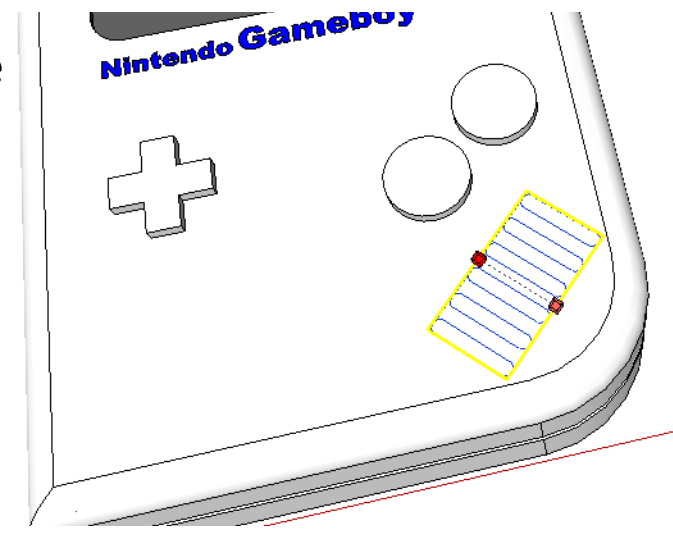


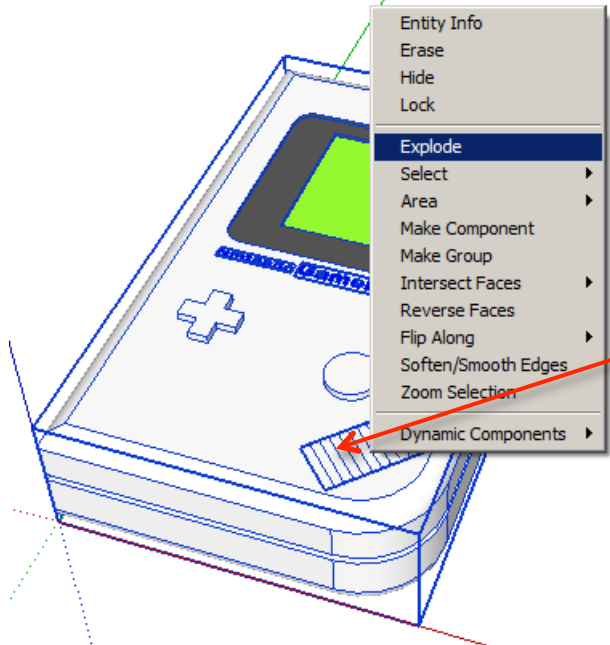


111 Rotate the square until the number in the bottom right hand-side says '45' or type '45' and *enter*.



112 Use the resize tool, resize the vents to a size that is appropriate.

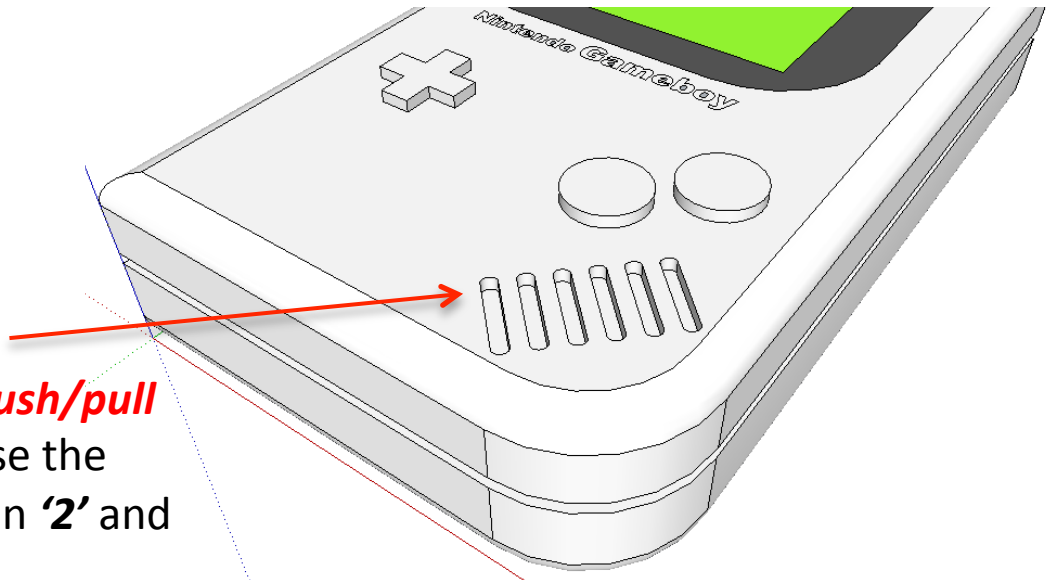


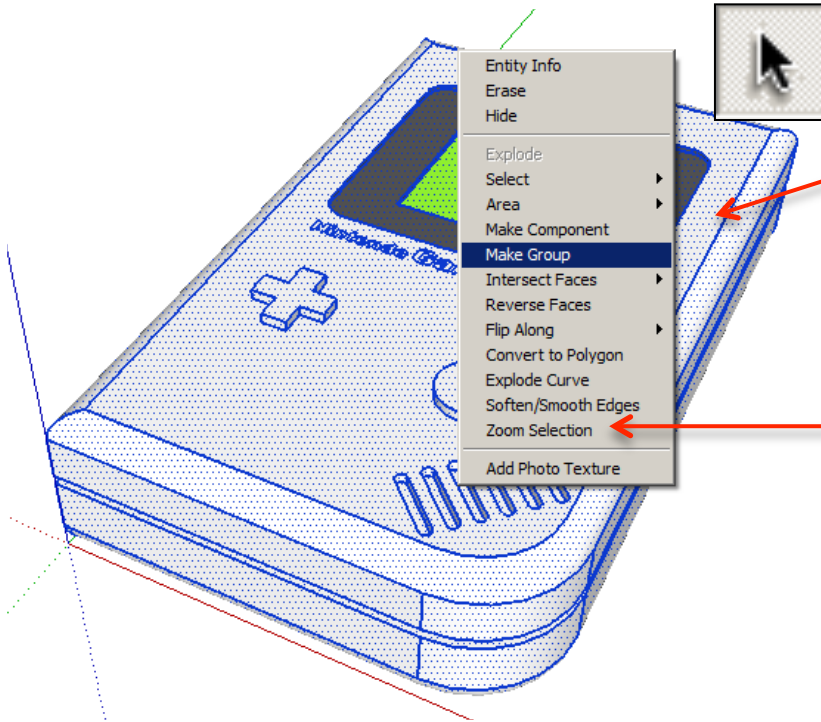


113. Use the select tool. Highlight the whole Gameboy. **Right click** on the mouse to produce the menu shown above and **click** on **explode**.



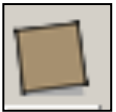
114. Select the **push/pull tool** and raise the cross. Type in '2' and press **enter**



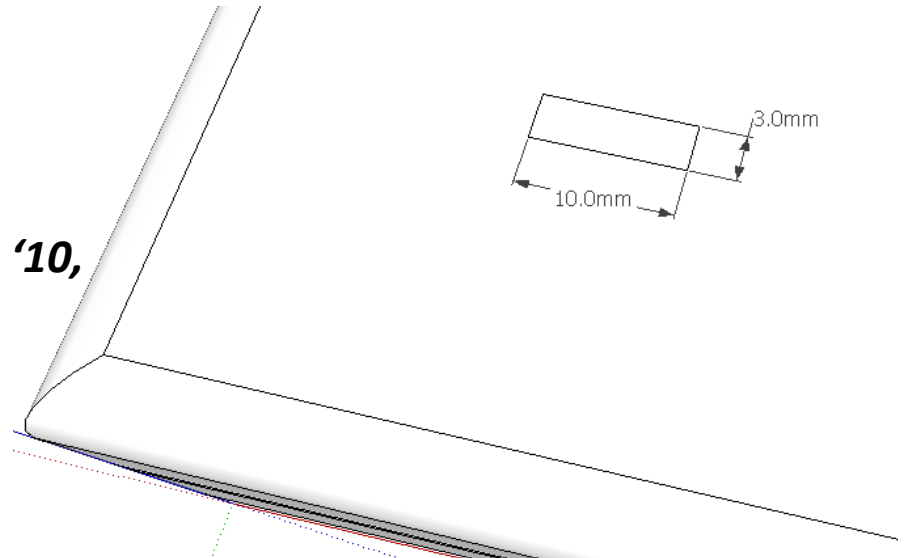


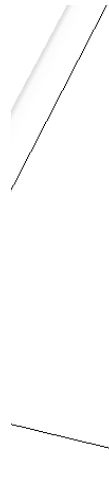
115 Use the **select tool** and keep clicking on the phone until it is all selected and highlighted in blue.

116. **Right click** on the mouse to produce the menu shown above and **click** on **make group**



117. Select the **rectangle tool** and draw a rectangle measuring '10, 3'





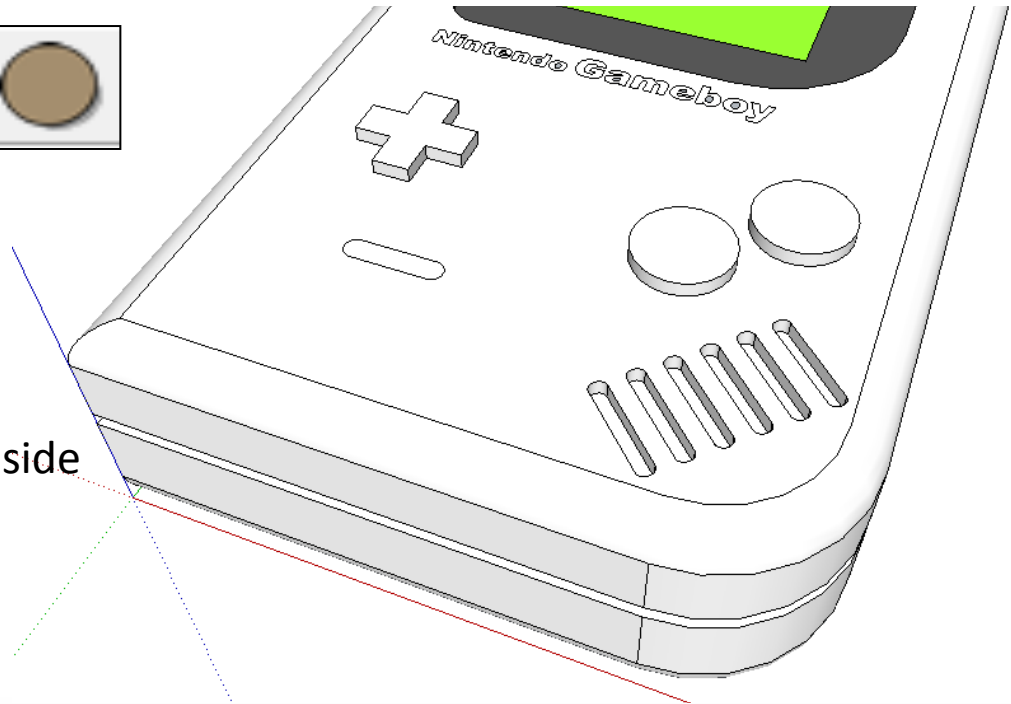
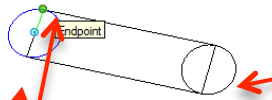
119. Pull the **circle** outwards until it meets one of the two endpoints shown.

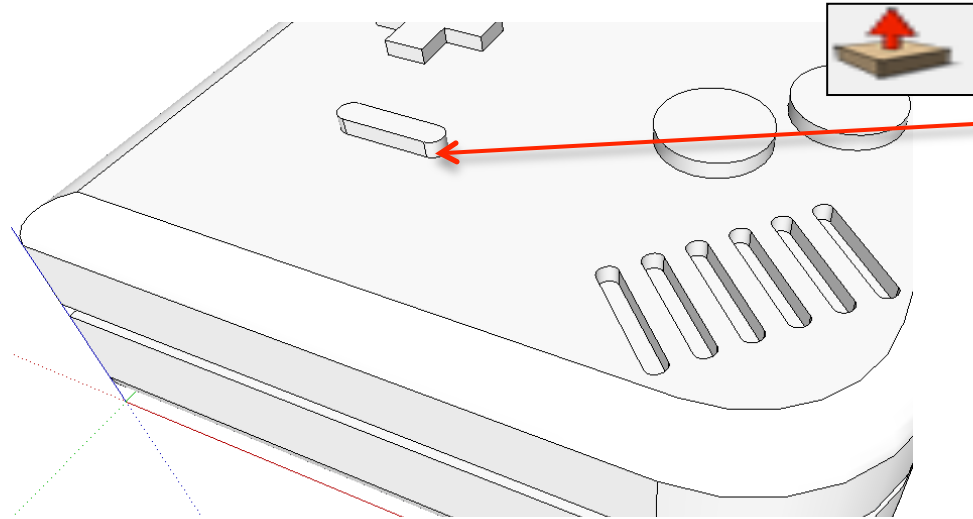


120. Delete the inside circles



118. Select the **circle tool** snap to the **midpoint** at the end of one of the rectangles shown

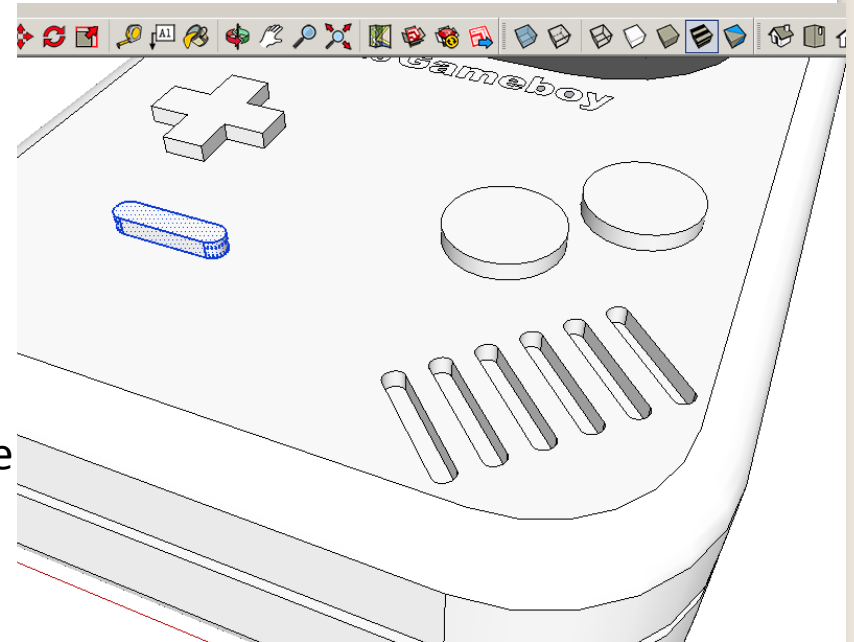


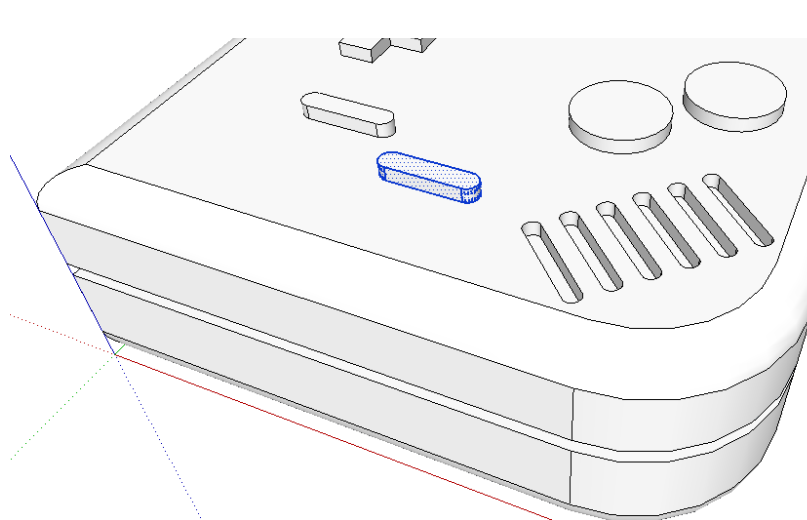


121. Select the **push/pull tool** and raise the cross. Type in '2' and press **enter**

122 Use the **select tool** and keep clicking on the phone until it is all selected and highlighted in blue.

123. **Copy and paste** the button by using **Ctrl C** and **Ctrl V**. Or use the edit tool bar and copy and paste commands

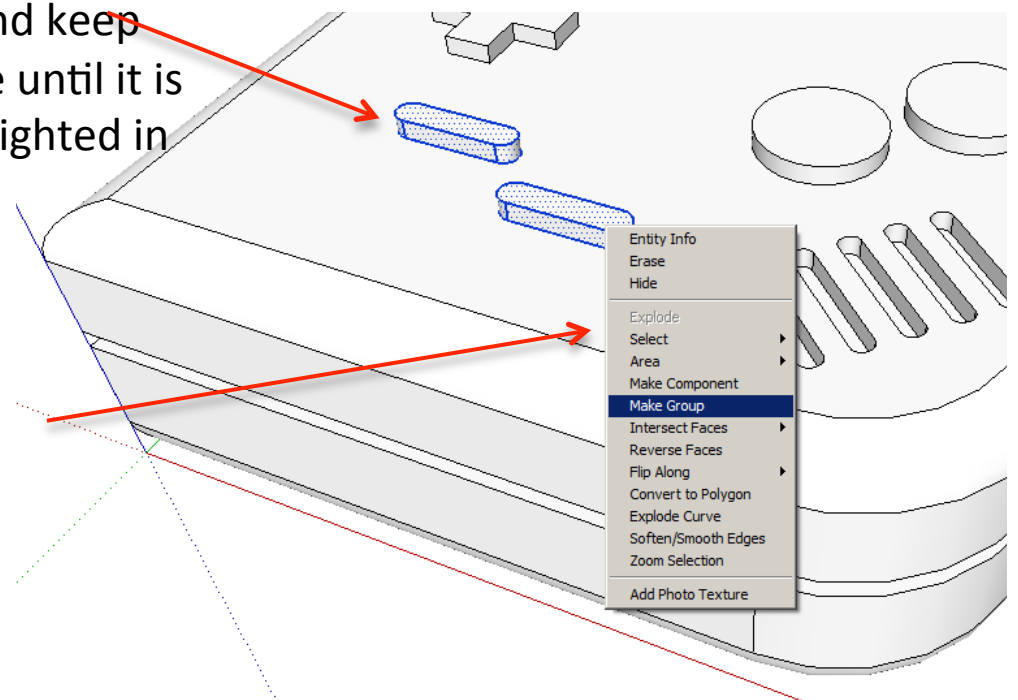


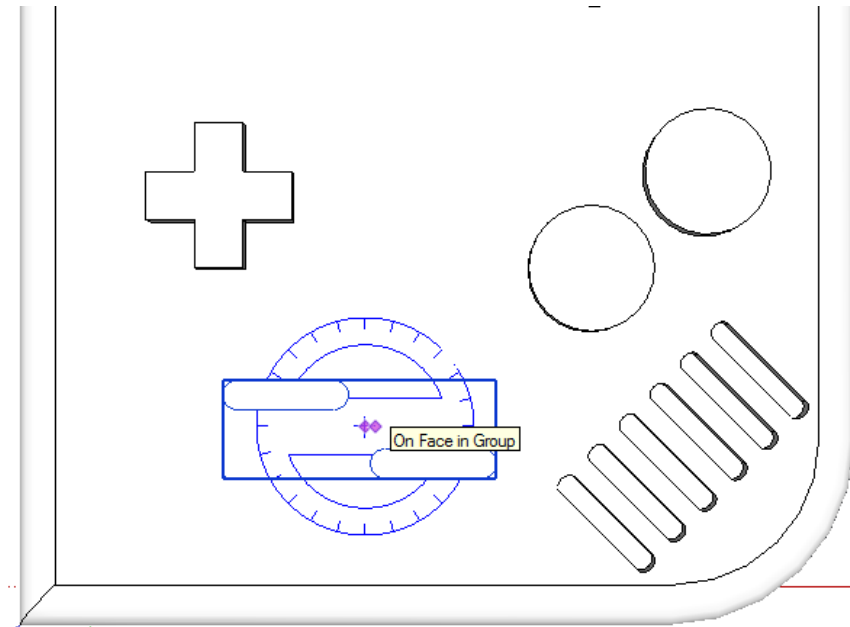


124. Use the **move tool** to position the button as shown

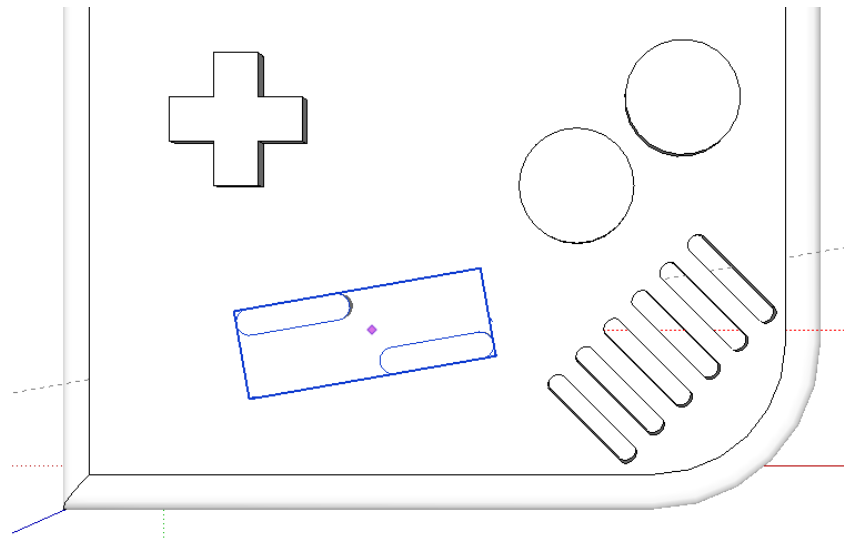
125 Use the **select tool** and keep clicking on the phone until it is all selected and highlighted in blue.

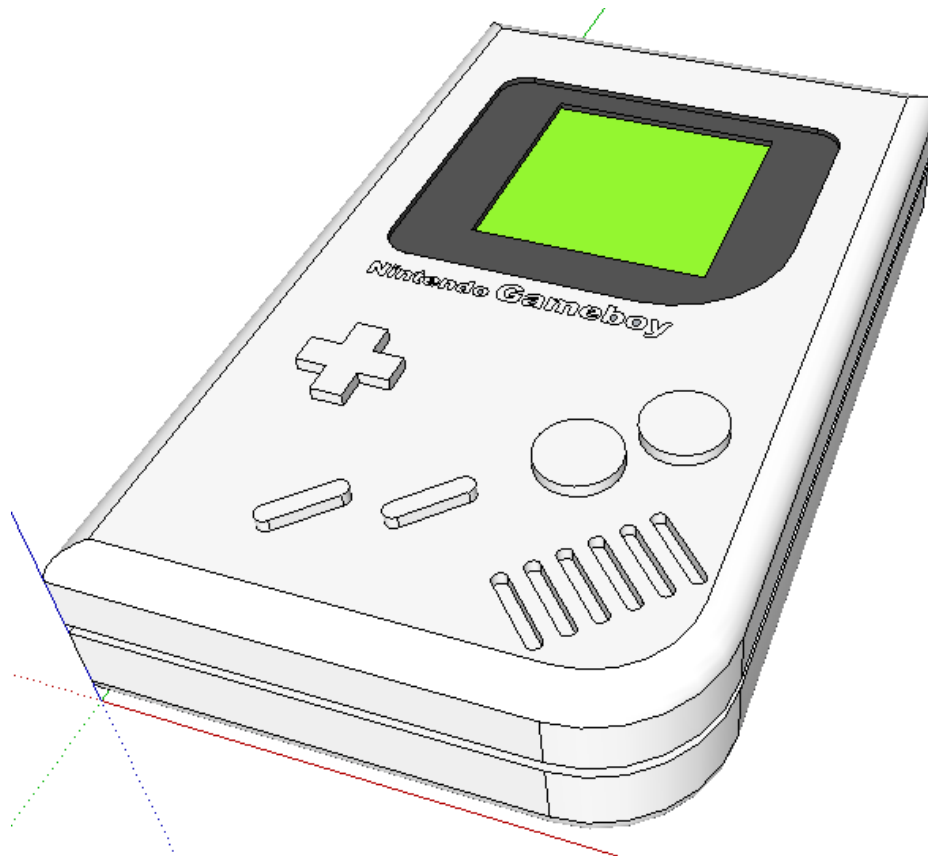
126. **Right click** on the mouse to produce the menu shown above and **click on make group**



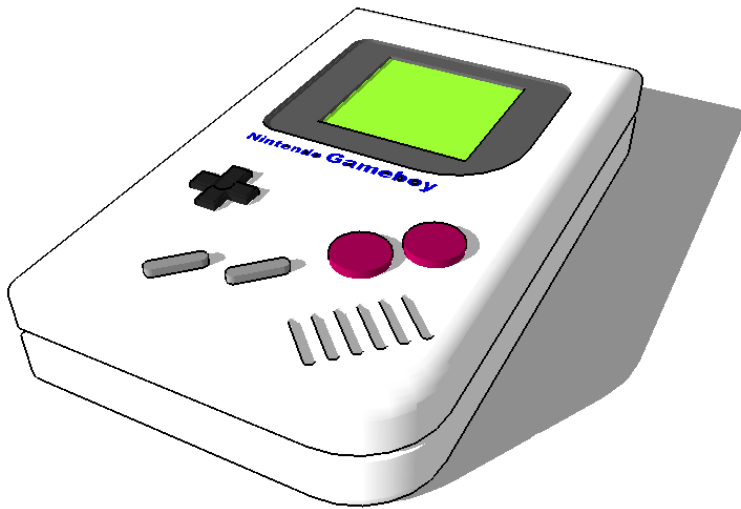


127. Use the **rotate tool** to angle the buttons as shown.





128. Use your own skills to add more details



129. Click **View – toolbars** and un-tick axis. Place a tick next to shadows

Tasks:

- Put other details on the Gameboy such as a charging socket, earphones, new buttons and features, etc.
- Experiment with colours and materials for rendering.



Extension

- Design a games console of your choice using correct dimensions. Use the internet to get these sizes.

