

CAD SKILLS



CAD Tutorial 6: I Pod Player

Level of Difficulty

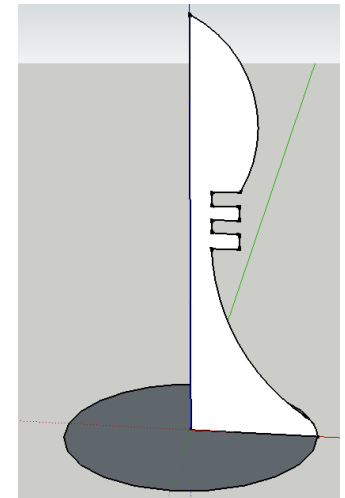
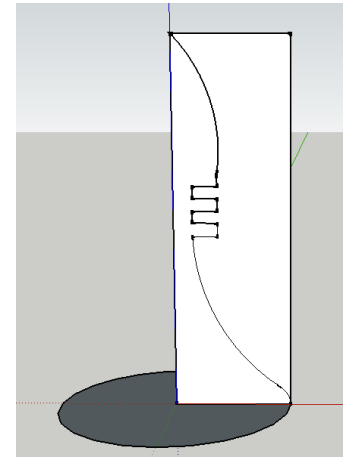
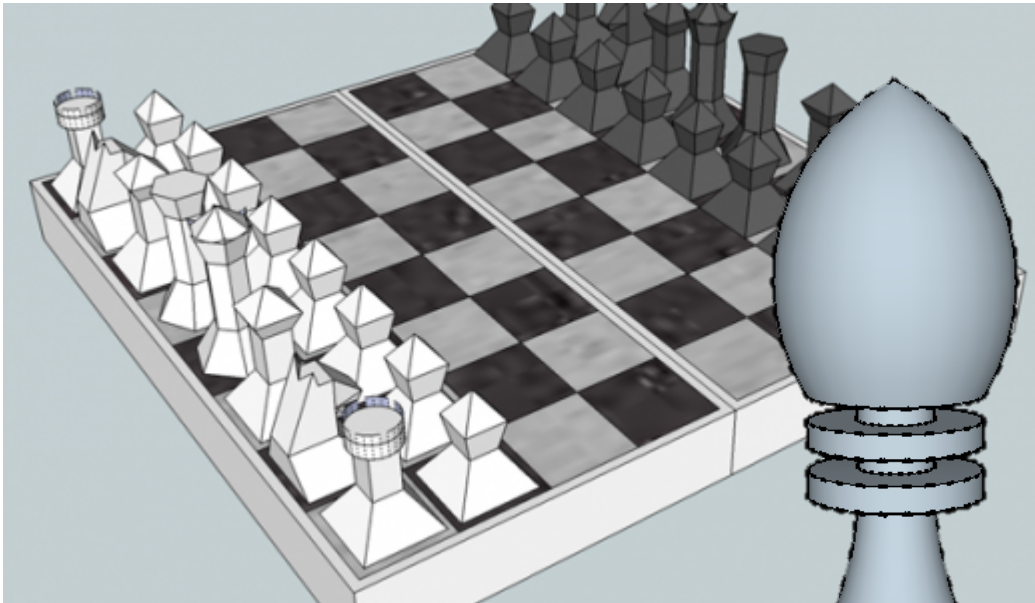


Time

Approximately 20–30minutes

Starter Activity

- Design a chess set using the follow me tool.



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...

- Draw an iPod using real-life sizes
- Use guidelines (construction lines)
- Add and use other tool sets
- Add 3D letters
- Add your own photographs
- Colour/render your design

Skills to be used in this project...

Basic Skills	New and Higher Skills
Zoom tool	Tape Measure tool for guidelines
Orbit tool	Arc tool
Pan tool	Move tool
Line tool	Use Views toolbar
Rectangle tool	Import photographs
Circle tool	Paint Bucket tool
Eraser tool	3D Text tool
Push/Pull tool	

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*








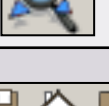

Sketchup Help Guide:

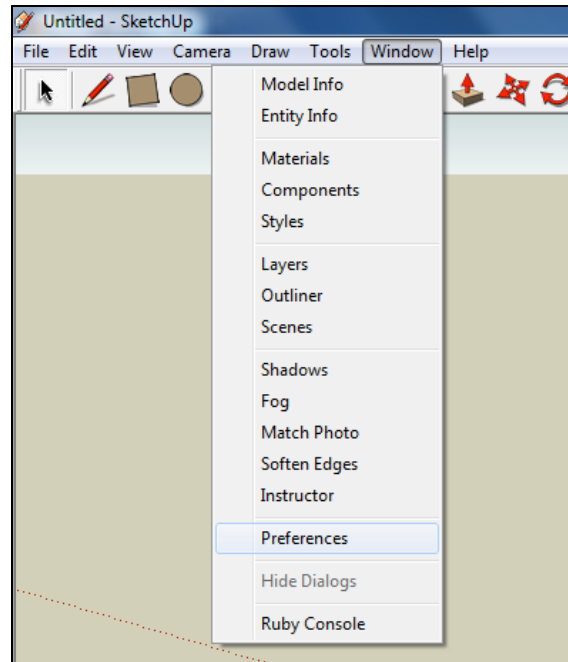
Computer Aided Engineering: 15. Drawing and Modification Commands

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:

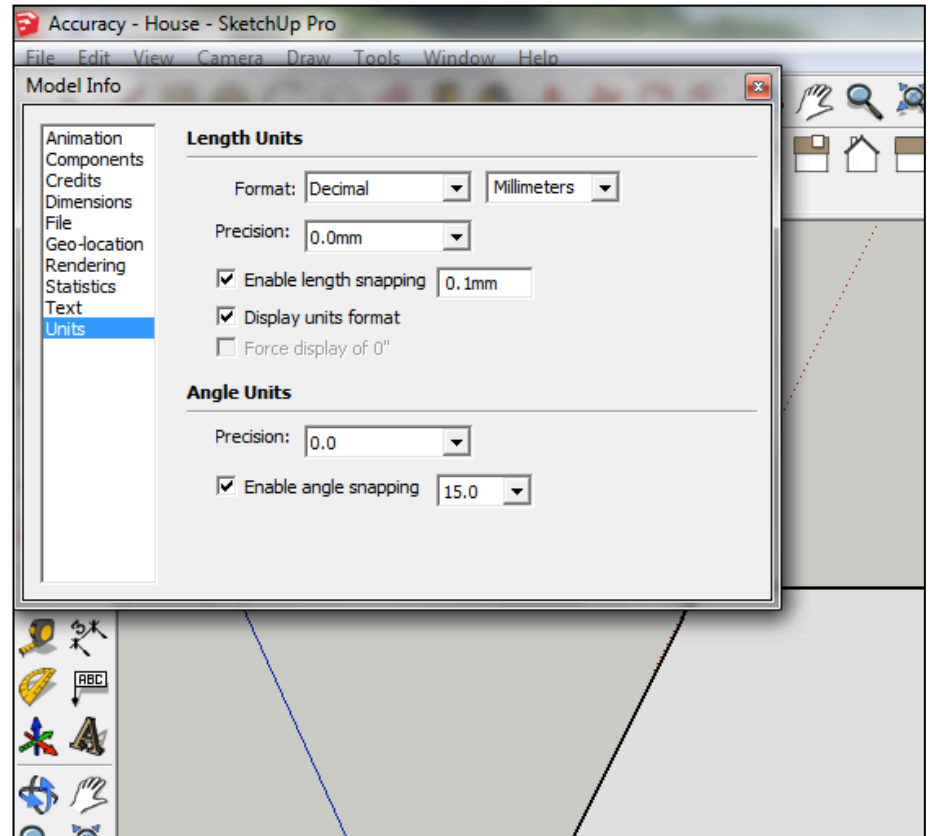
Computer Aided Engineering: 15. Drawing and Modification Commands

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 life 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 6 / Curved iPod

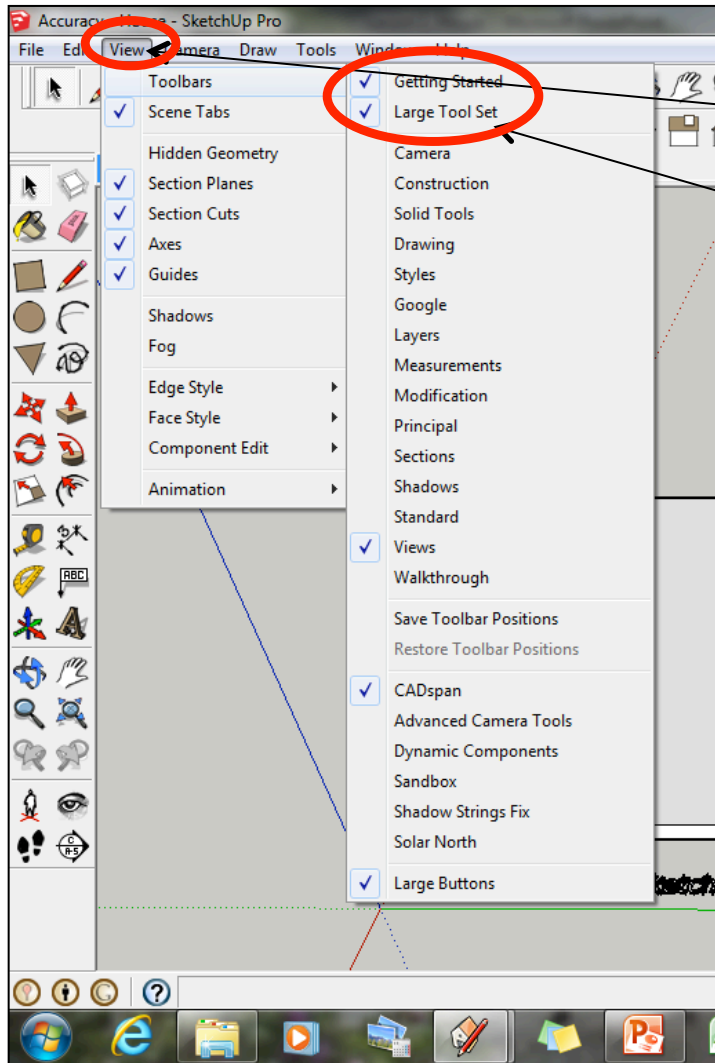
Open the sketch up drawing. Once you have opened SketchUp, go to **Window** and select **Model Info**



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**.

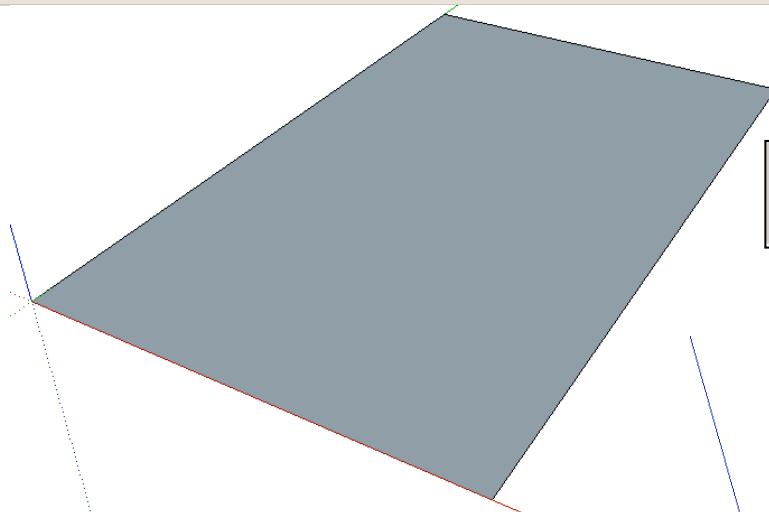
3. Now select the **View** then **toolbars** and ensure **Getting Started** and **Large Tool Set** are ticked



3a Select **View**

3b Tick Getting Started
3c Tick Large Tool Set

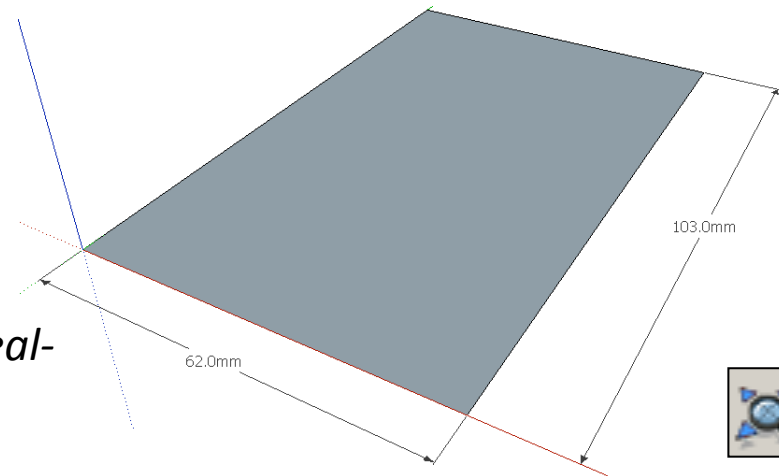
Note: this will place a tool bar across the top (**getting started**) and the side (**Large Tool Set**)



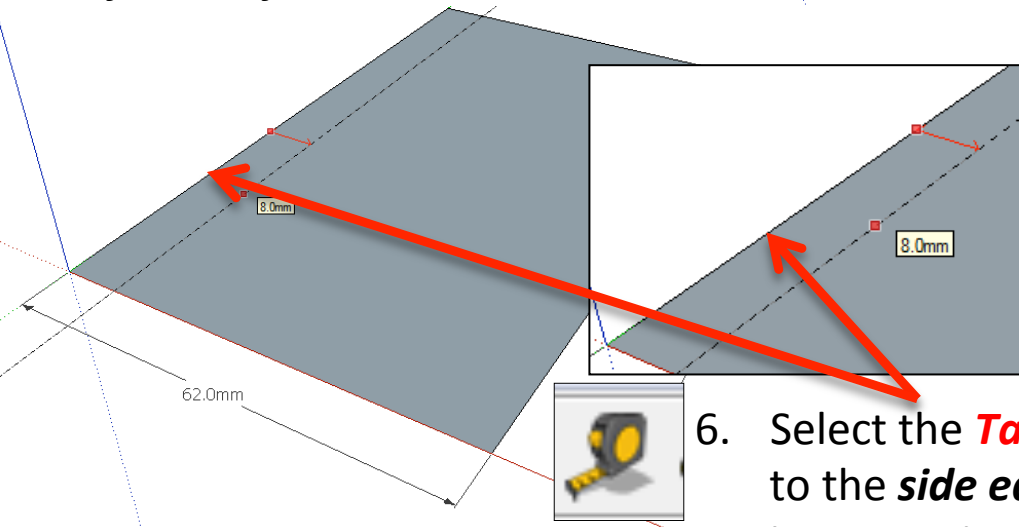
4. Select the **Rectangle tool** and draw a rectangle on the base by clicking and **dragging the cursor diagonally**.



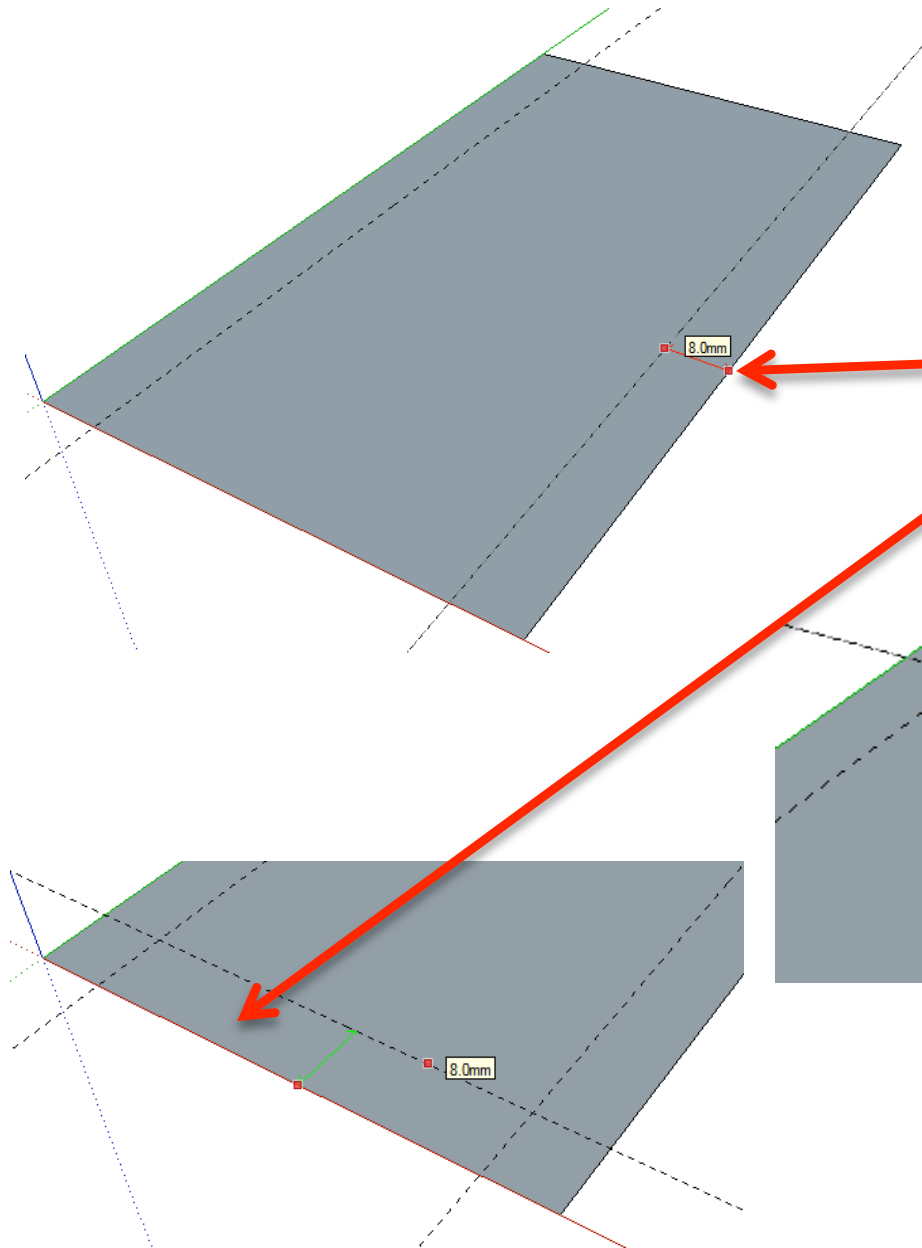
5. Once you have drawn the rectangle, enter '**62,103**' and then press **Enter**. This is the real-life size of the iPod.



Your resized rectangle may look very small. **Click on the zoom extents** tool to automatically zoom in.

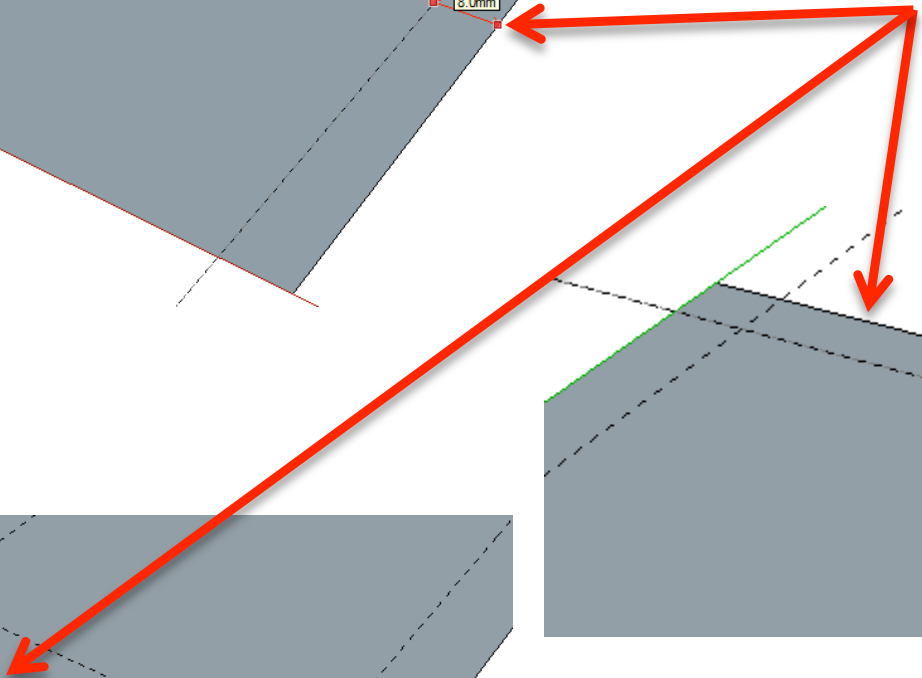
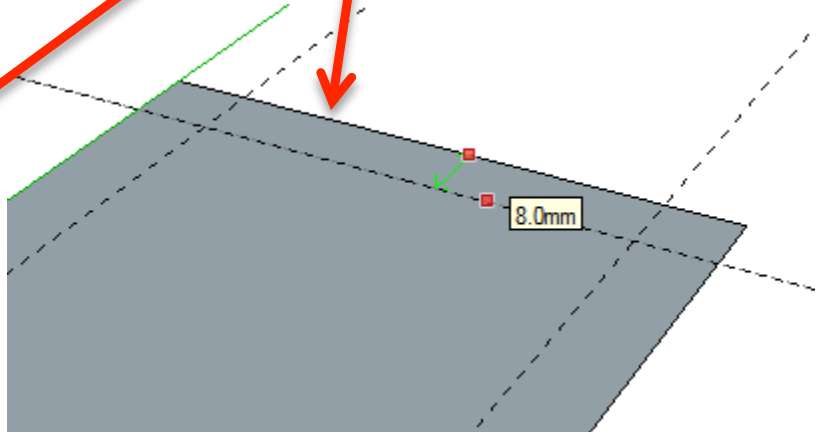


6. Select the **Tape measure tool** and snap to the **side edge** as shown. Pull a guide line in and **type 8** and press **enter**.



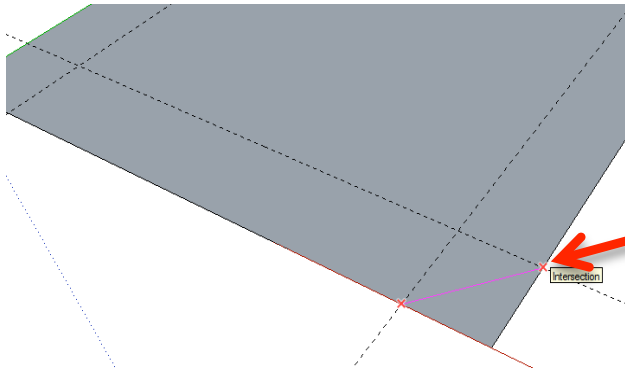
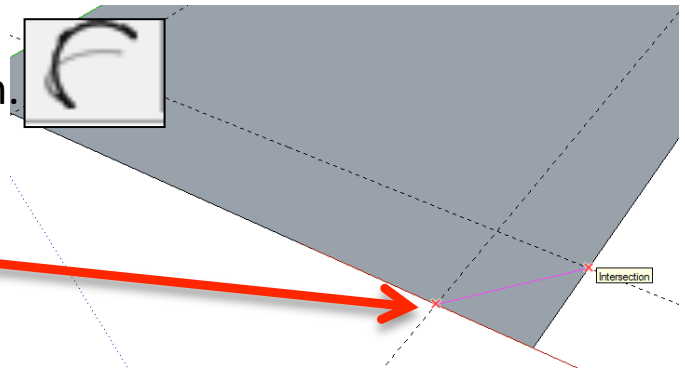
7. Do this on the other **three edges** to make a margin all the way around the rectangle.

(Outside Edge).

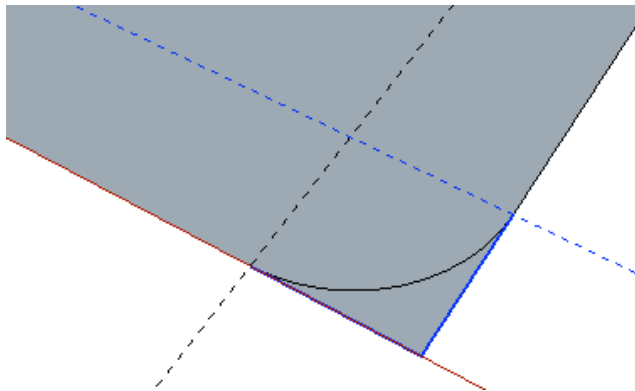




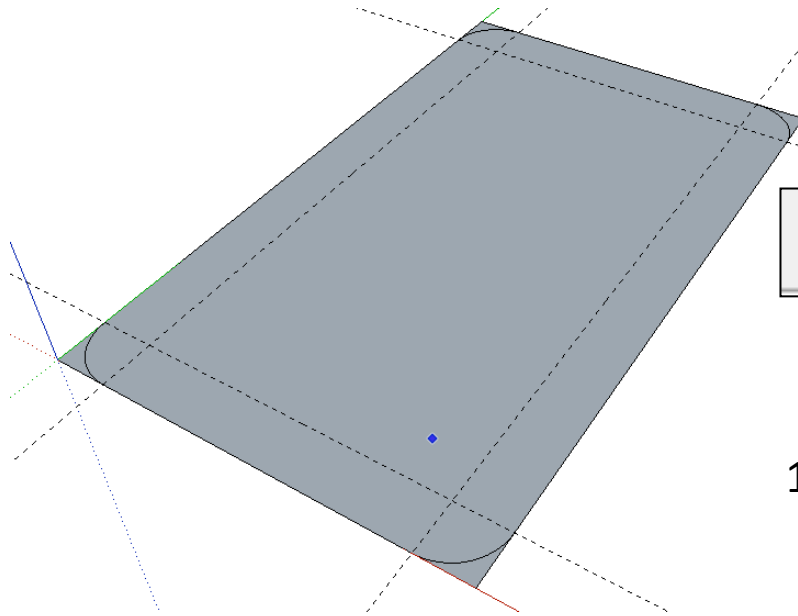
8. **Select the *Arc tool*** Click on the ***end of a guideline*** where it meets the edge shown. Look for the red cross and the prompt **Intersection** to appear.



9. Now draw a line diagonally across the corner, to join with the other guideline's edge. Again, look for the red cross and **Intersection** to appear before clicking on it.



10. Now move the cursor towards the centre of the line you have just drawn and bend it outwards a little. Then ***type '8'*** and ***press Enter*** to give a radius of 8 mm.

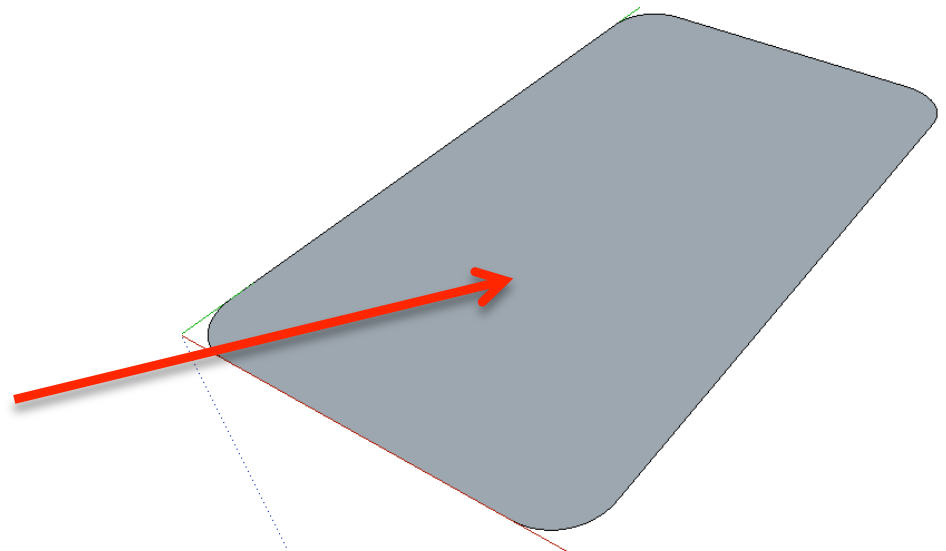


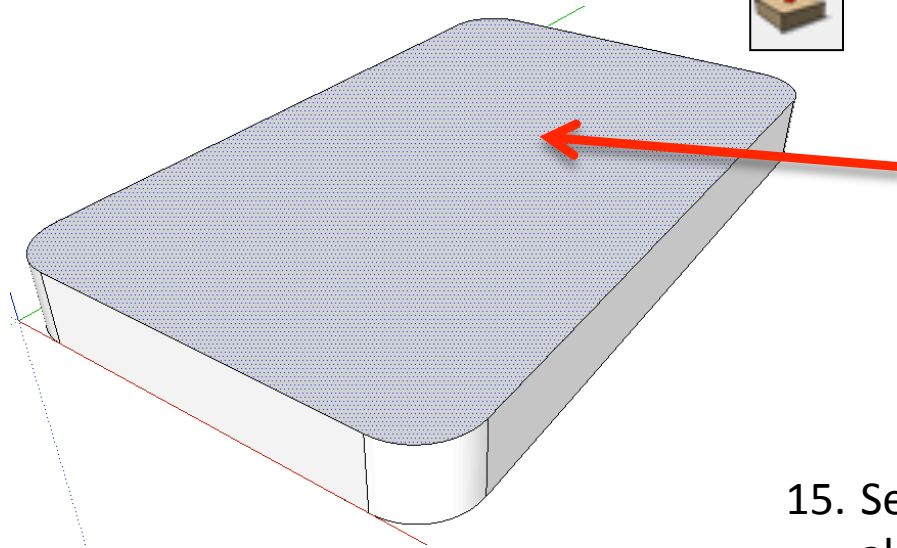
11. Do ***the same*** at ***each corner*** of the rectangle, to form an arc at each corner.



12. Use the ***Eraser tool*** to remove the unwanted corner lines and guidelines.

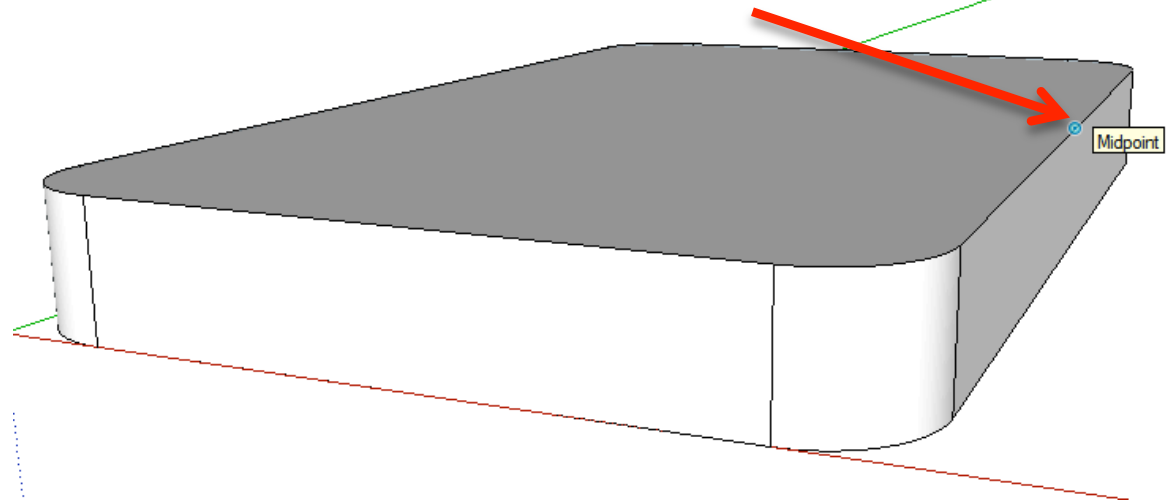
13. This will leave you with a ***shape*** like this.

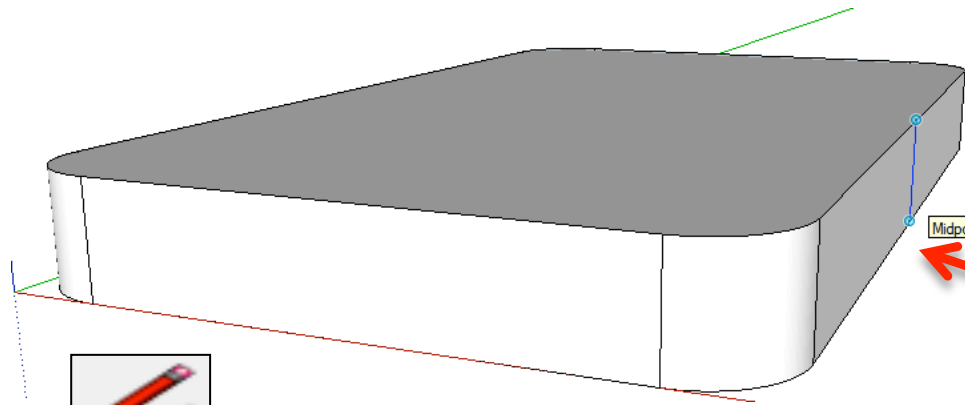




14. Select the **Push/Pull tool** and click on the shape. It should now be **highlighted in blue dots**. Pull up the shape to make it 3D, enter '**10**' and then **click enter**.

15. Select the **Pencil tool** and run it along the top edge until a **blue dot** appears and it says **midpoint**

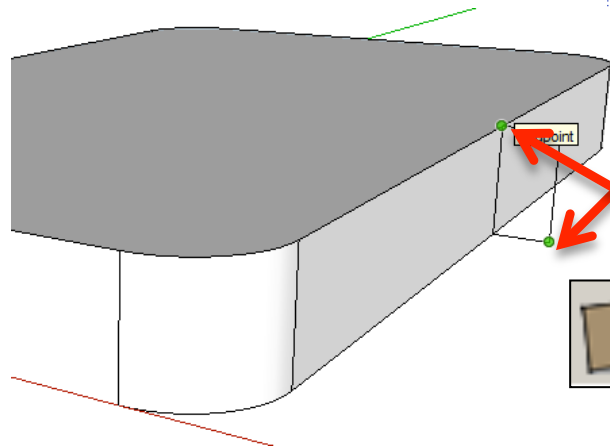
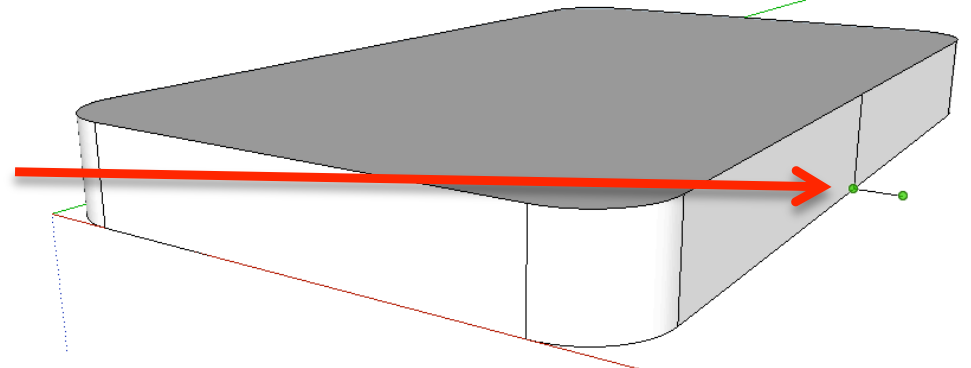




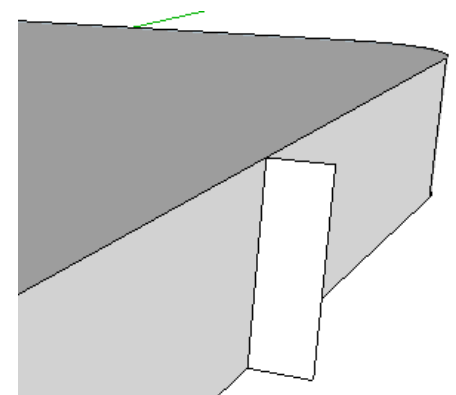
16. Using the **Pencil tool** draw a line down from the top edge **midpoint** to the bottom edge **midpoint**.

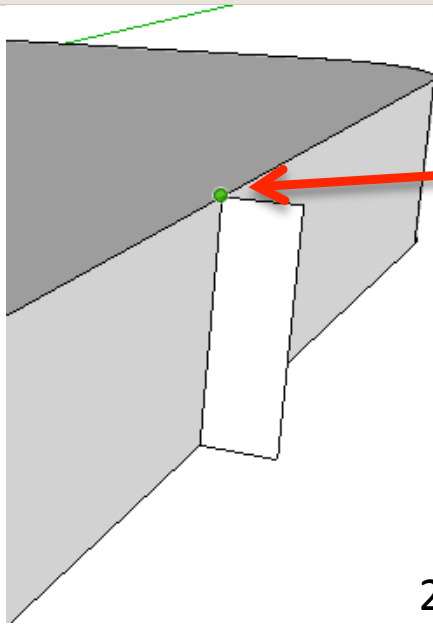


17. Using the **Pencil tool** draw a line out on either the **green axis** or **red axis** and type in **5** and **press enter**.

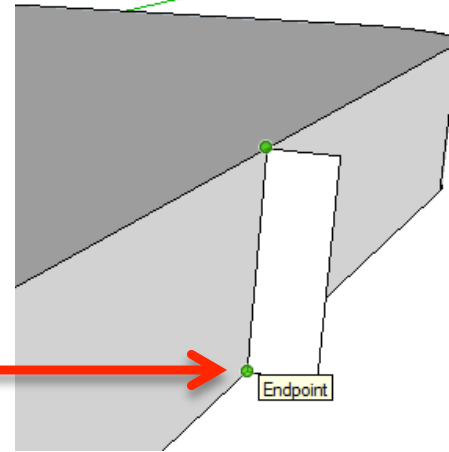


18. Using the rectangle **tool** draw a square from the **two endpoints** shown

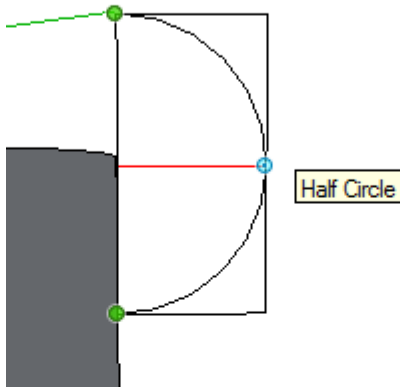




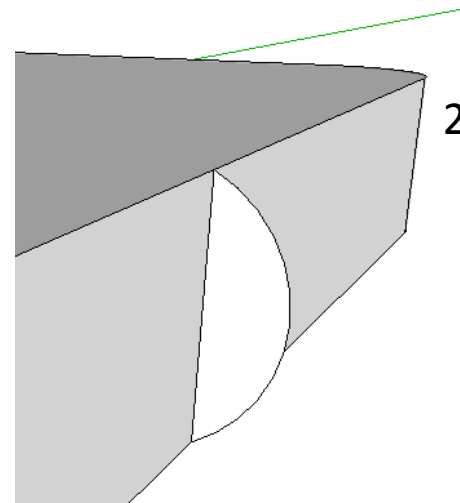
19. Click on the **arch tool**. Click on the **top left corner** of the vertical square you have just drawn.



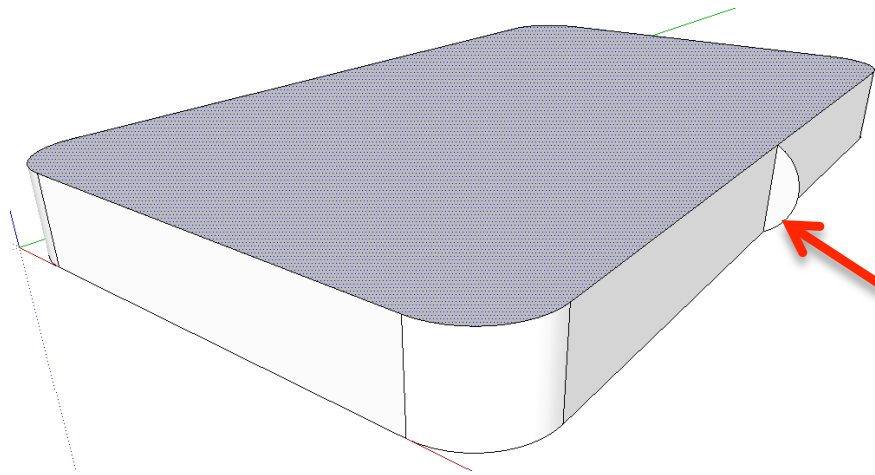
20. Now click on the **bottom left hand corner**.



21. Now click on the **mid** point on the **right hand** shown.



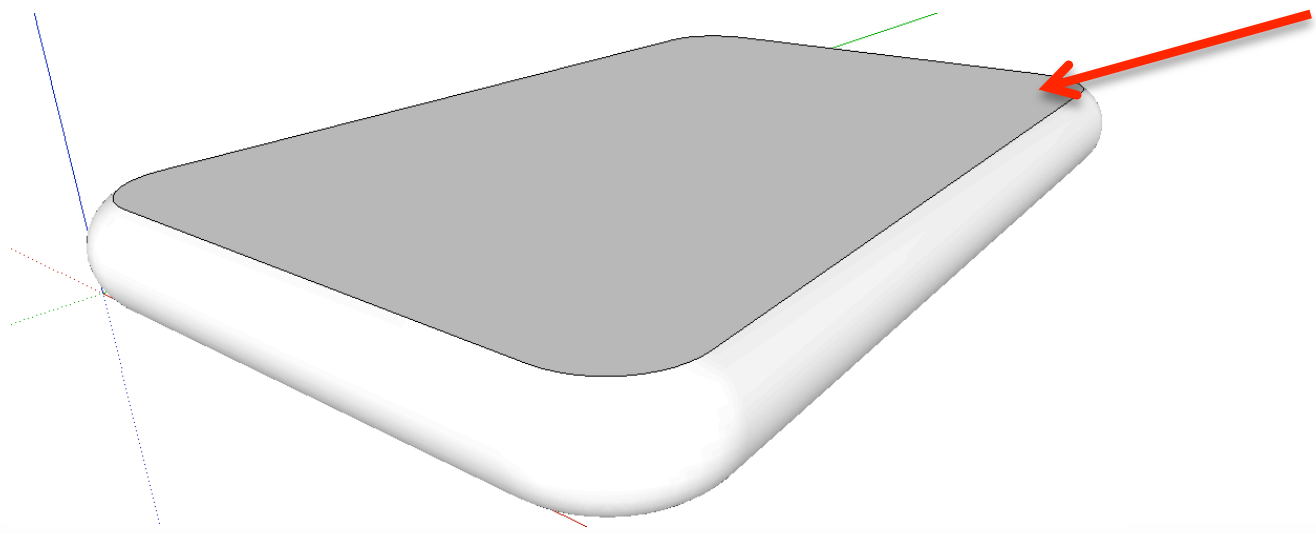
22. Use the **rubber tool** to erase the corners so you are left with a **radius** as shown



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



24. Select the **follow me tool** and click on the **semi circle** on the side. You should have drawn the shape shown below.....



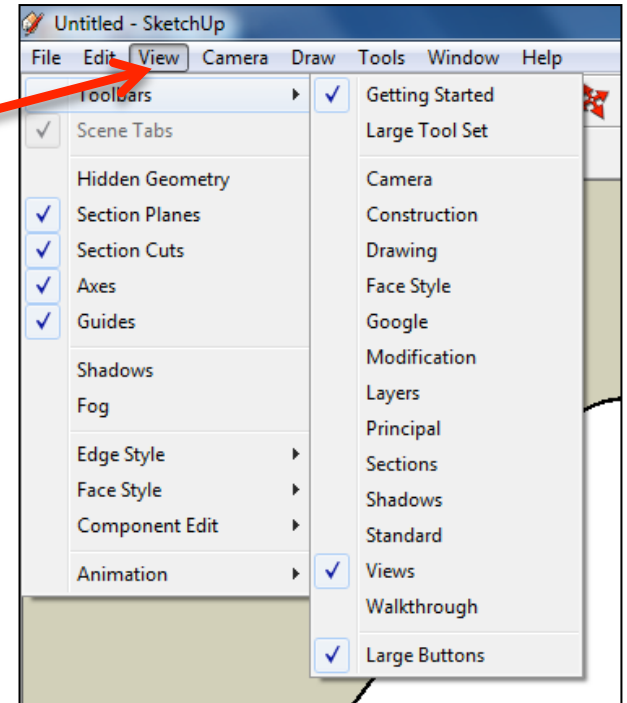
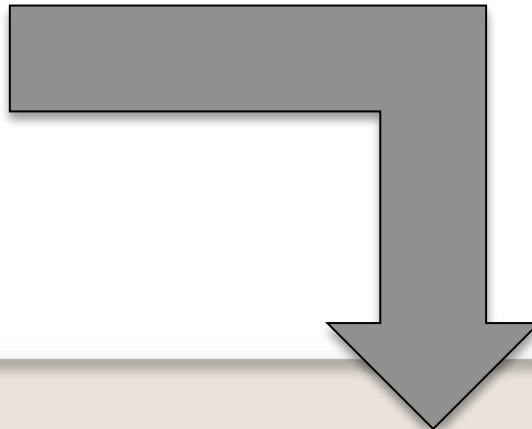
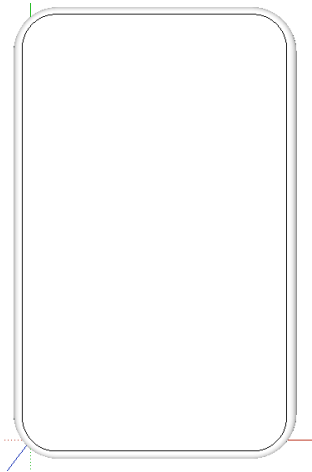


25. Now you want to be able to view your object **from the top**. To do this you are going to use the **View** toolbar.

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



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



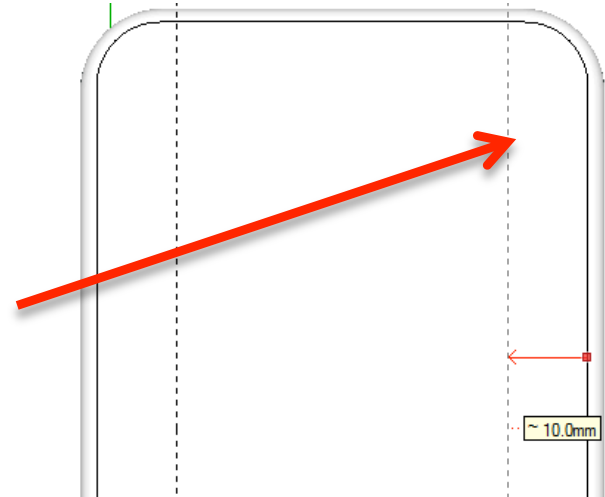
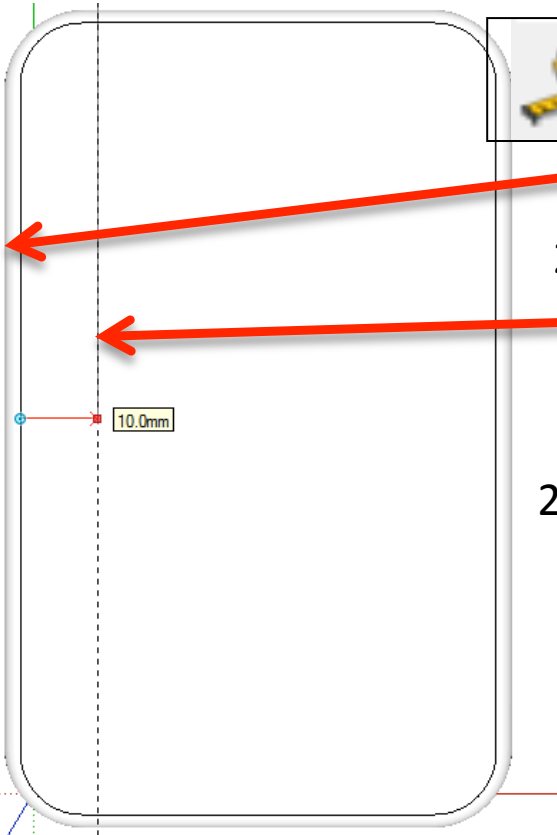


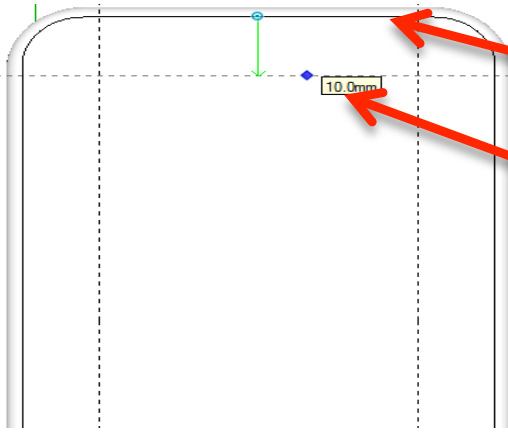
27. Select the ***Tape measure tool*** and snap to the ***side edge*** as shown

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

29. ***Click a second time*** to set the guide line and ***type 10 and enter***. You will have a guide line ***10mm*** in from the ***side edge***

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





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



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

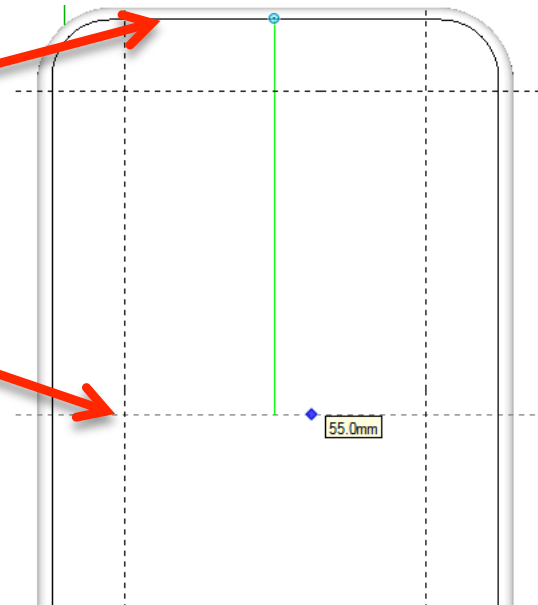
33. **Click a second time** to set the guide line and **type 10 and enter**. You will have a guide line **10mm** in from the **side edge**

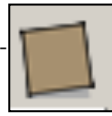
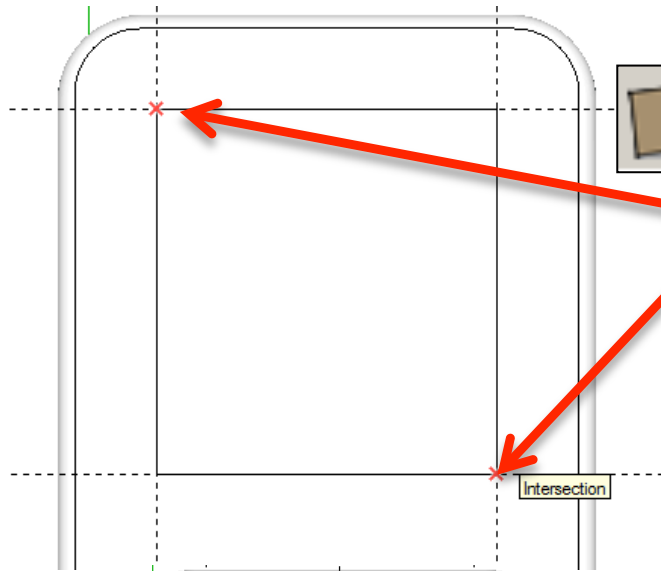


34. Select the **Tape measure tool** and snap to the **top edge** as shown

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

36. **Click a second time** to set the guide line and **type 50 and enter**. You will have a guide line **50mm** in from the **side edge**

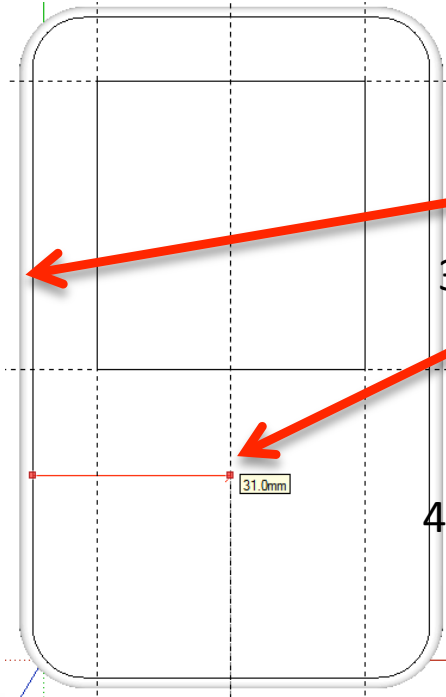




37. Select the **rectangle tool** and snap to the **left corner** as shown and start drawing a square to the bottom right hand intersection as shown for the screen.



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



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

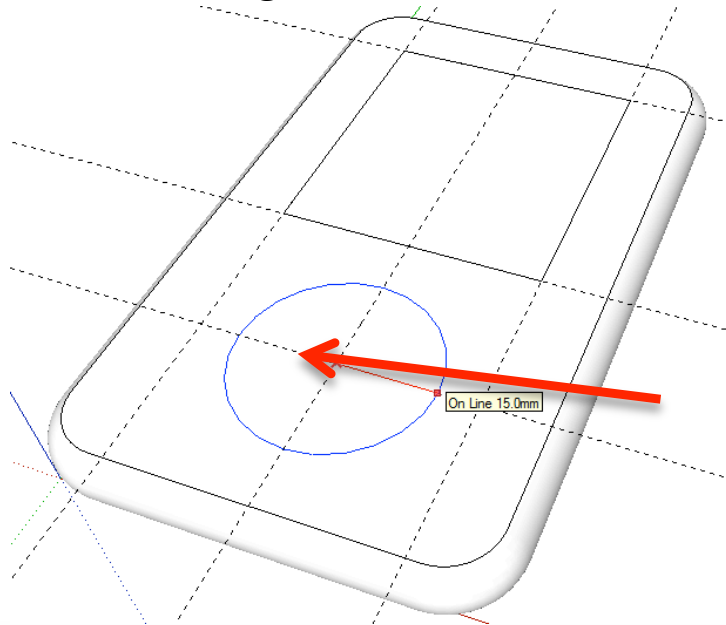
40. **Click a second time** to set the guide line and **type 31 and enter**. You will have a guide line **31mm** in from the **side edge**



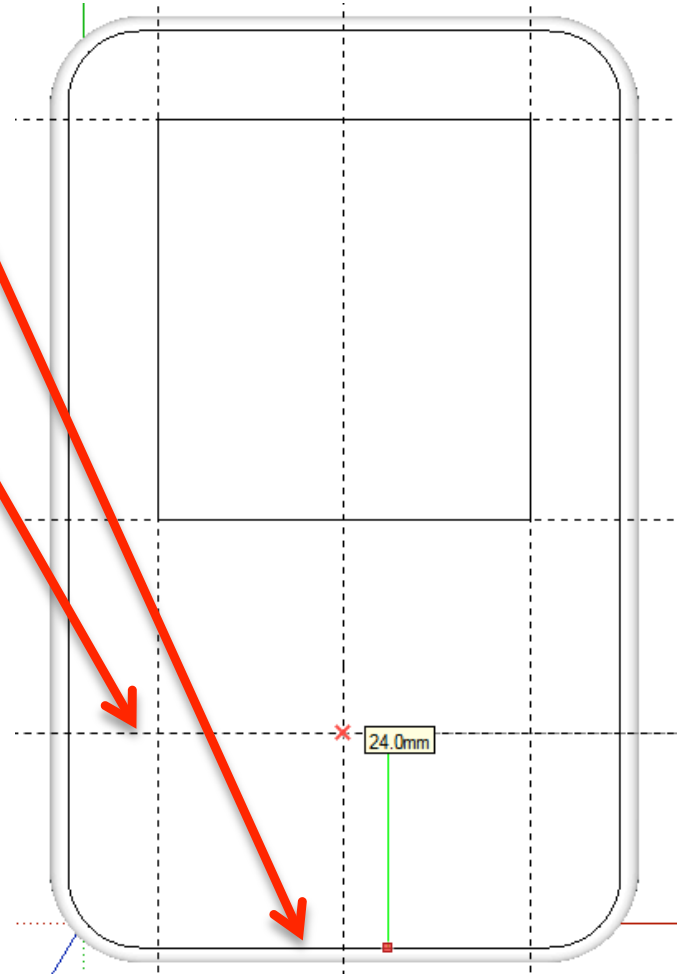
41. Select the **Tape measure tool** and snap to the **bottom edge** as shown

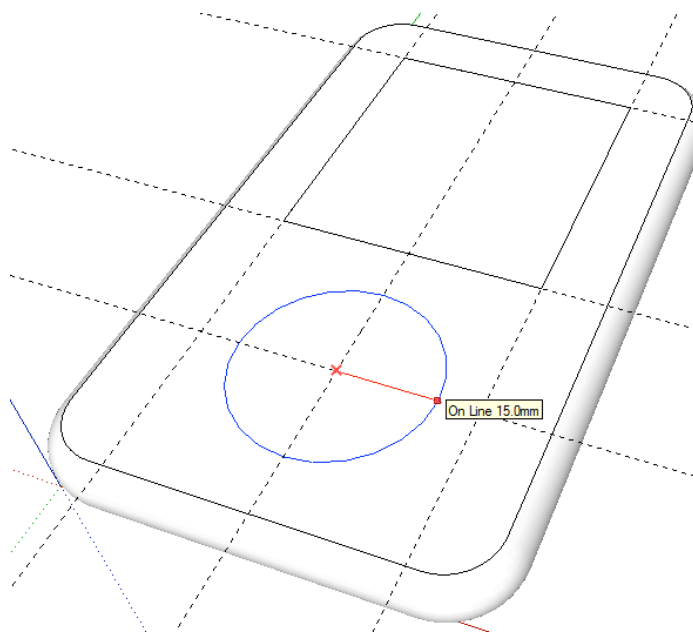
42. **Click once** and it will draw a dotted guide line from the edge shown

43. **Click a second time** to set the guide line and **type 24 and enter**. You will have a guide line **24mm** in from the **side edge**



44. Select the **circle tool** and snap to the **intersection as shown**

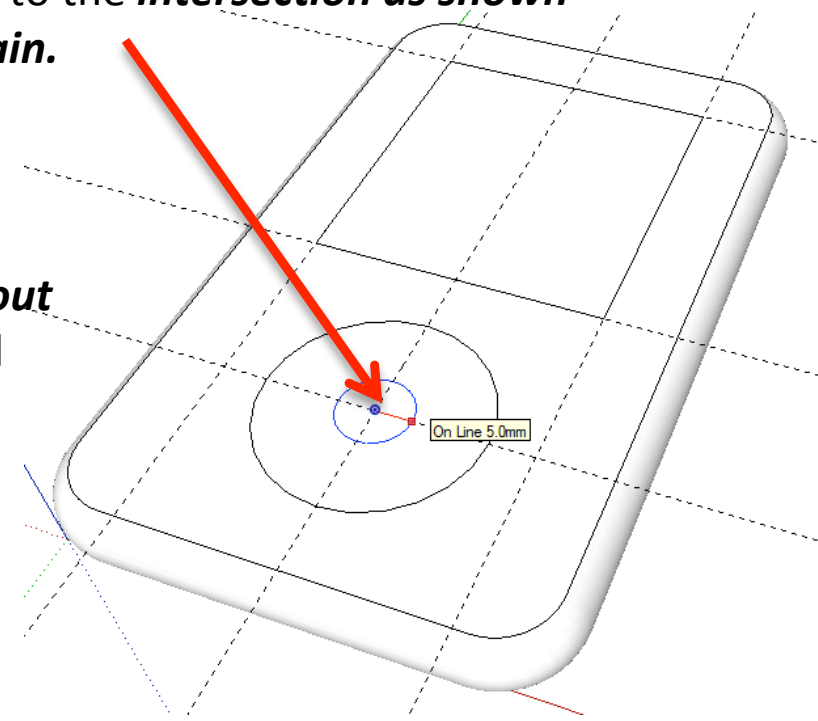




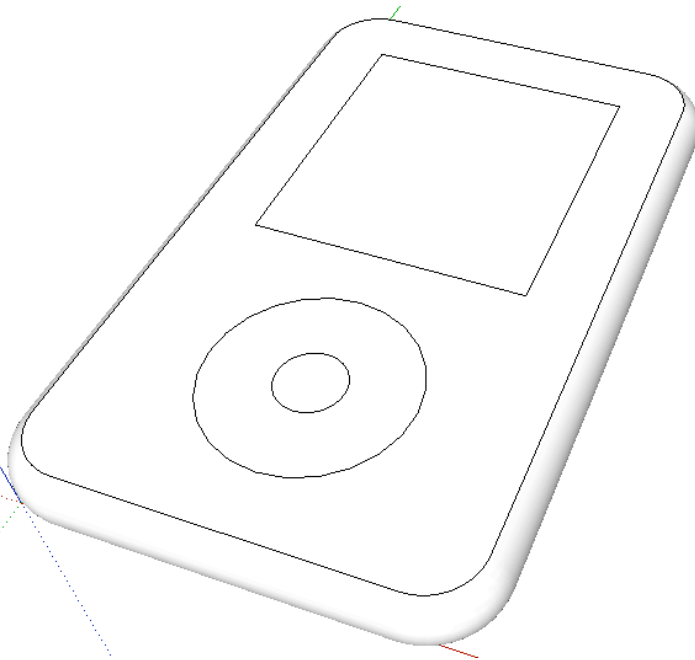
45. **Pull the circle circumference out** and **type 15 and enter**. You will have a circle with a radius of **15mm**.



46. Select the **circle tool** and snap to the **intersection as shown again**.



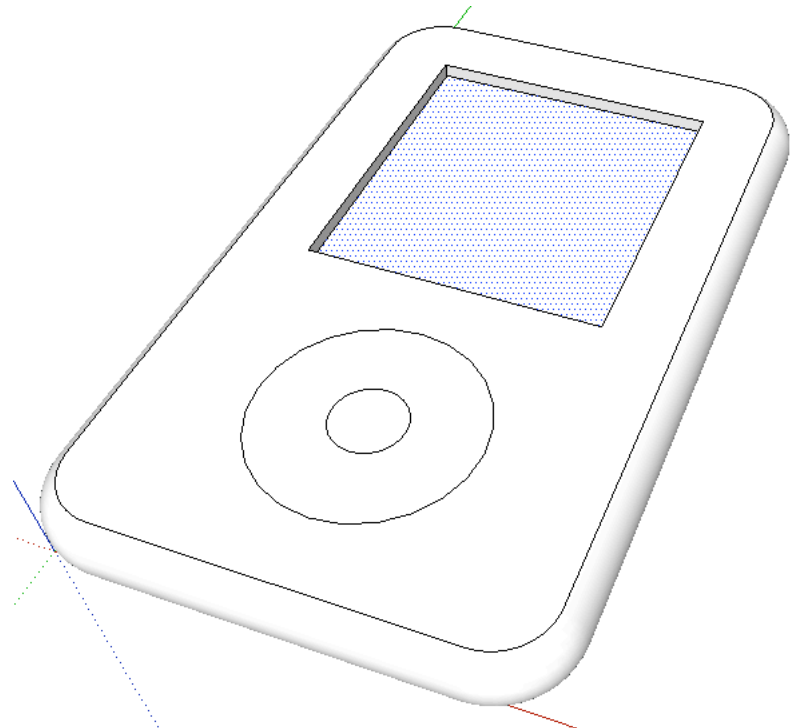
47. **Pull the circle circumference out** and **type 5 and enter**. You will have a circle with a radius of **5mm**.



49. Select the **Push/Pull** tool. Push the screen square down and **type '1' and enter**. This will recess the screen by 1 millimetre.

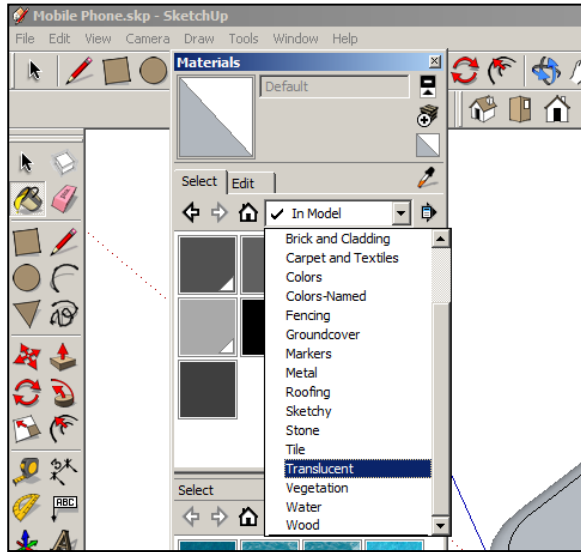


48. Use the **rubber tool** to erase the guidelines or alternatively click **View-Guides** and **un-tick**



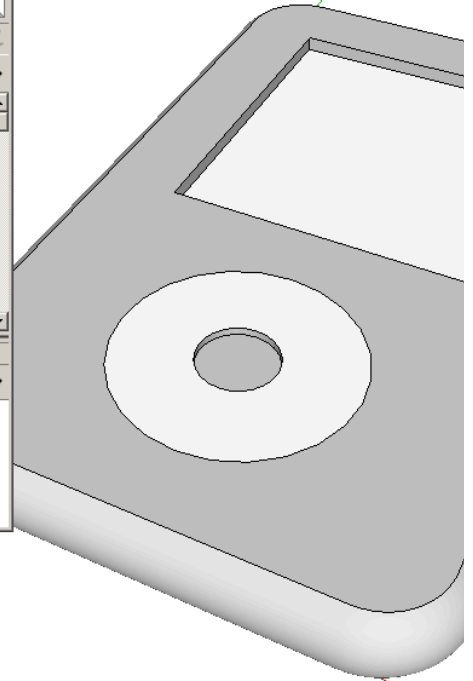
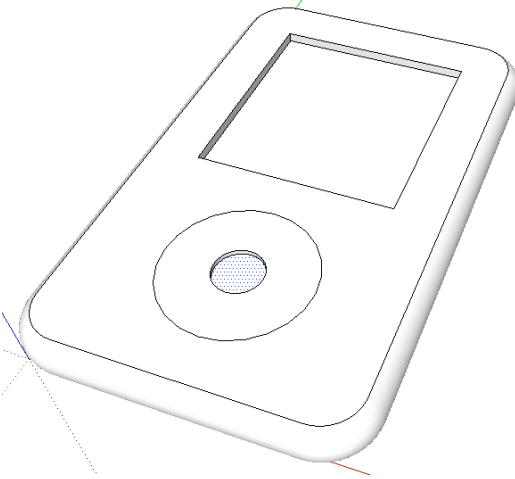
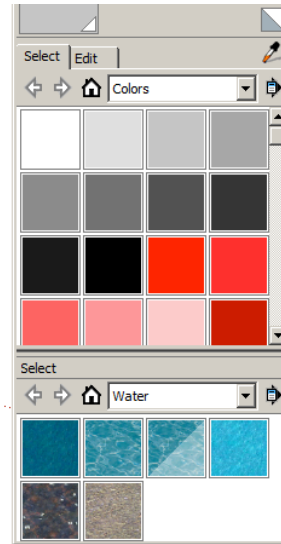


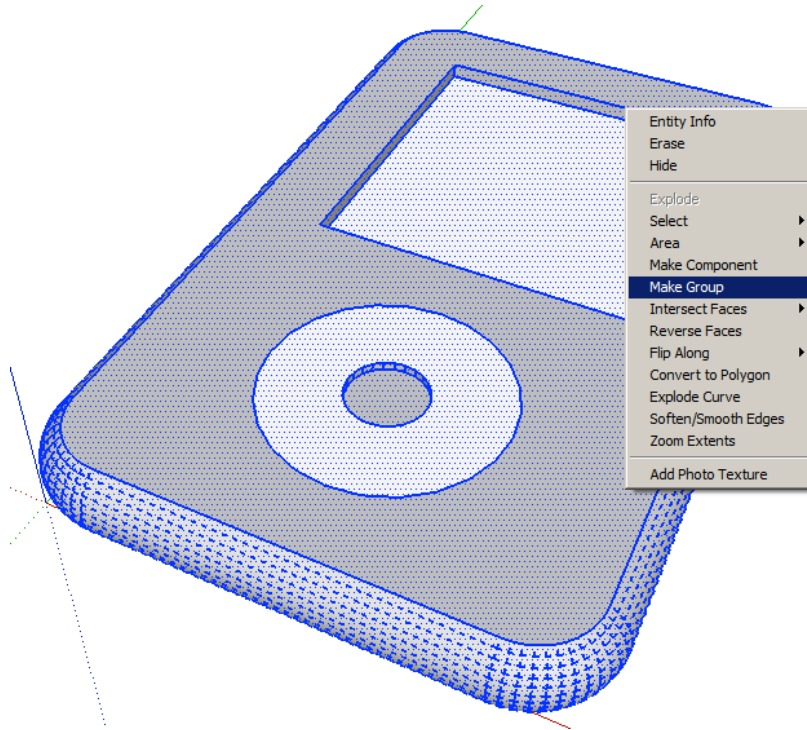
50. Select the **Push/Pull** tool.
Push the centre circle down
and **type '1' and enter.**



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

52. Click on the **drop down menu.**
You will find a range of colours
and textures here. **Colour your iPod**





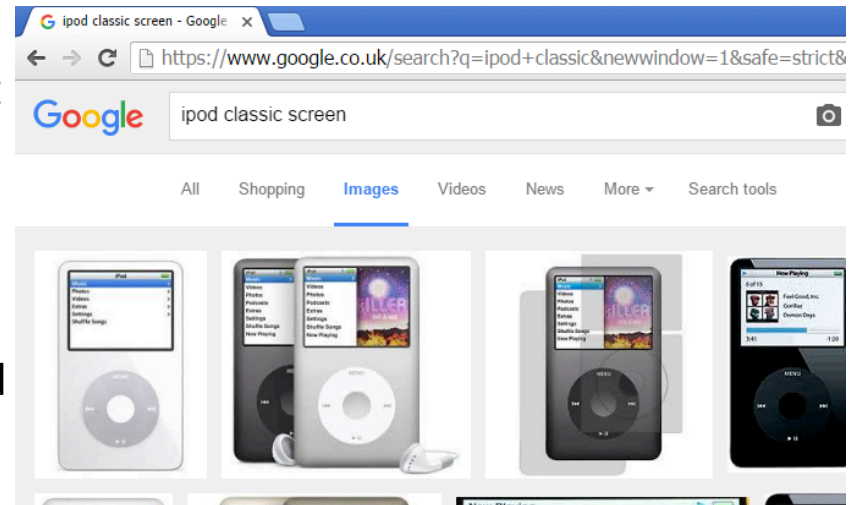
- Entity Info
- Erase
- Hide
- Explode
- Select
- Area
- Make Component
- Make Group**
- Intersect Faces
- Reverse Faces
- Flip Along
- Convert to Polygon
- Explode Curve
- Soften/Smooth Edges
- Zoom Extents
- Add Photo Texture

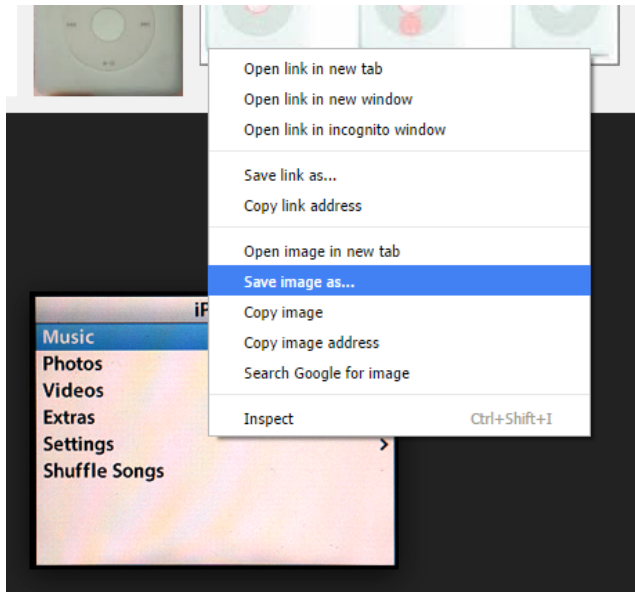
53. Use the **select tool** and keep clicking on the iPod until it is all selected and highlighted in blue.

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

55. We now need to add the Ipod screen onto our drawing. Type it into Google.

56. **Click on images** and search for a suitable image. We are only after the screen not an image of a iPod as well.



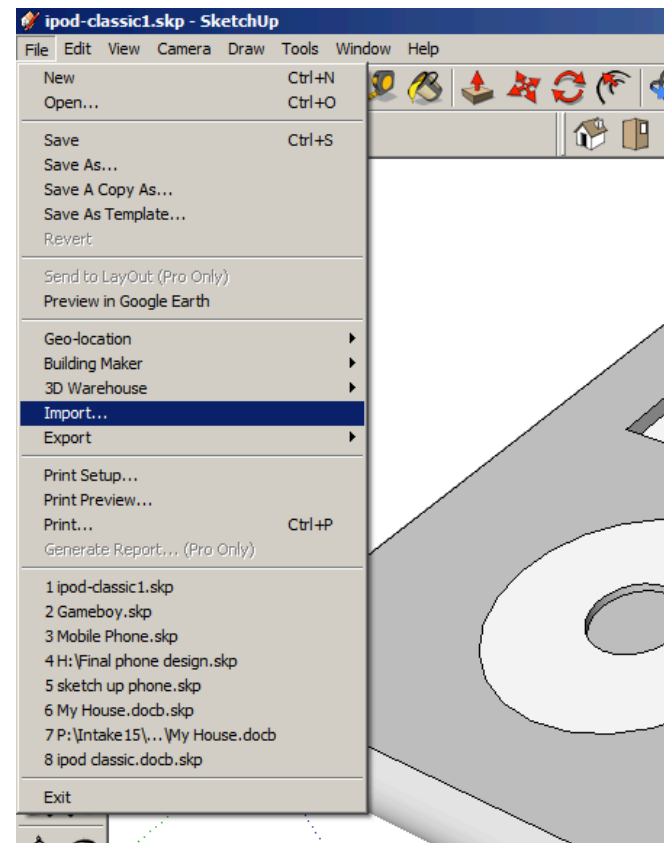


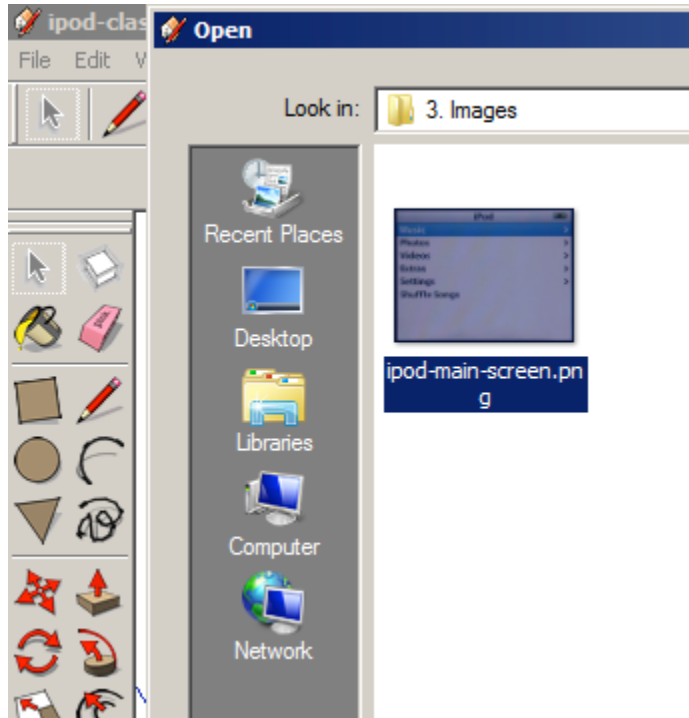
58. Make a note of where the file is saved in your area

59. Back in sketch up Click on **File – Import**

60. On **File Types** use the drop down menu to select **All Supported Image Types**

57. **Right click** on the image and save image as **into your file.**

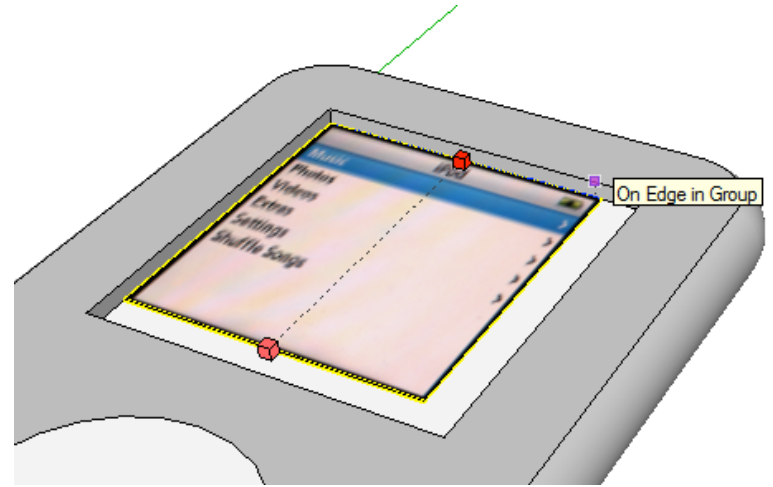
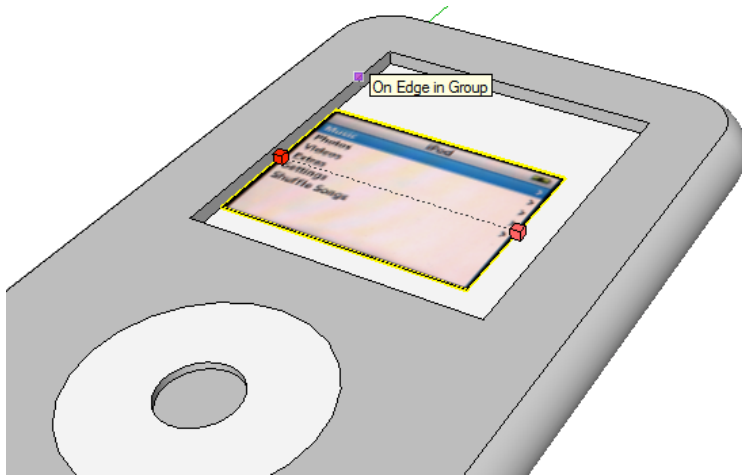




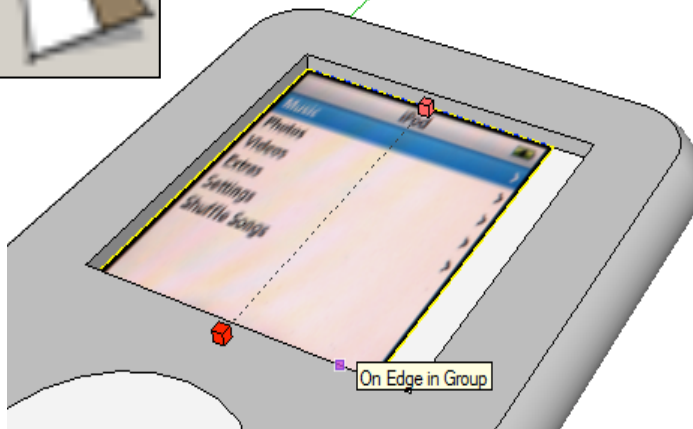
61. Search for and open the image you saved from the internet.

62. Place the image on your iPod screen. Do not try and make it the right size we will come to that.





63. Select the image and then the scale tool

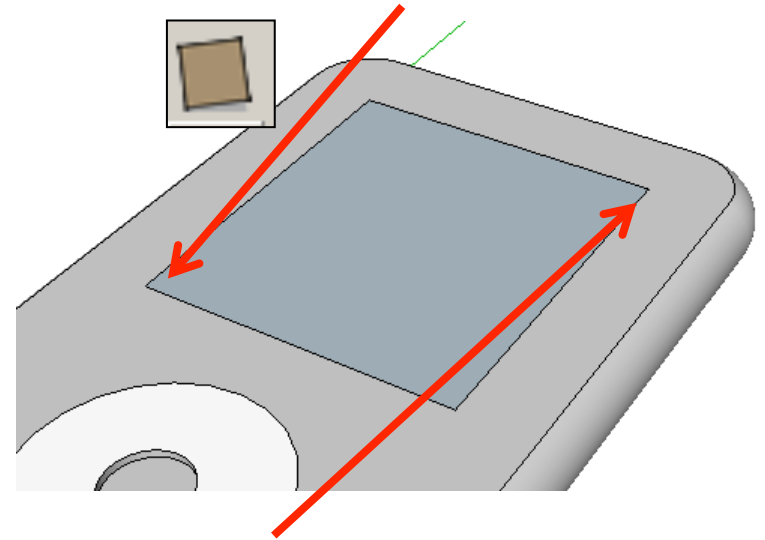


64. **Resize** the image to fit the screen

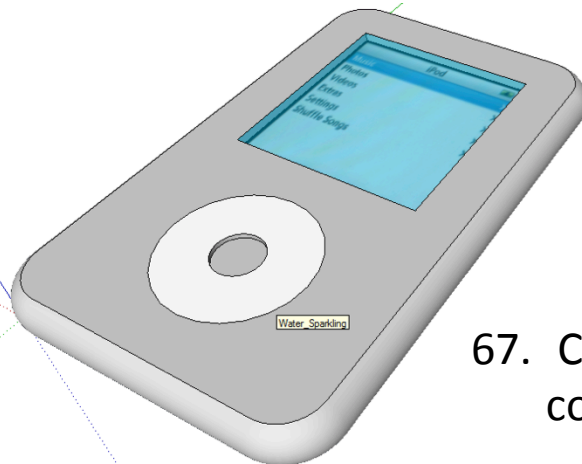




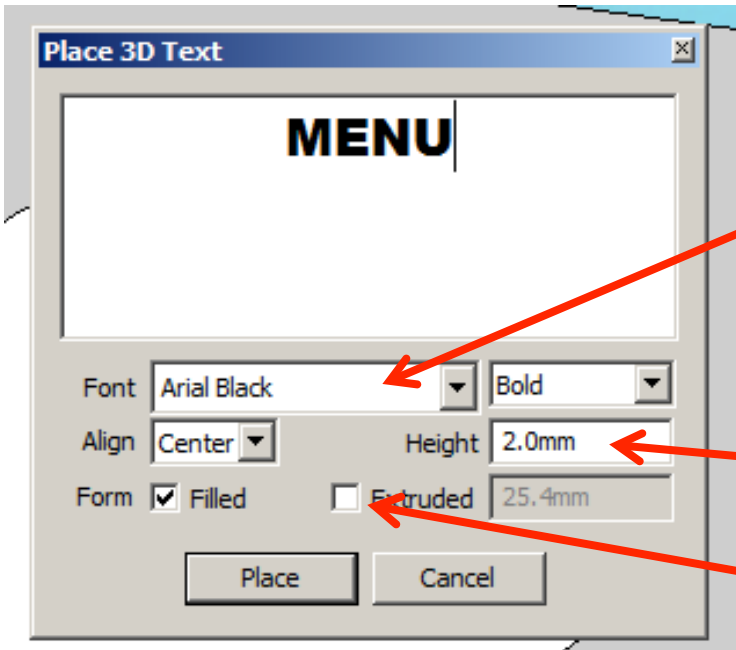
65. **Select** the **rectangle tool** and draw a rectangle starting in the bottom left hand corner of the screen.



66. Draw a rectangle from the bottom left hand corner to the top right hand corner of the screen



67. Click on the **colour bucket tool** and colour in translucent



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



69. Change the Font to **Arial Black**

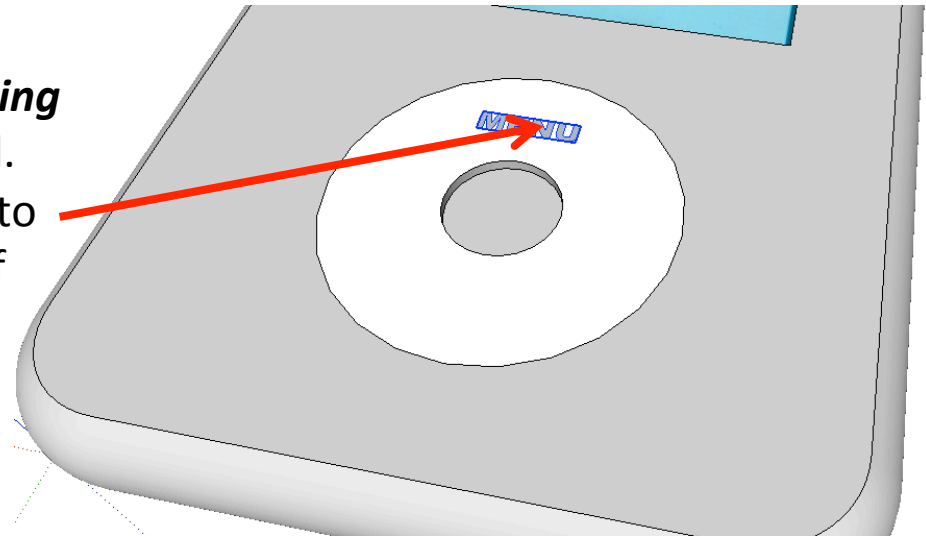
70. Type in '**MENU**'.

71. For the **height** type in **2.00mm**

72. Click **extruded** and type in **0.05mm**



73. Place the **3D lettering** on the menu wheel. Use the **move tool** to adjust its position if you are not happy.



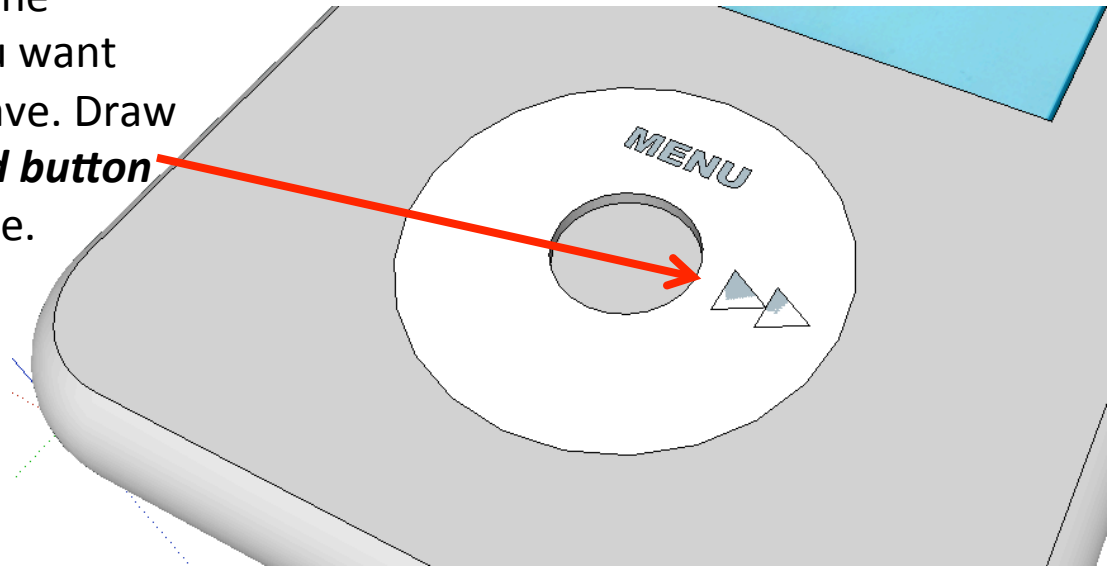


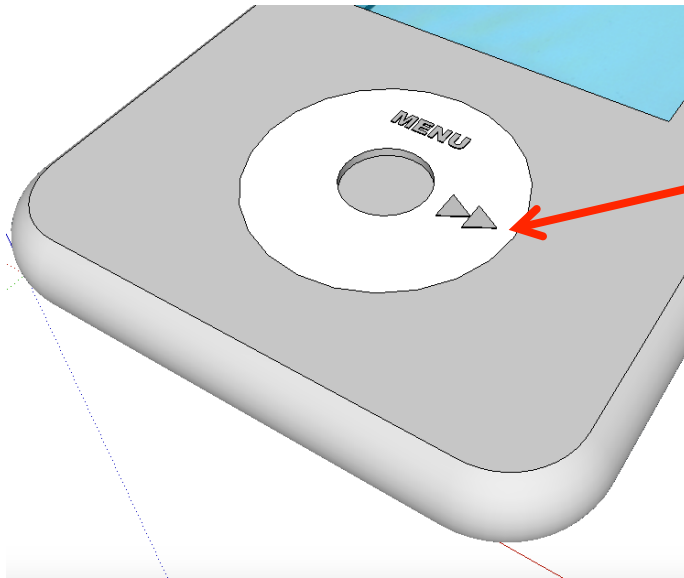
74. You can create the rest of the details using **the pencil tool** or **polygon tool**.



75. If you use the polygon tool you will need to select the tool, type **'3'** and **enter**.

76. This determines the number sides you want the polygon to have. Draw your **fast forward button** as shown opposite.

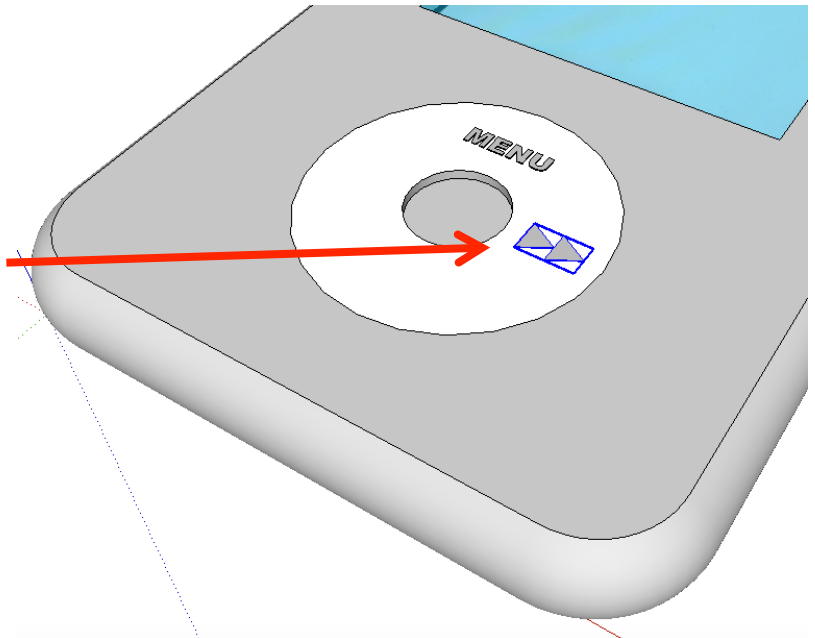


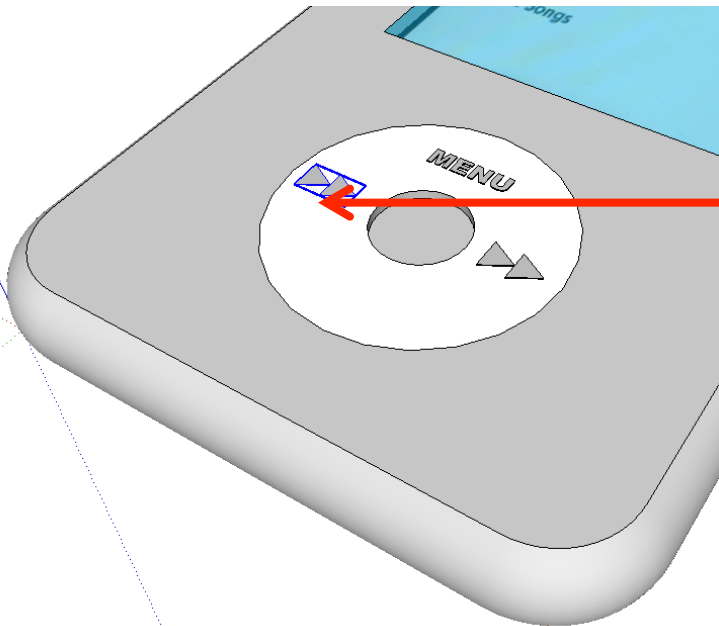


77. Use the **push pull tool** to raise. Type **0.05** and **press enter**.



78. Use the **select tool** and highlight the two buttons. **Right click and group**.





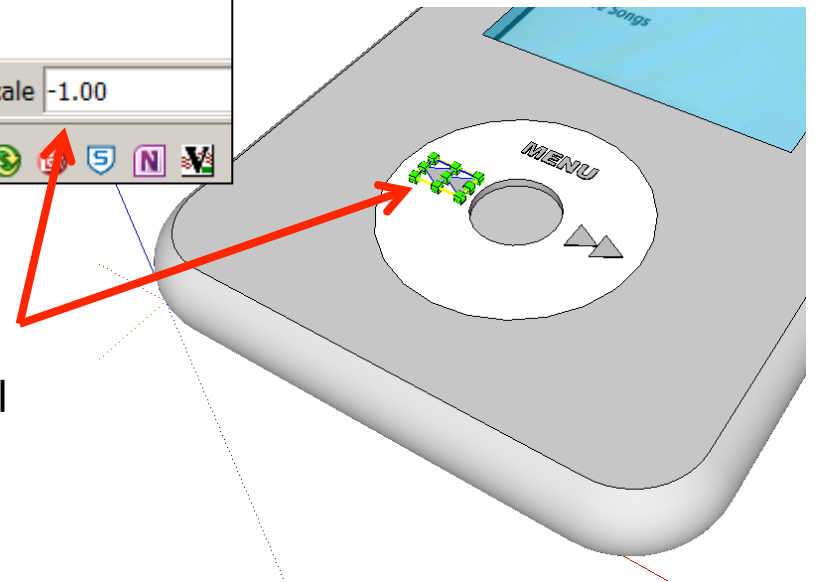
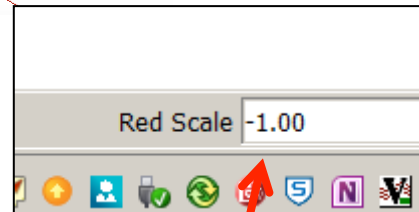
79. **Copy and paste** the two buttons by using **Ctrl C** and **Ctrl V**. Or use the edit tool bar and copy and paste commands



80. Use the **move tool** to position the buttons on the opposite side of the wheel.



81. Use the **scale tool** to mirror the buttons. Make sure the scale tool says -1.00. This means that the buttons are the exact same size.





82. You can create the play button details using **the pencil tool** or **polygon tool** and the rectangle tool

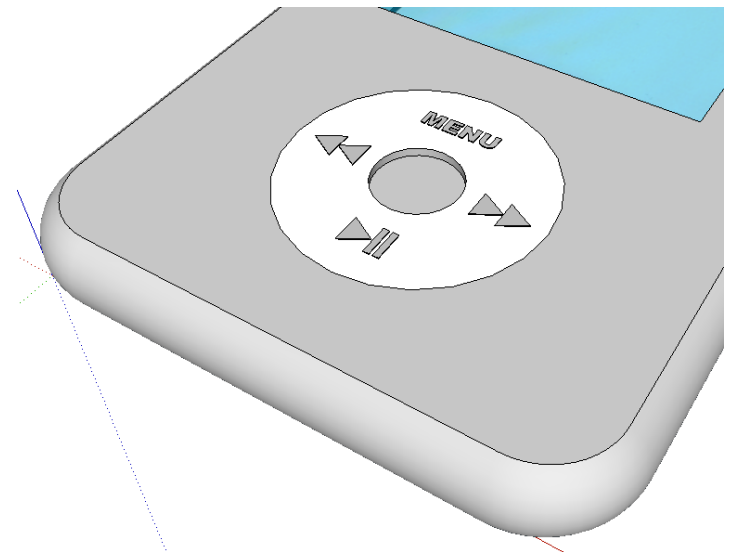


83. If you use the polygon tool you will need to select the tool, type **'3'** and **enter**.



84. Use the **push pull tool** to raise. Type **0.05** and **press enter**.

85. Use the **select tool** and highlight the two buttons. **Right click and group**.





Tasks:

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

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



Extension

- Design a Sony Walkman using CAD.....

