CAD TUTORIAL 9: FERRY BOAT

CAD Tutorial 9: Ferry Boat

Level of Difficulty

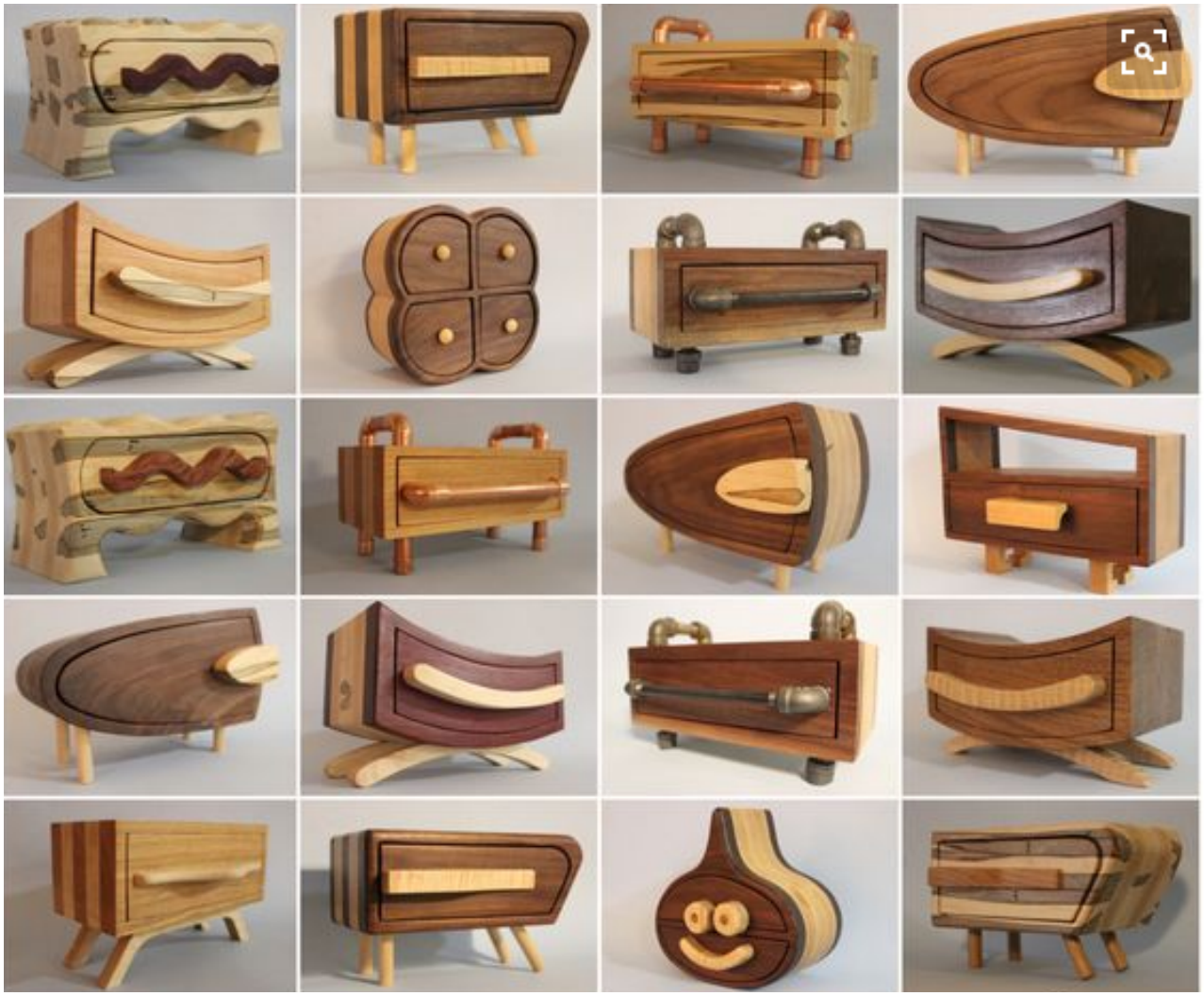
★★★★★

Time

Approximately 30–40 minutes

Starter Activity

- Design a Storage Unit



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

- Link basic shapes
- Use the Arc tool
- Use the Follow Me tool to produce a rounded edge
- Use construction lines/points
- Colour/render your finished toy boat

Skills to be used in this project…

Basic Skills	New and Higher Skills
Zoom tool	Construction lines and points
Orbit tool	Tape Measure tool
Pan tool	Arc tool
Line tool	Follow Me tool
Rectangle tool	Loading new toolbars
Circle tool	Paint Bucket tool
Eraser 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

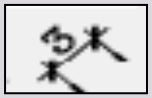
Visual : *Presentation*

Auditory: *Video*

Kinaesthetic: *Demonstration*

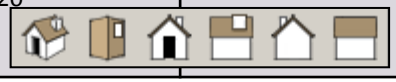
Sketchup Help Guide:

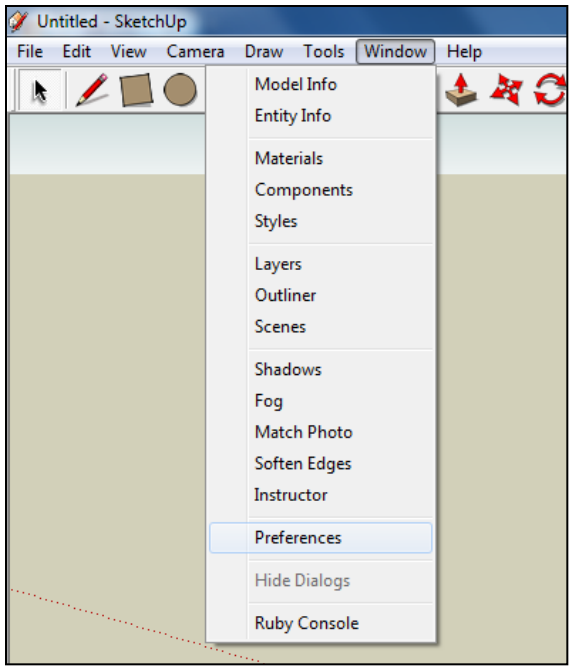
Computer Aided Engineering: 15. Drawing and Modification Commands

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:

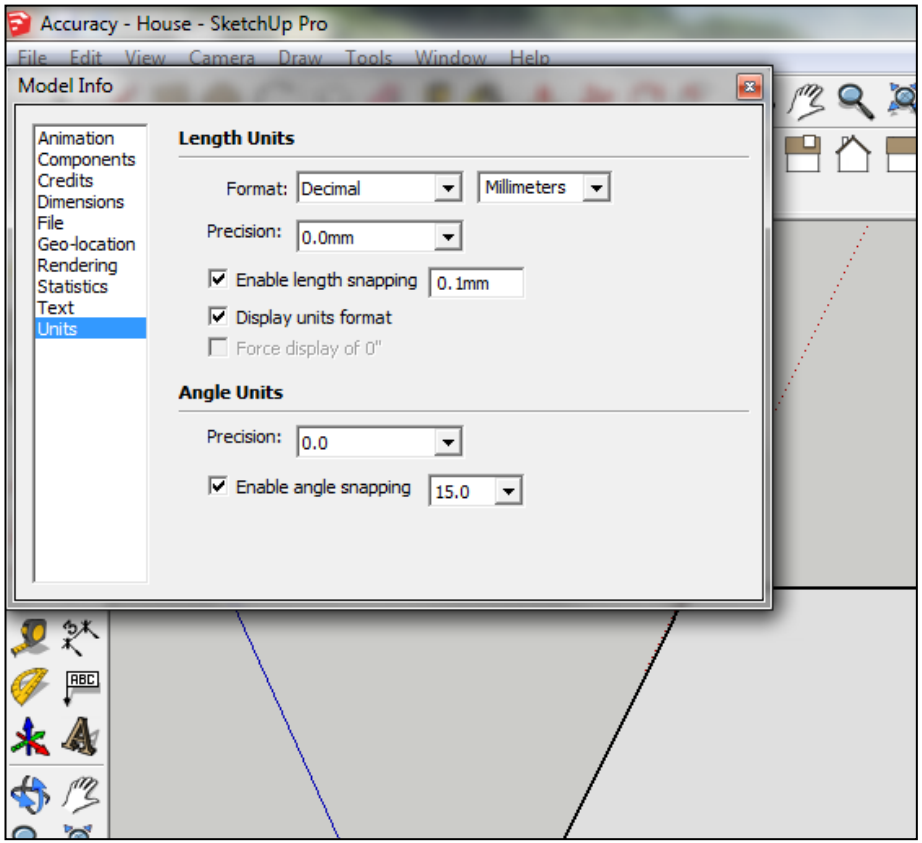
Computer Aided Engineering: 15. Drawing and Modification Commands

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 sixe 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 9 / Ferry Boat

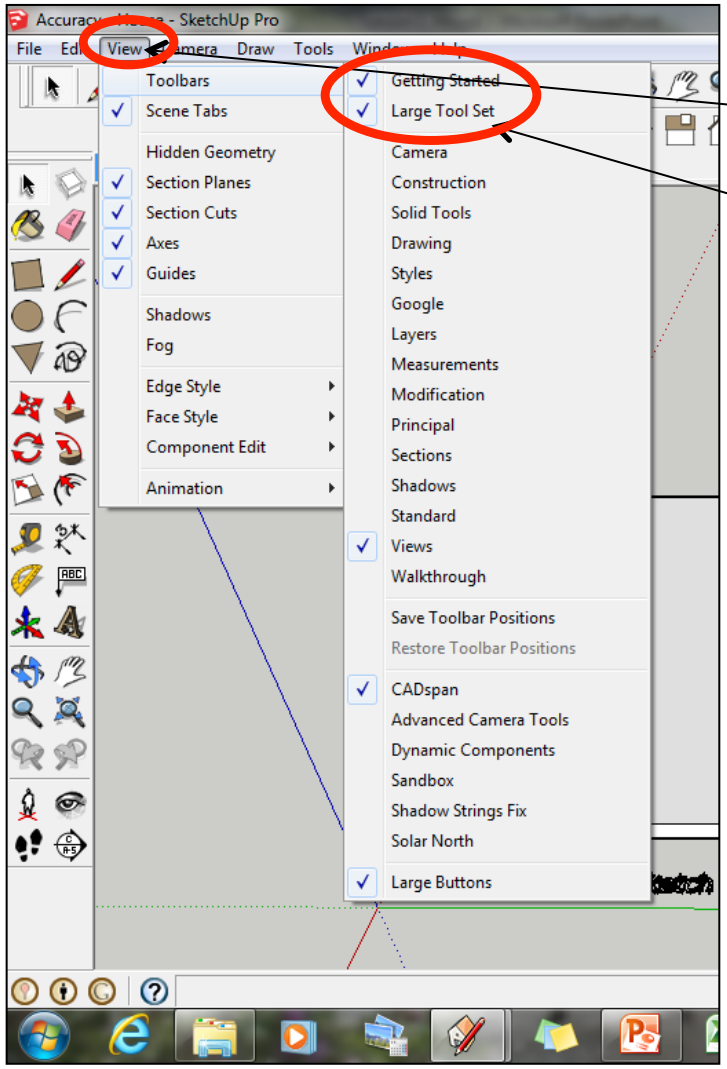
Open the sketch up drawing. Once you have opened SketchUp, go to **Window** and select **Model Info**



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

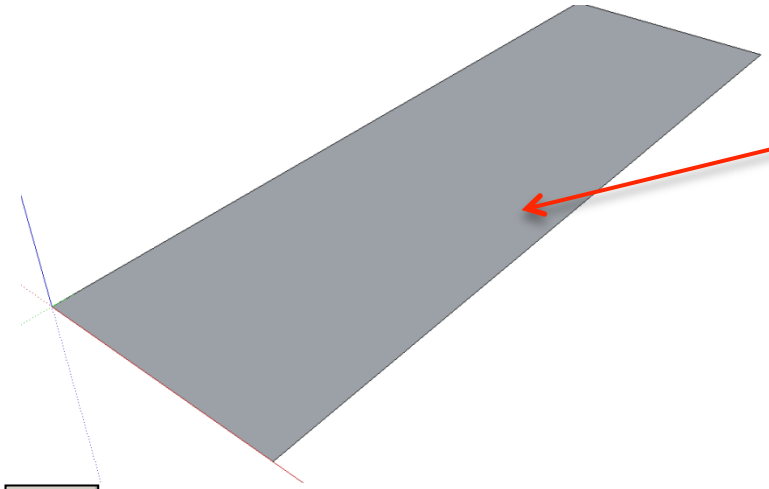


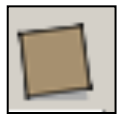
3a Select **View**

3b Tick Getting Started

3c Tick Large Tool Set

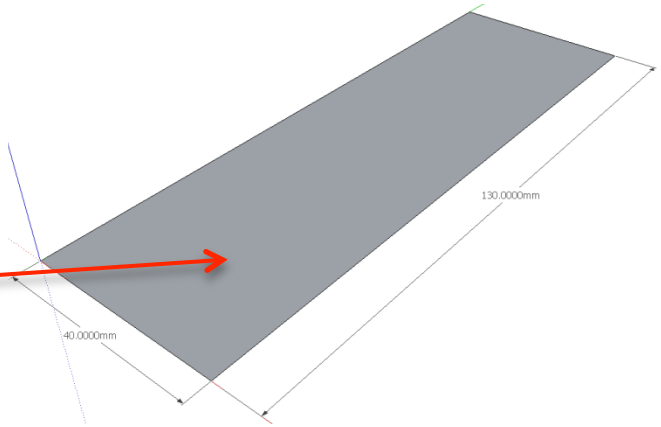
Note**: this will place a tool bar across the top **(getting started)** and the side **(Large Tool Set)

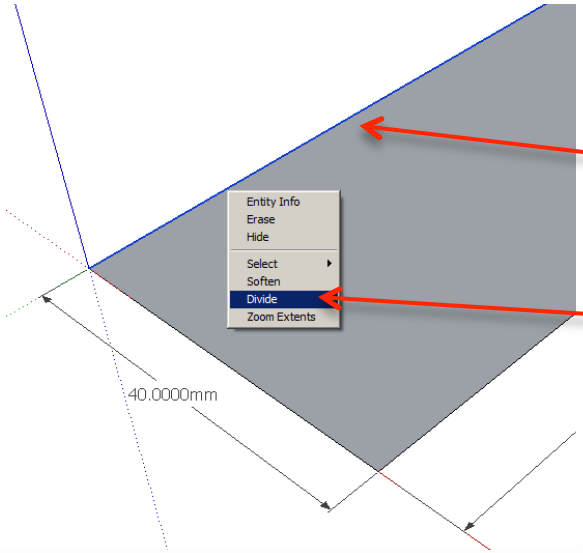




1. ***Click*** on the ***rectangle tool*** **.** Start drawing a square.

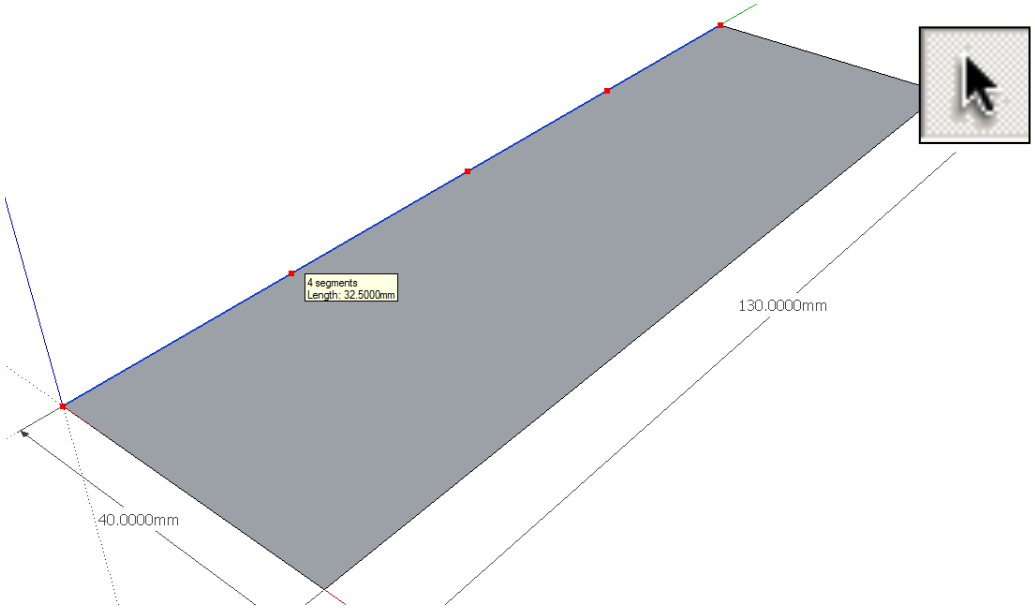
2. Type in **‘40,130’** and press ***Enter.*** **Click on the zoom extents symbol.**



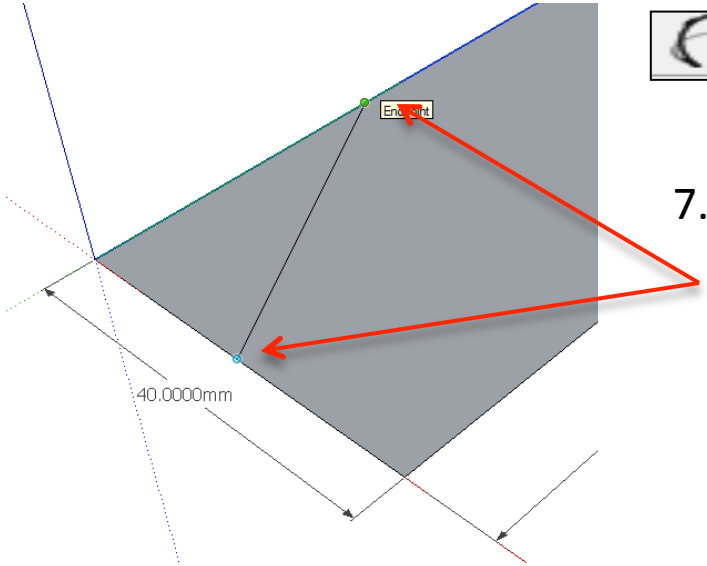


3. Use the Select ***tool*** and click on the line on the side of rectangle shape. The line should be ***highlighted in blue***.

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

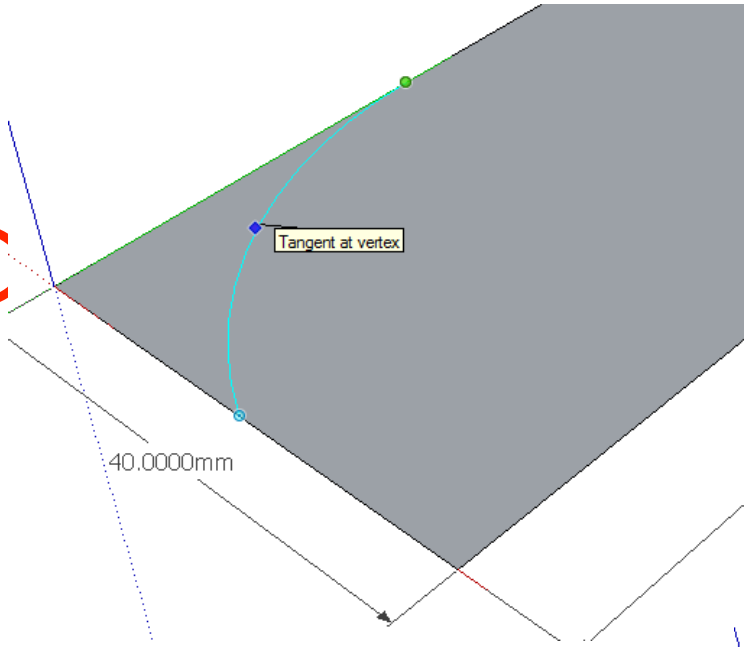


5. Using the mouse whilst on the **blue line** move it right or left. You are looking to ***divide*** it by ***4 segments.*** You can also type in **'4'** and **enter**.



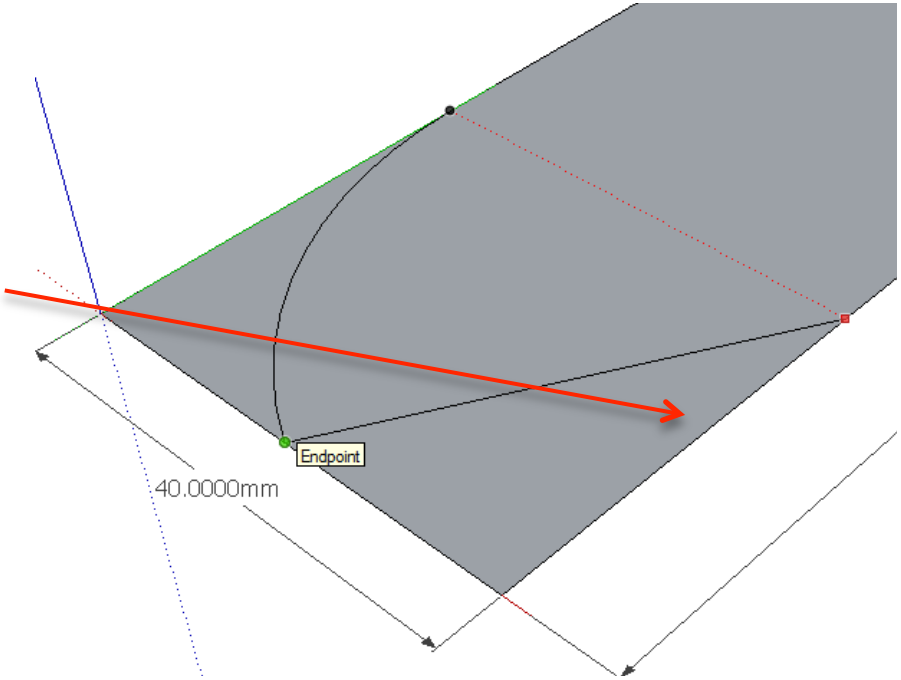
6. Now select the **Arc** tool.

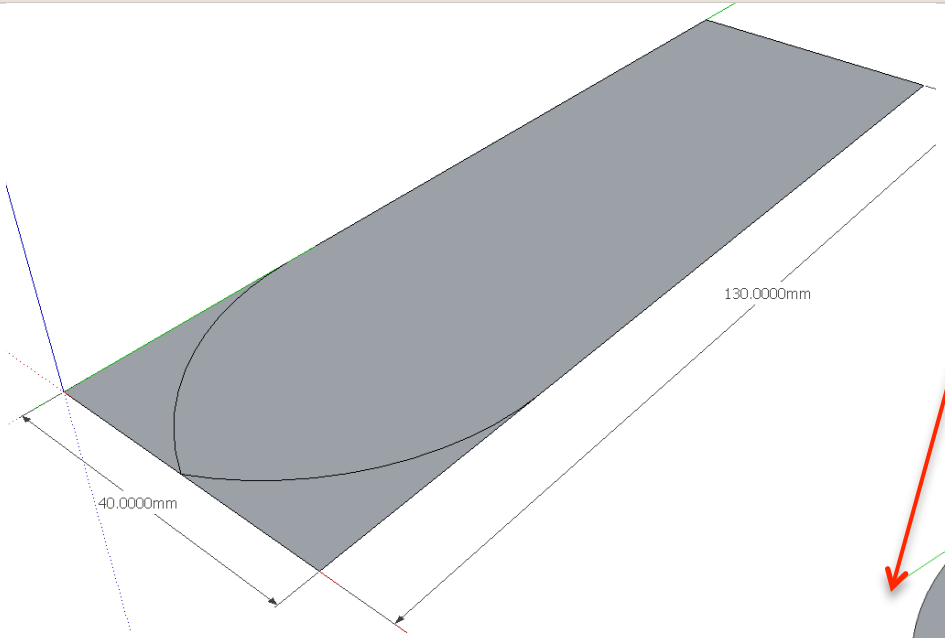
7. With the ***Arc tool***, draw a line to join the two construction points. The first divide point on the ***left-hand side*** it will say ***endpoint*** and the ***centre point*** at the front of the boat.



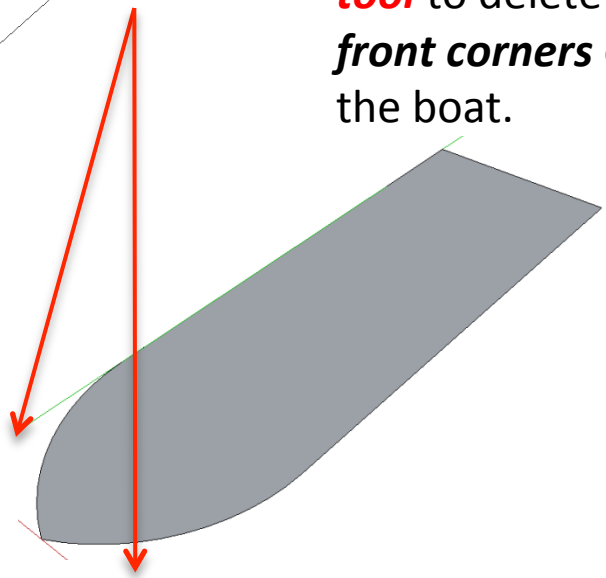
8. With the ***Arc tool***, push the ***arc out***. Look for the line to go **blue** or type in ***'5'*** and ***press enter.***

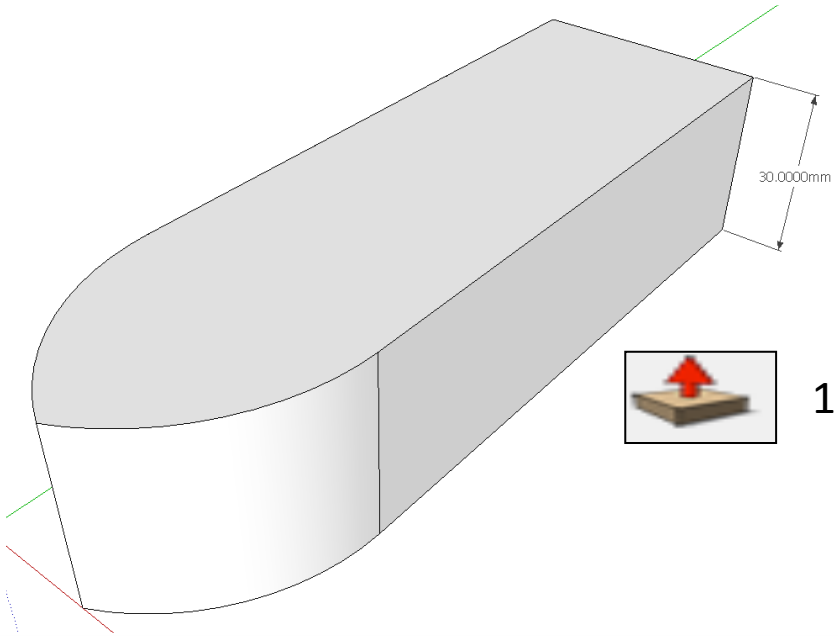
9. ***Repeat*** the process on the opposite side.



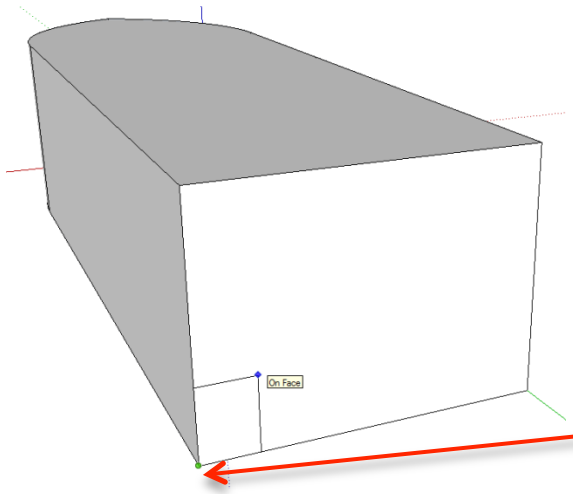


10. Use ***the eraser tool*** to delete the ***front corners*** of the boat.

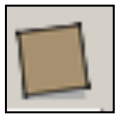




11. Use ***the push pull tool*** to raise the boat. Type in ***'30'*** and ***press enter.***

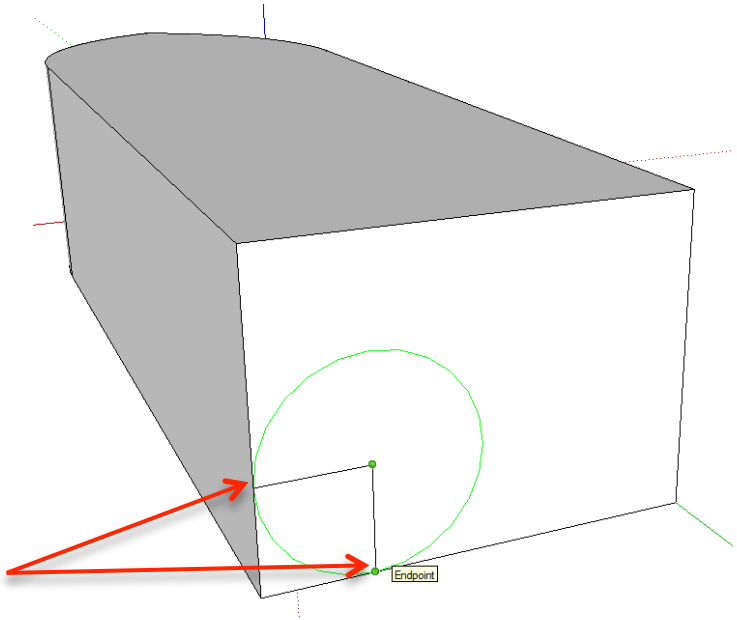


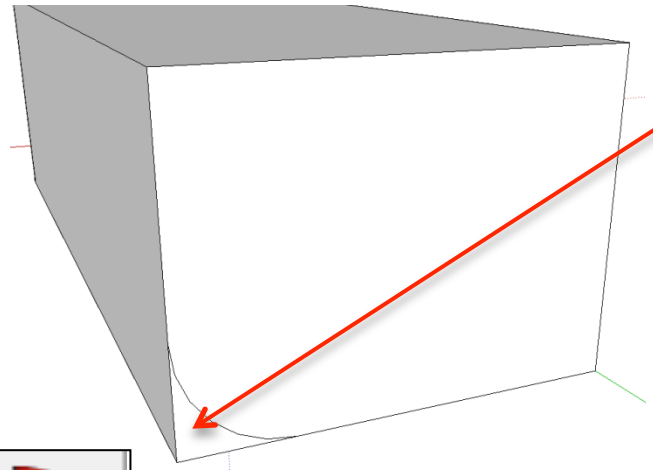
12. Use ***the orbit tool*** to rotate the boat so you can see the rear of it.



13. Use ***the square tool.*** Starting in the ***bottom left hand corner***. Draw a square. Type in '***10,10'*** and ***press enter.***

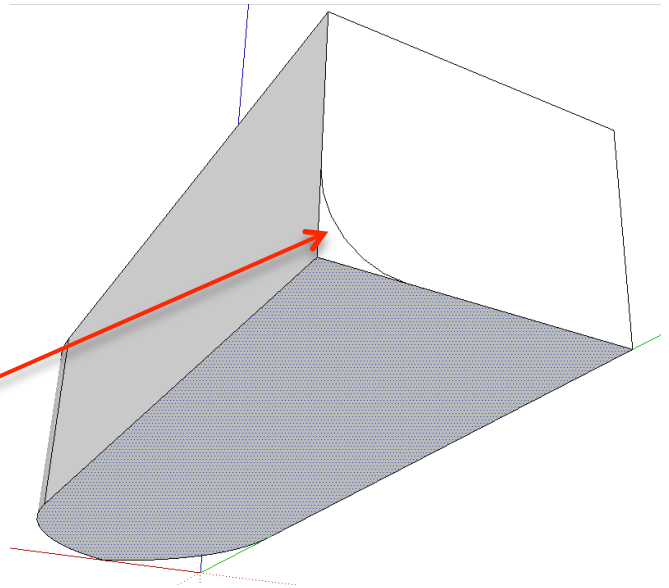
14. Use ***the circle tool.*** Starting in the ***centre of the square***. Draw a circle outwards. The ***circumference*** of the circle should touch either of the two endpoints shown.

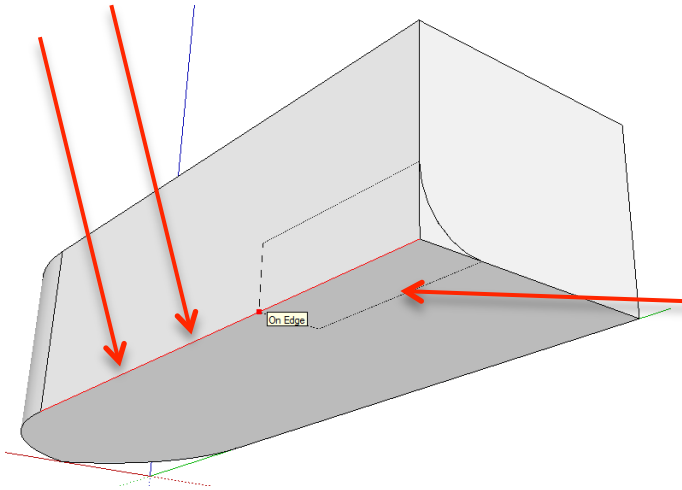




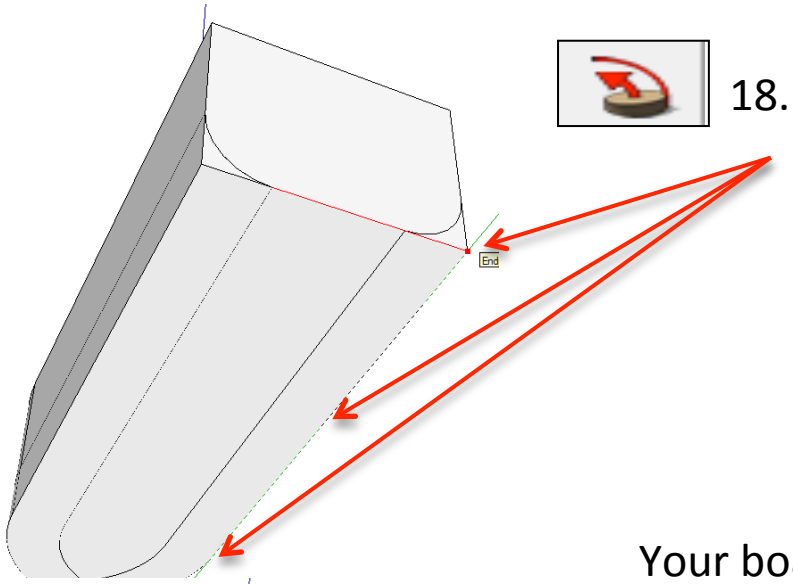
15. Use the ***eraser tool*** to erase the parts of the circle not needed..

16. Use the ***follow me tool*** . Click on the corner segment shown.



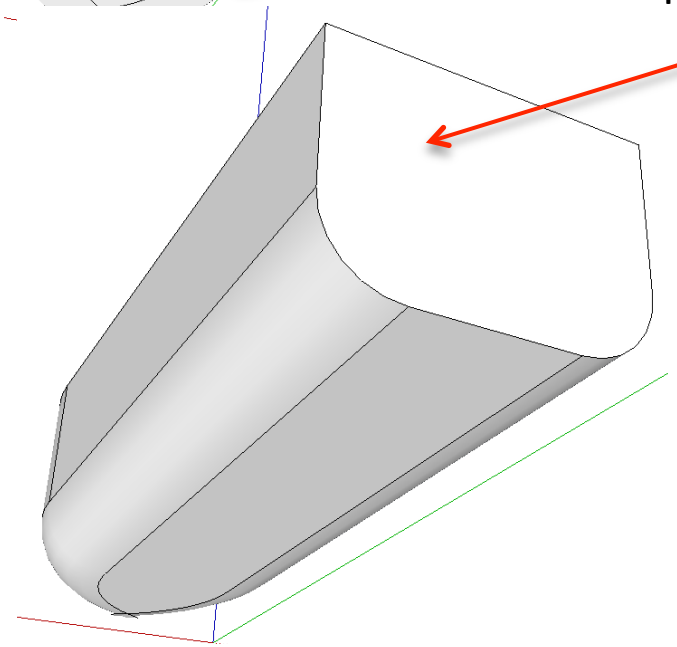


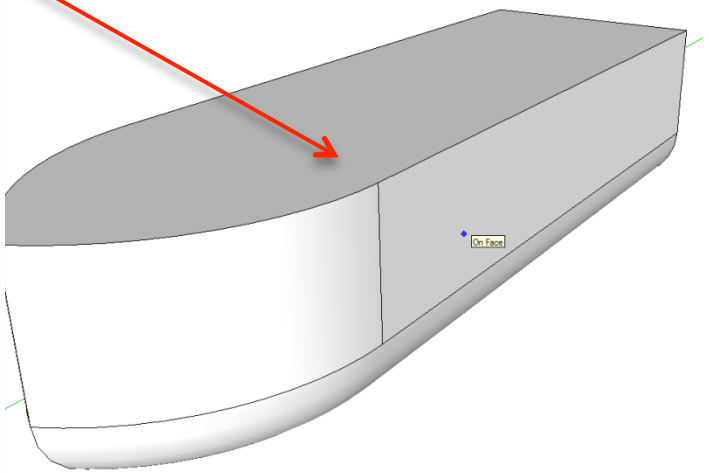
17. Use the ***follow me tool*** . Push the segment back. Hover over the edge shown to help guide the follow me tool.

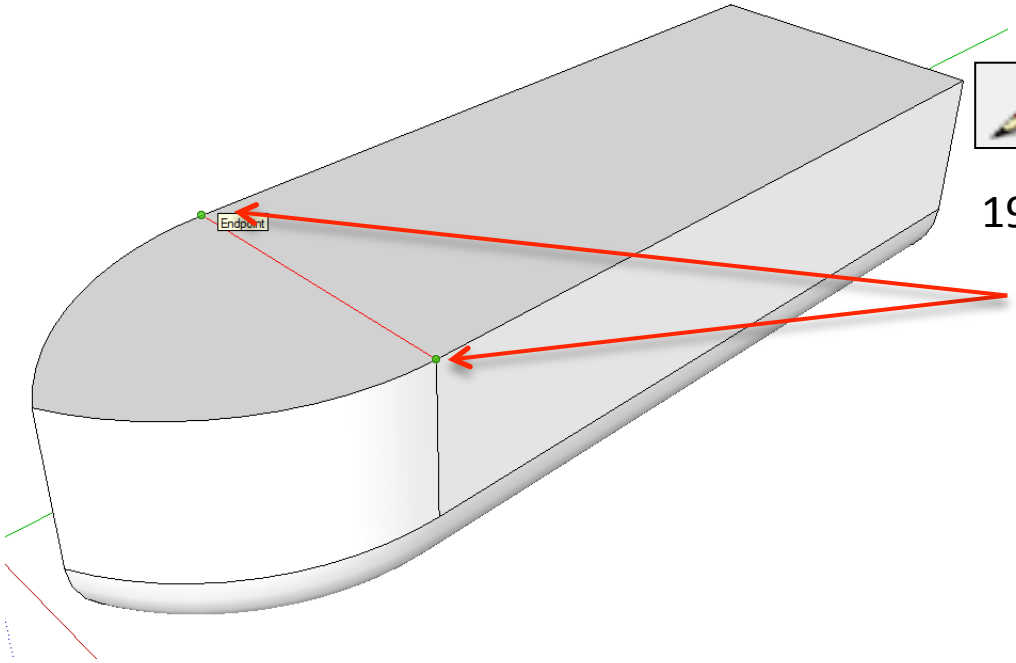


18. Using the ***follow me tool*** . Push the segment around to the opposite side and corner shown

Your boat should now look like this……

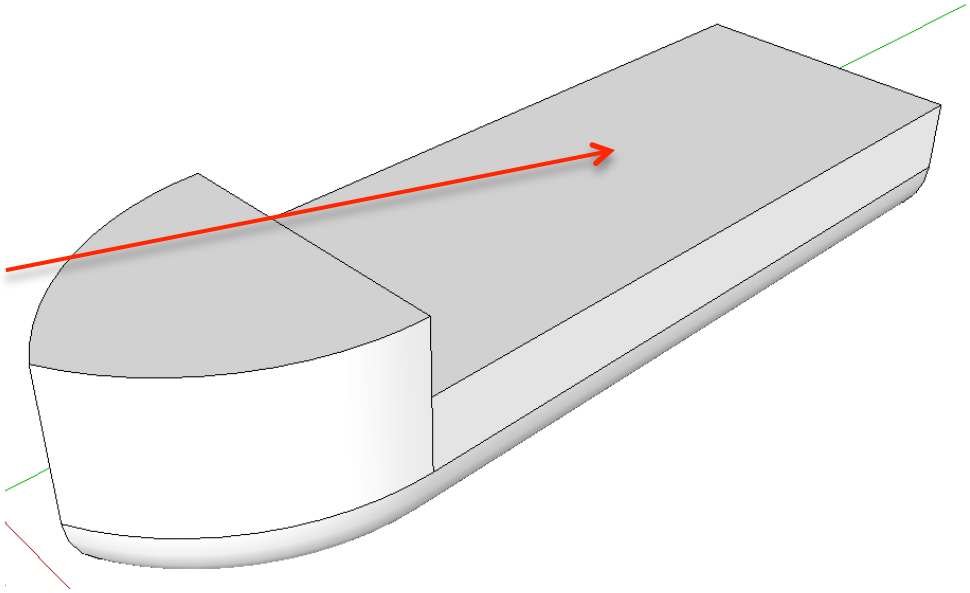


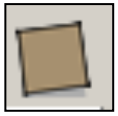


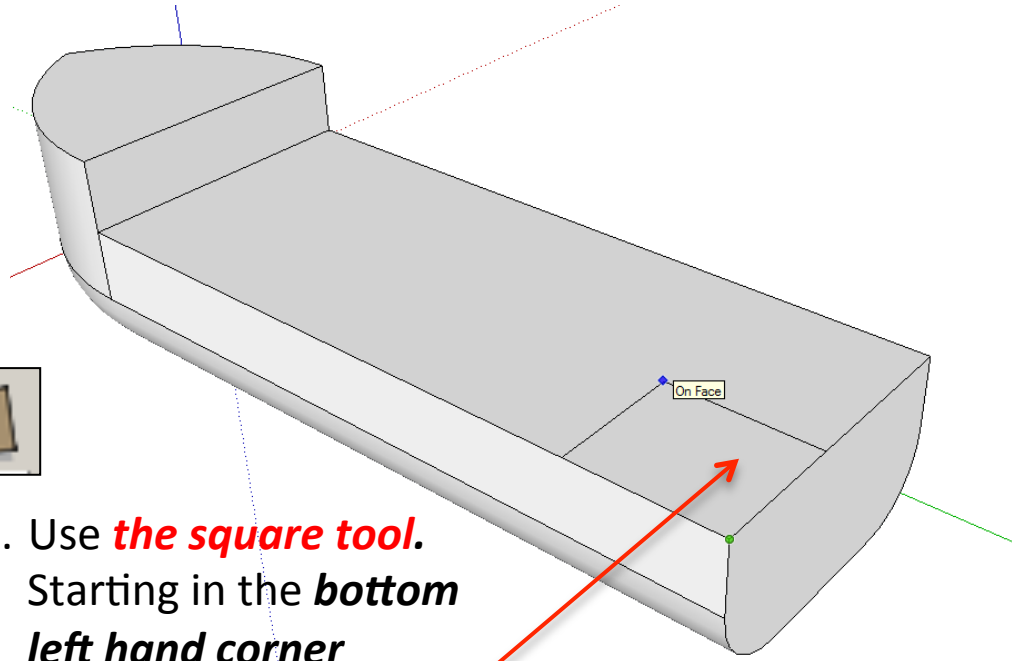


19. Using the ***pencil tool*** . Draw a line across from ***endpoint*** to the other as shown

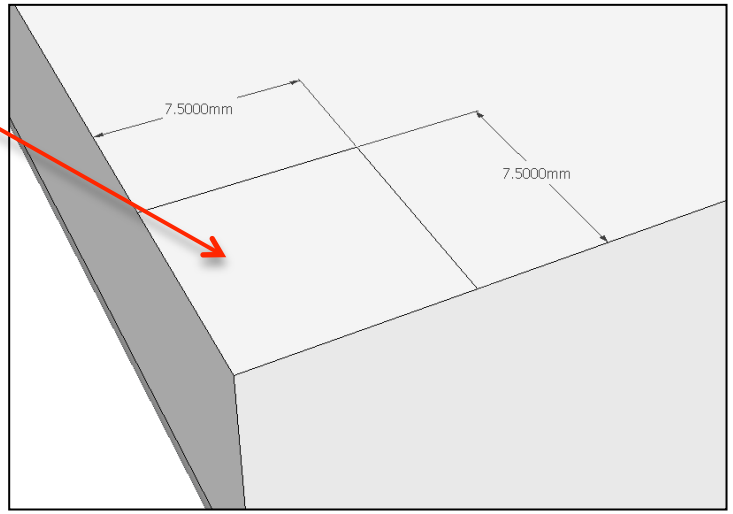
20. Use ***the push pull tool*** to lower the boat. Type in ***'10'*** and ***press enter.***

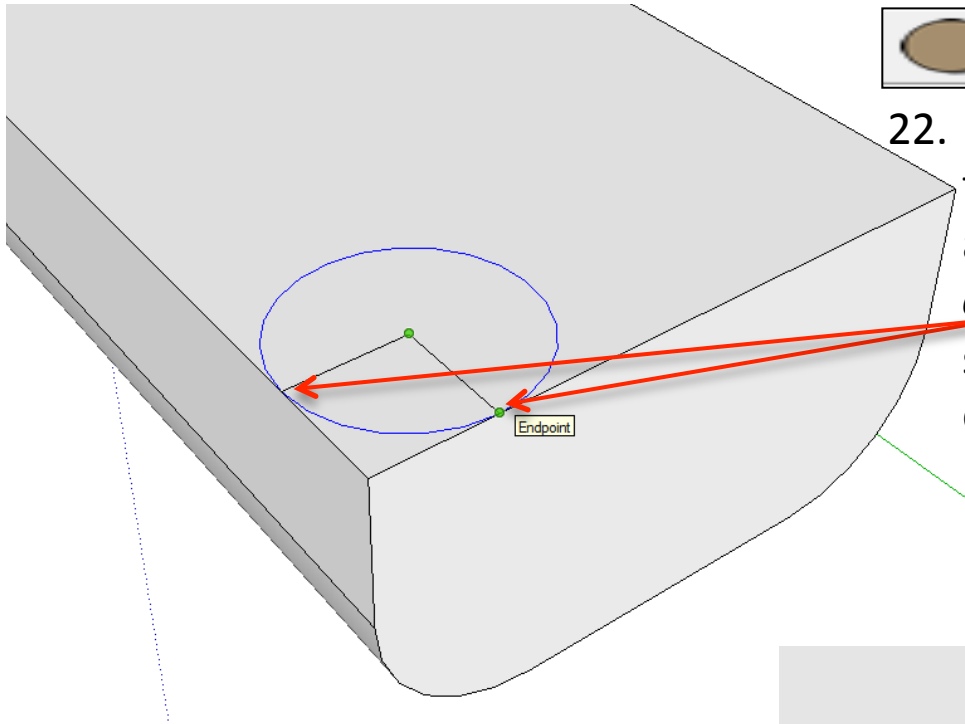




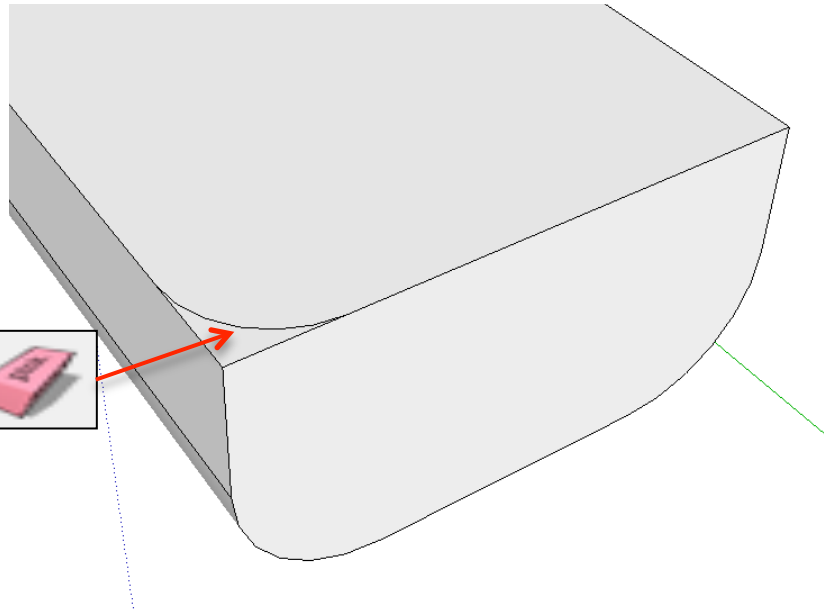


21. Use ***the square tool.*** Starting in the ***bottom left hand corner shown***. Draw a square. Type in '***7.5,7.5'*** and ***press enter.***

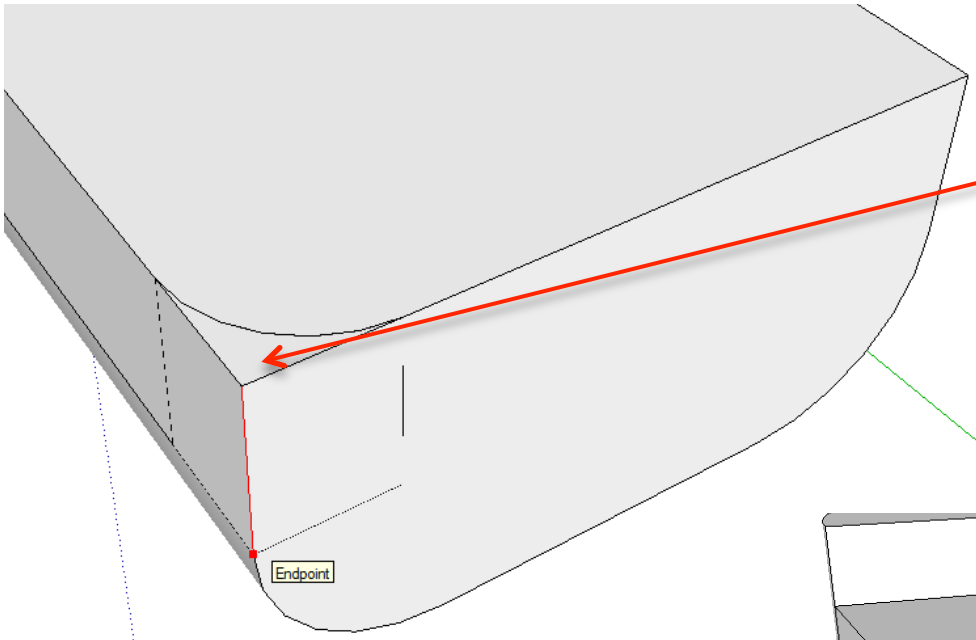




22. Use ***the circle tool.*** Starting in the ***centre of the square***. Draw a circle outwards. The ***circumference*** of the circle should touch either of the two endpoints shown.

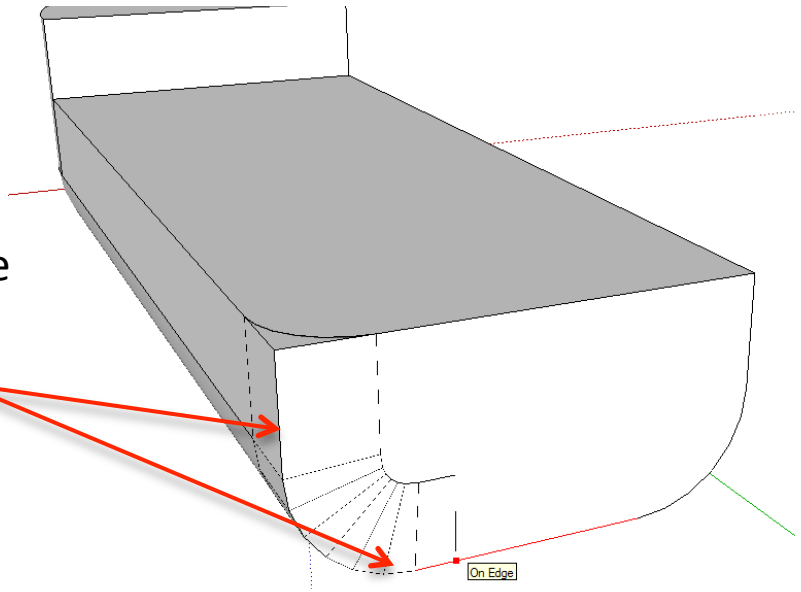


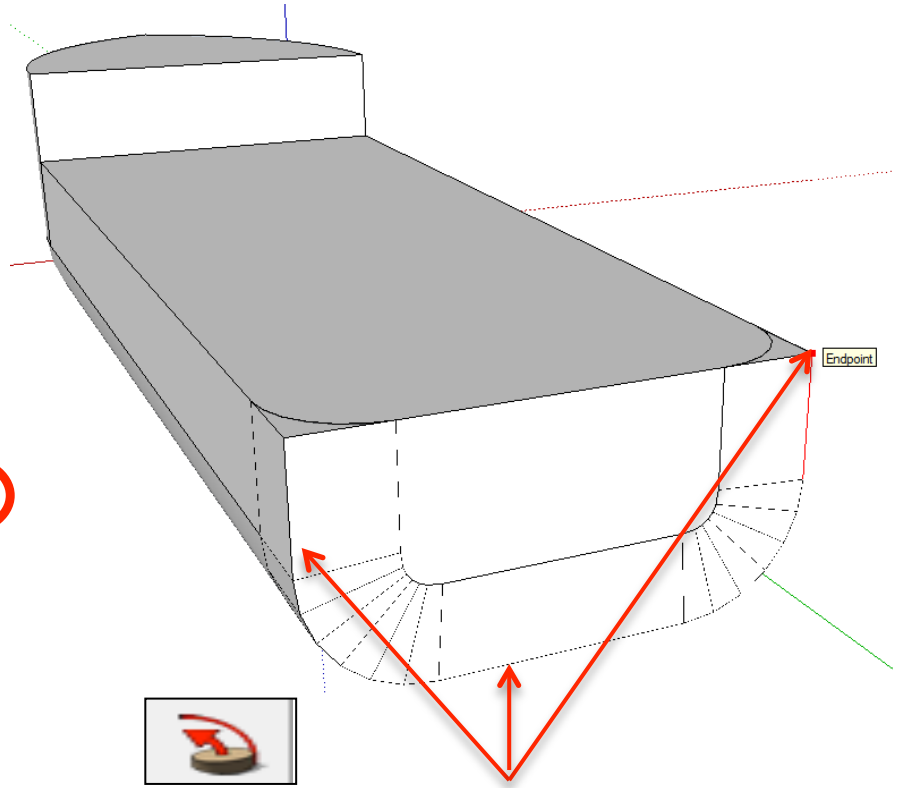
23. Use the ***eraser tool*** to erase the parts of the circle not needed..



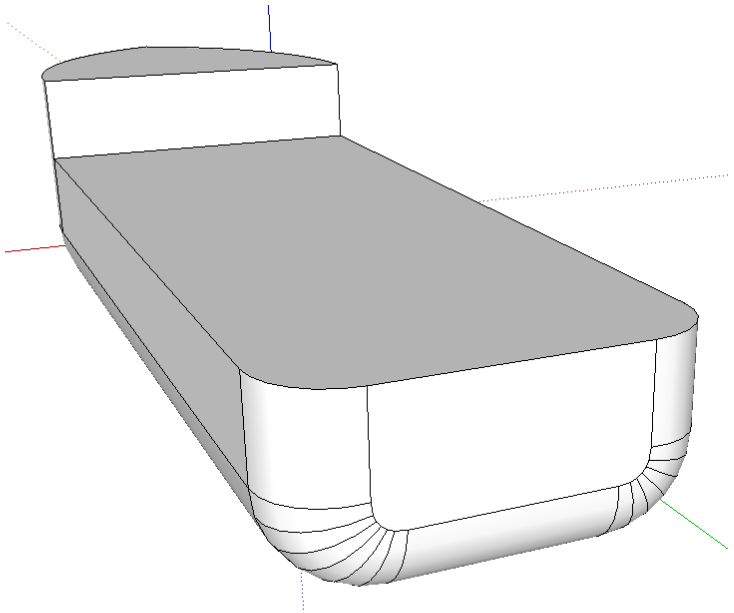
24. Use the ***follow me tool*** . Click on the corner segment shown.

25. Use the ***follow me tool*** . Push the segment down. Hover over the edge shown to help guide the follow me tool.





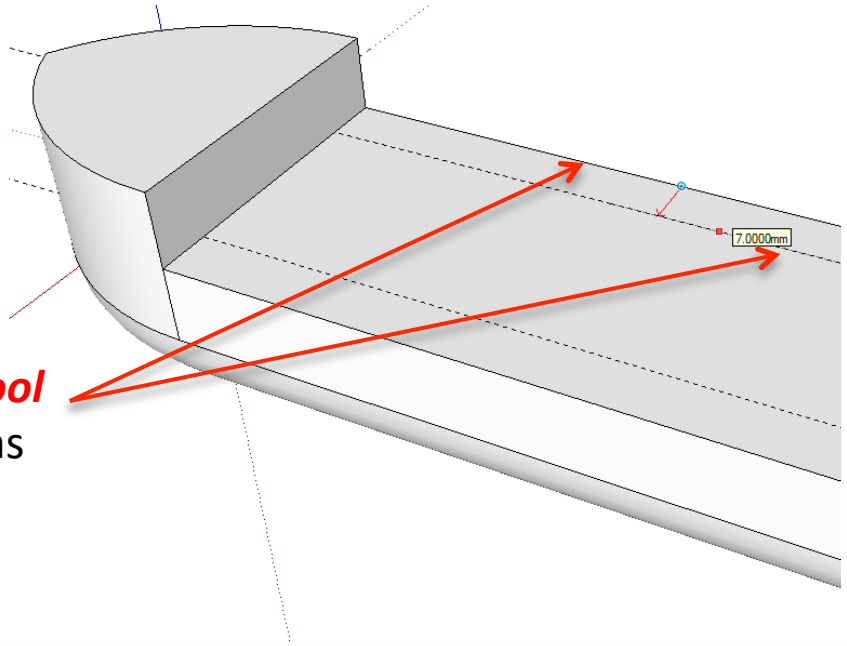
26. Using the ***follow me tool*** . Push the segment around to the opposite side and endpoint shown.

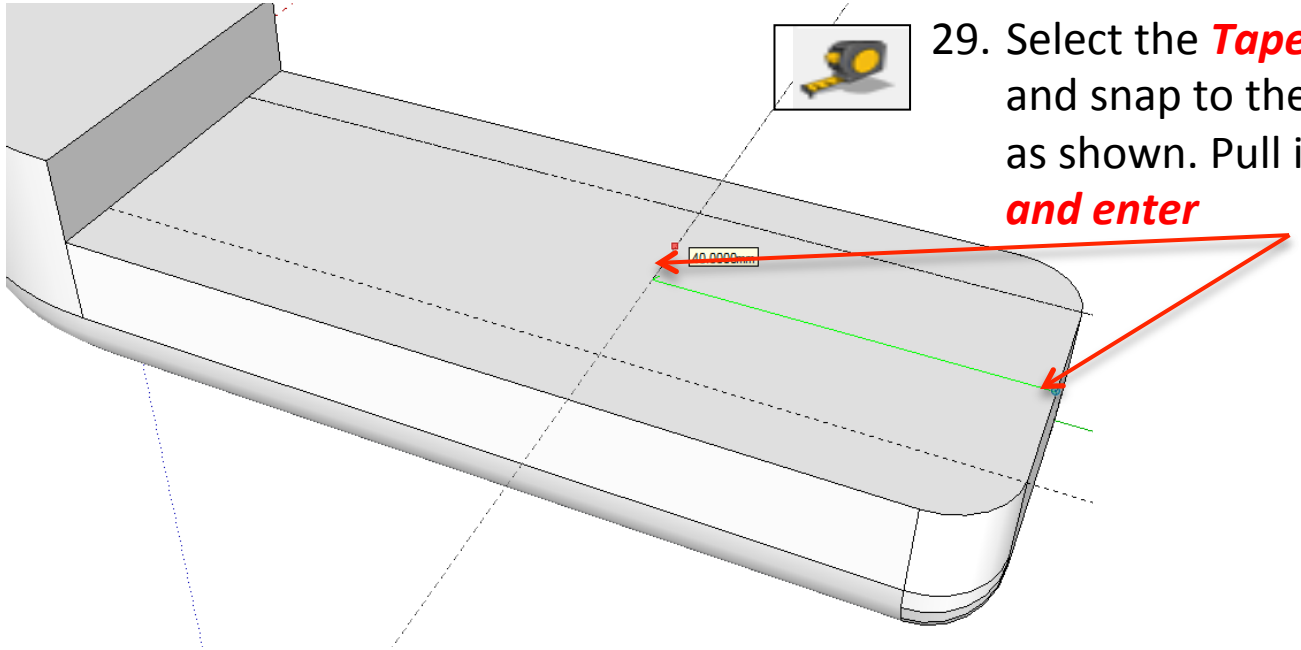


Your boat should now look like this…

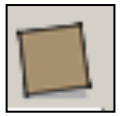
27. Select the ***Tape measure tool*** and snap to the ***side edge*** as shown. Pull in and ***type 7 and enter***

28. Select the ***Tape measure tool*** and snap to the ***side edge*** as shown. Pull in and ***type 7 and enter***

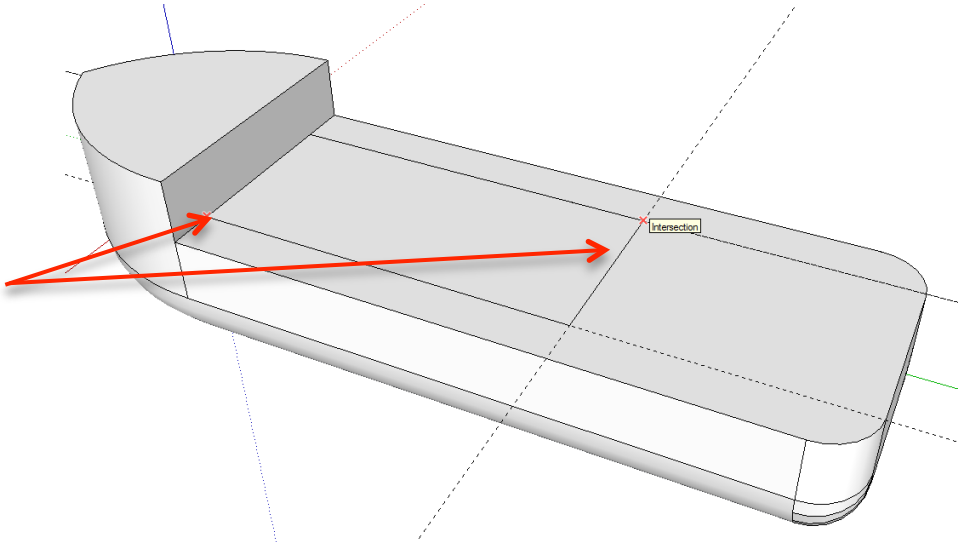


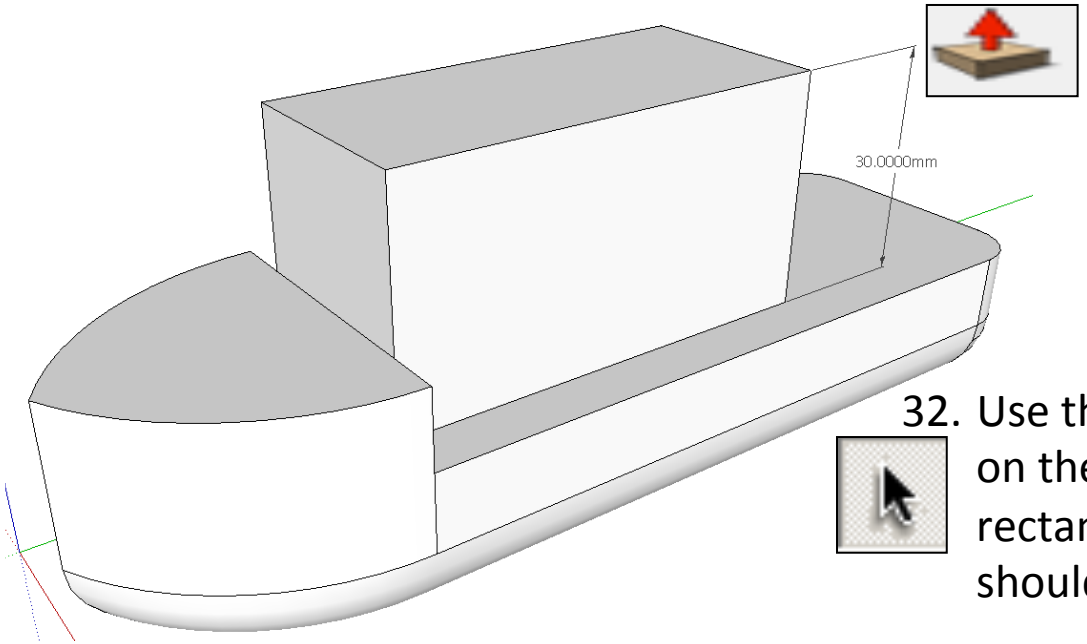


29. Select the ***Tape measure tool*** and snap to the ***BACK edge*** as shown. Pull in and ***type 40 and enter***



30. Use ***the square tool.*** Starting in the ***TOP left hand corner shown***. Draw a square.



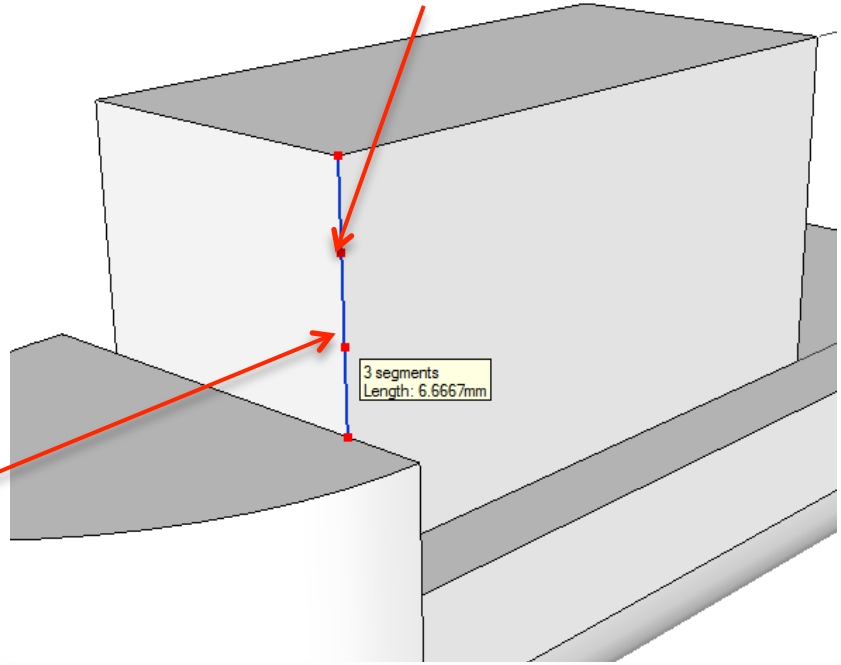


31. Use ***the push pull tool*** to raise the boat. Type in ***'30'*** and ***press enter.***

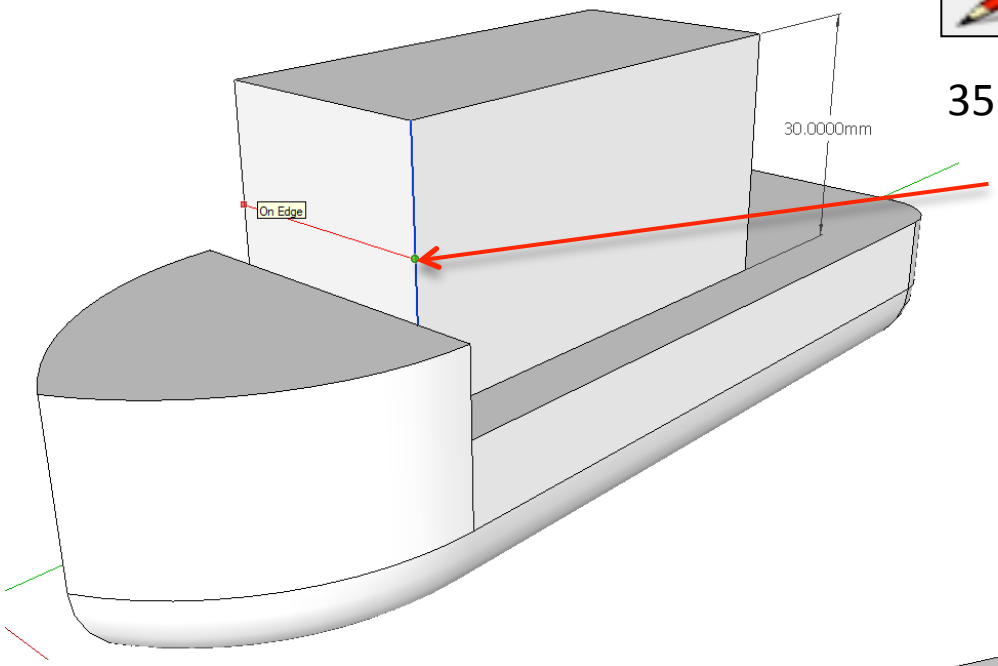
32. Use the Select ***tool*** and click on the line on the side of rectangle shape. The line should be ***highlighted in blue***.

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

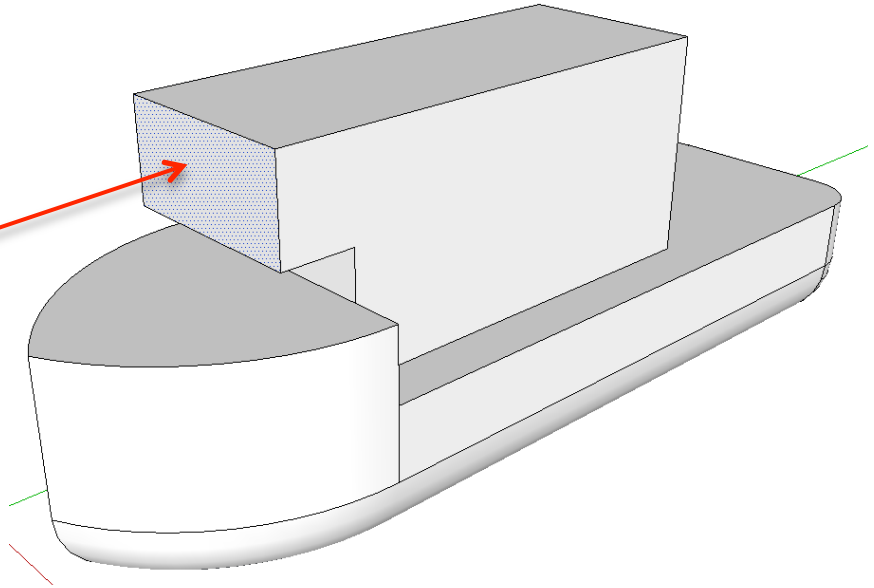
34. Using the mouse whilst on the **blue line** move it right or left. You are looking to ***divide*** it by ***3 segments.*** You can also type in **'3'** and **enter**.



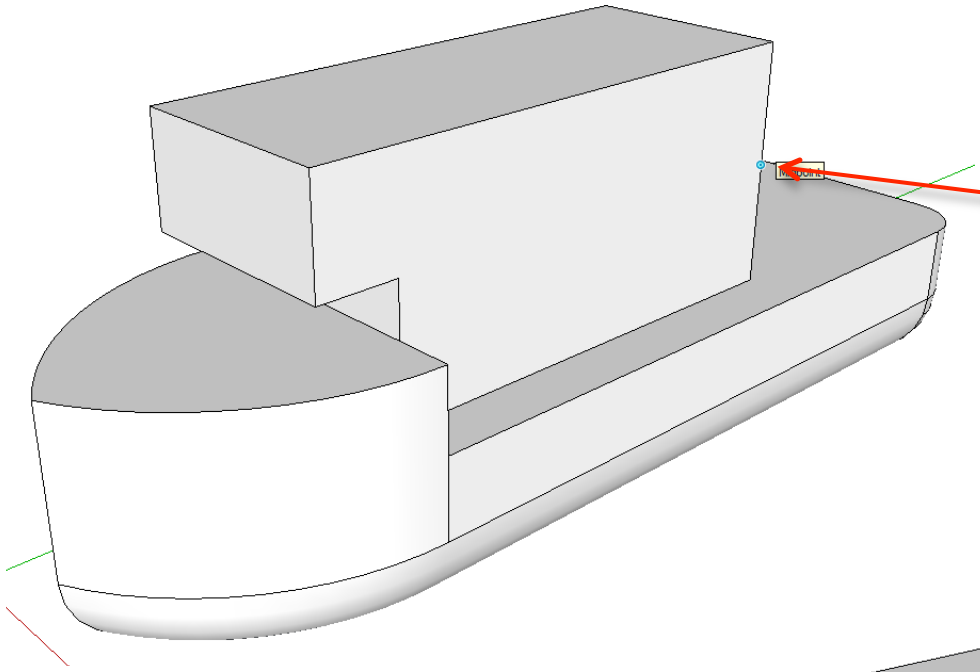
35. Using the ***pencil tool*** . Draw a line across from ***endpoint*** to the other as shown



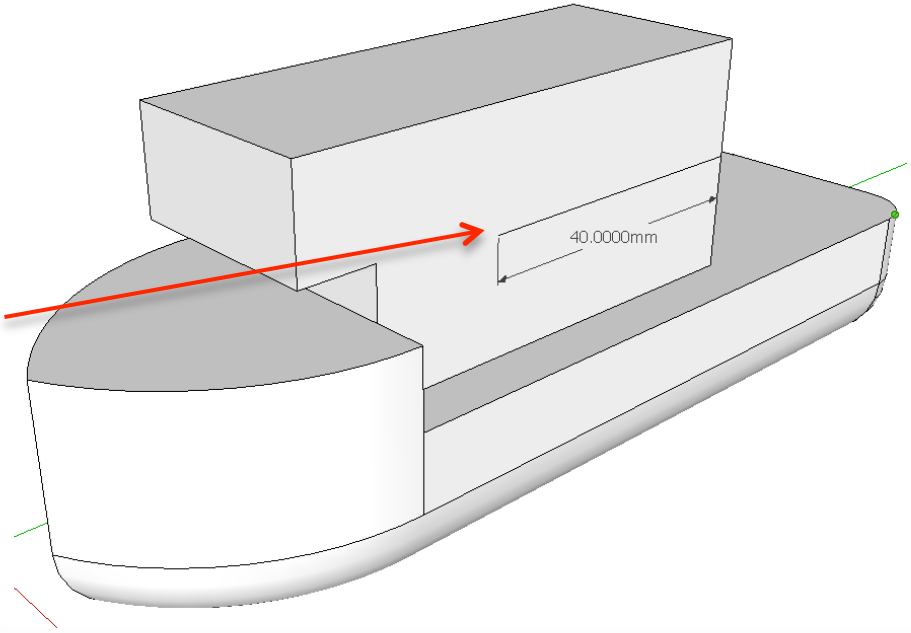
36. Use ***the push pull tool*** to pull the ***top half of the cabin outwards***. Type in ***'10'*** and ***press enter.***

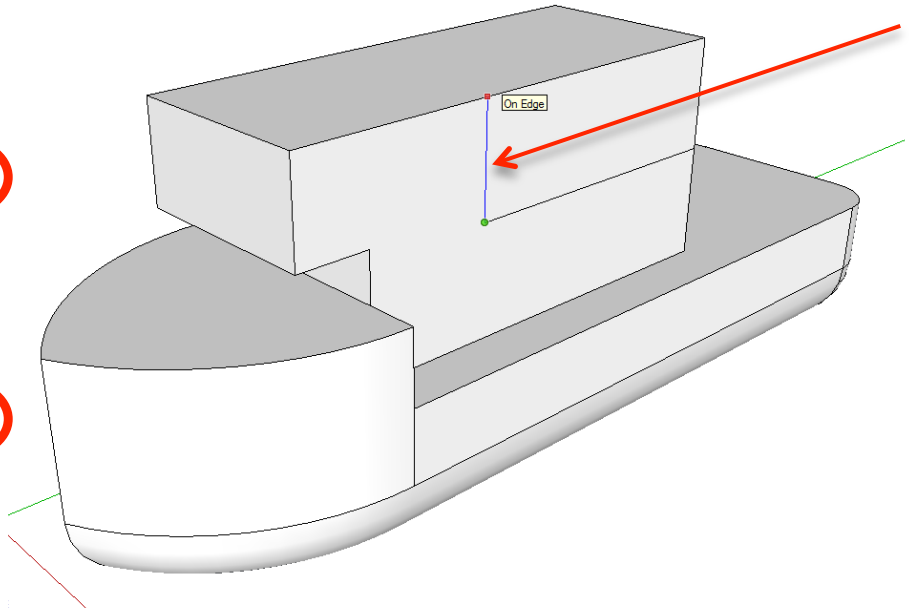


37. Using the ***pencil tool*** . Snap to the midpoint shown……



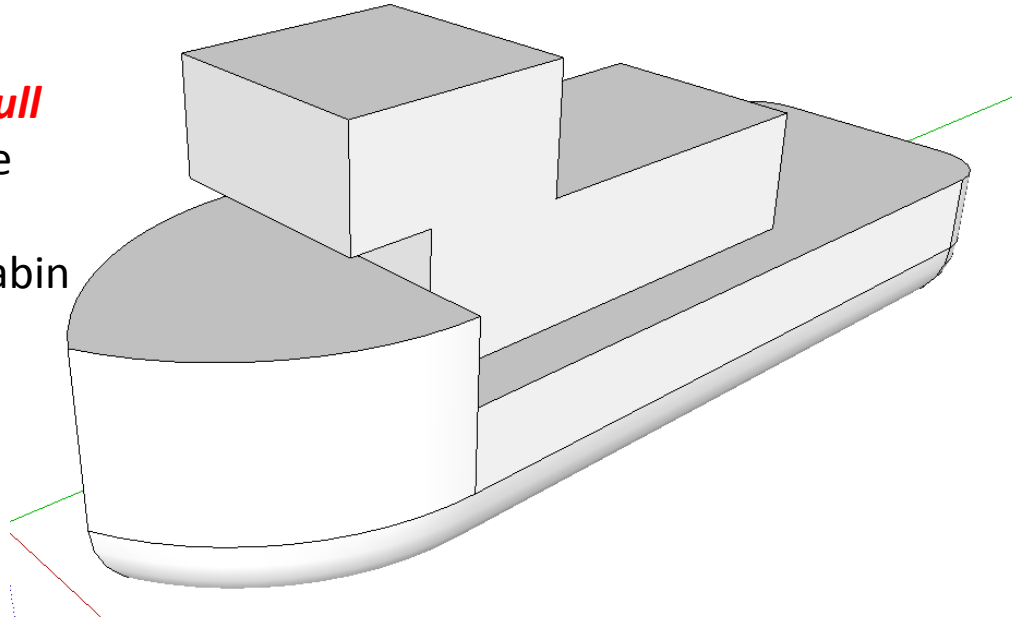
38. Using the ***pencil tool*** . Draw a line back on either the ***red*** or ***green axis***. Type in ***'40'*** and press ***enter.***





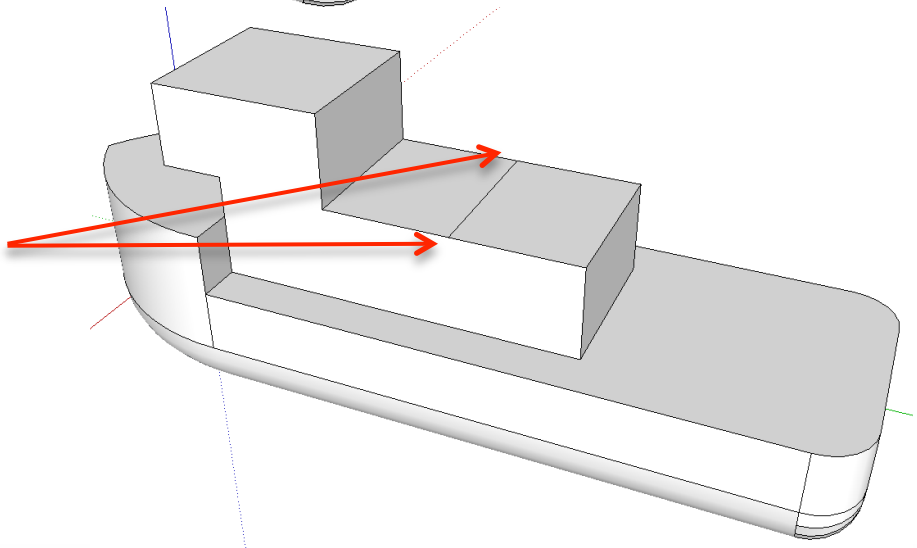
38. Using the ***pencil tool*** . Draw a line ***directly up*** from the end of the last line. It should be on the ***blue axis***

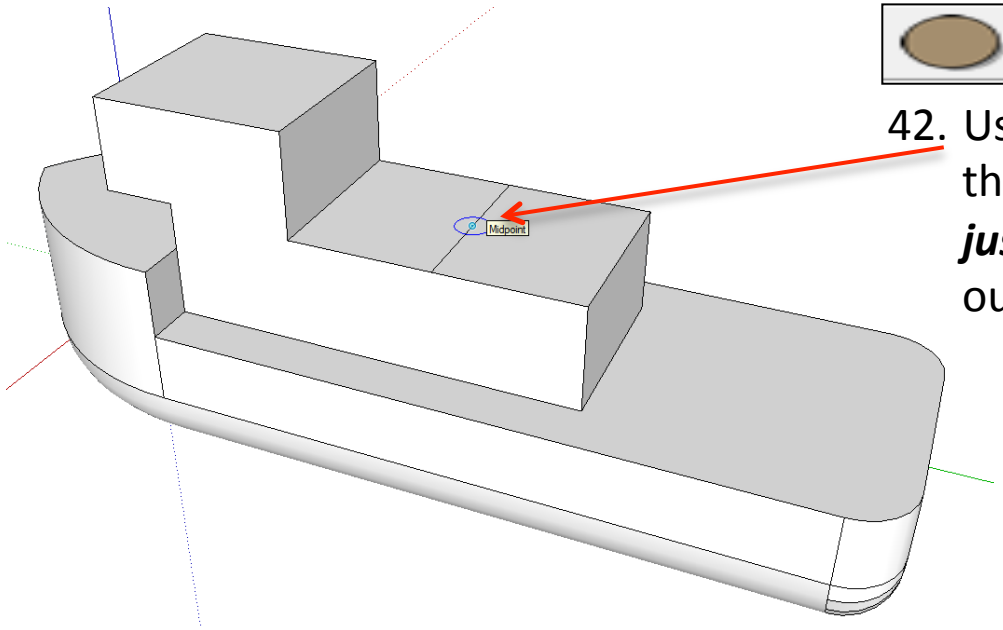
39. Use ***the push pull tool*** to push the top right hand corner of the cabin back until it disappears..



40. Using the ***pencil tool*** . Snap to the midpoint shown…….

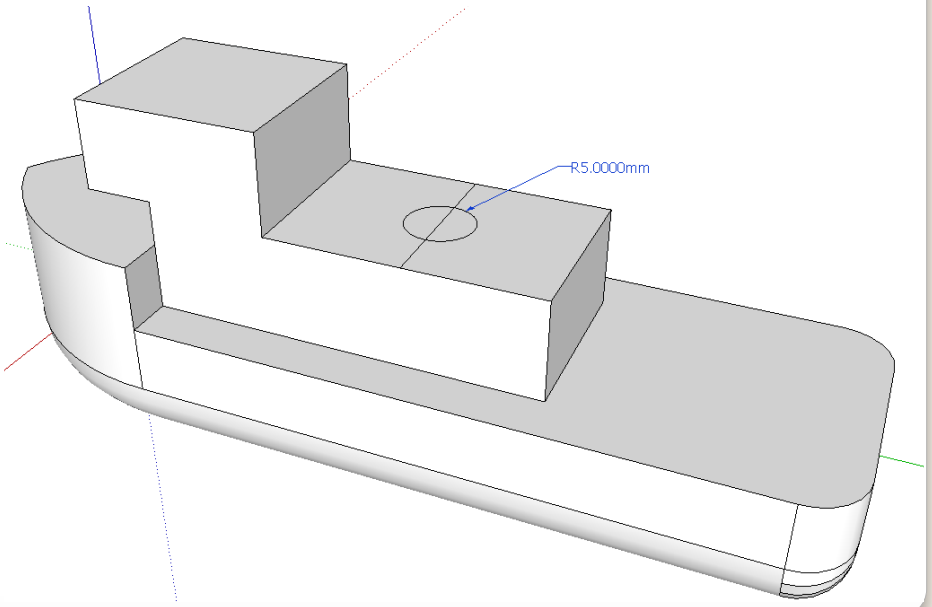
41. Using the ***pencil tool*** . Draw a line across from ***midpoint*** to the other as shown

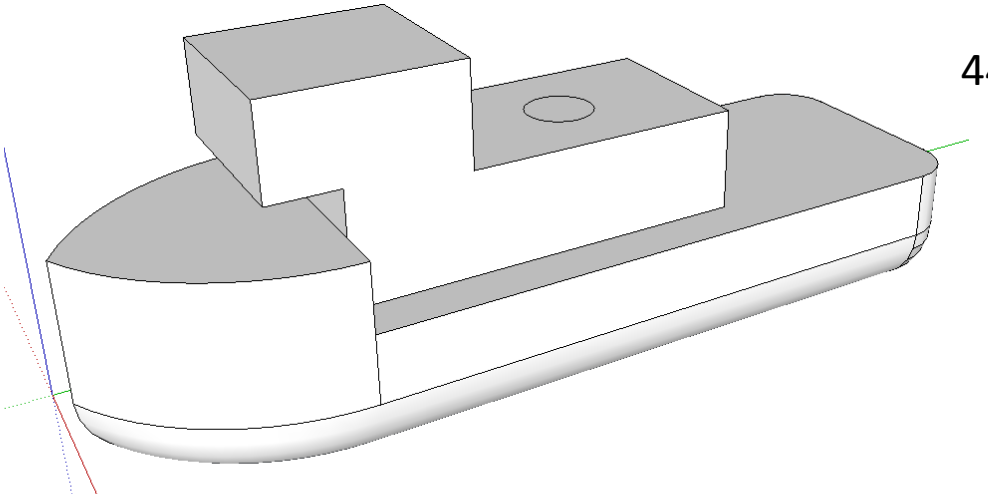




42. Use ***the circle tool.*** Starting in the ***centre of the line you have just drawn***. Draw a circle outwards.

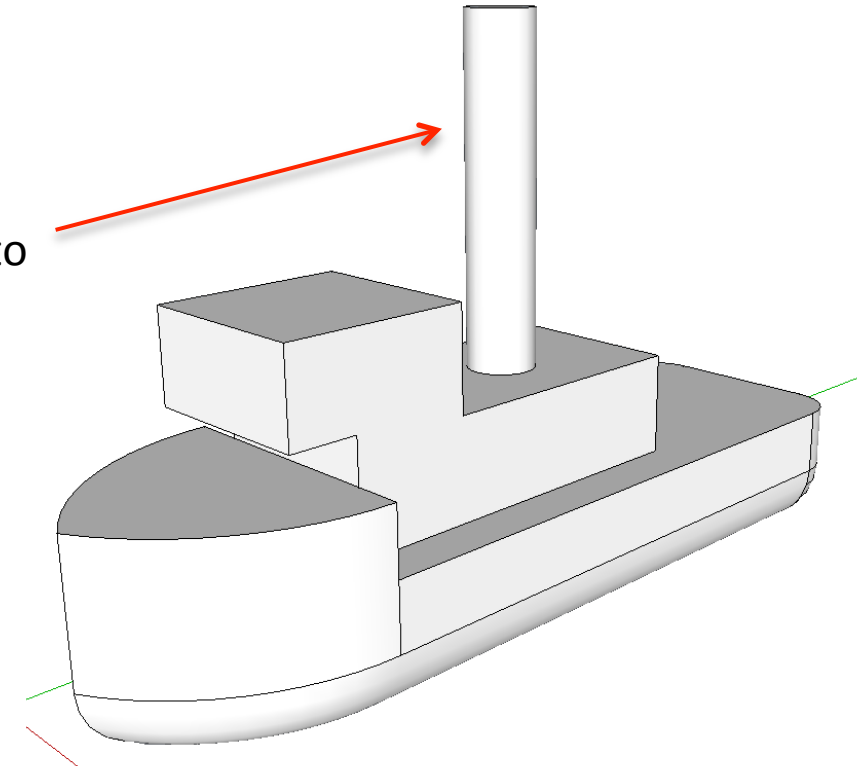
43. Use ***the circle tool.*** Type in ***4.5*** and ***press enter.***

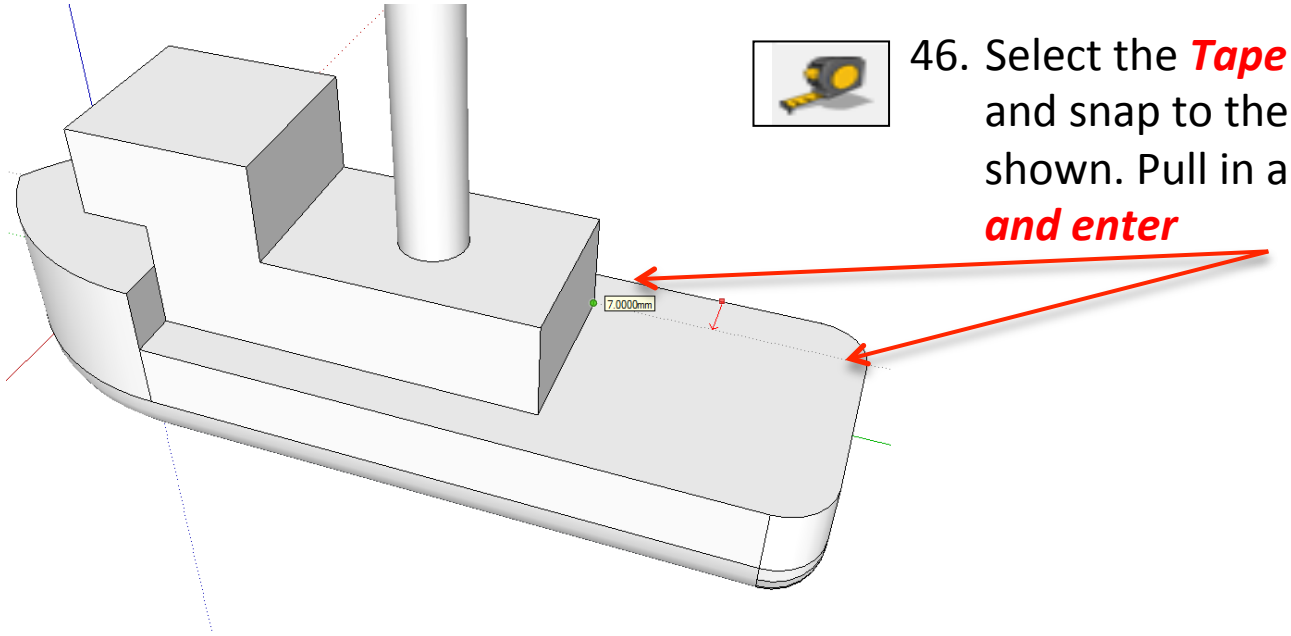




44. Use the ***eraser tool*** to erase the parts of the circle not needed..

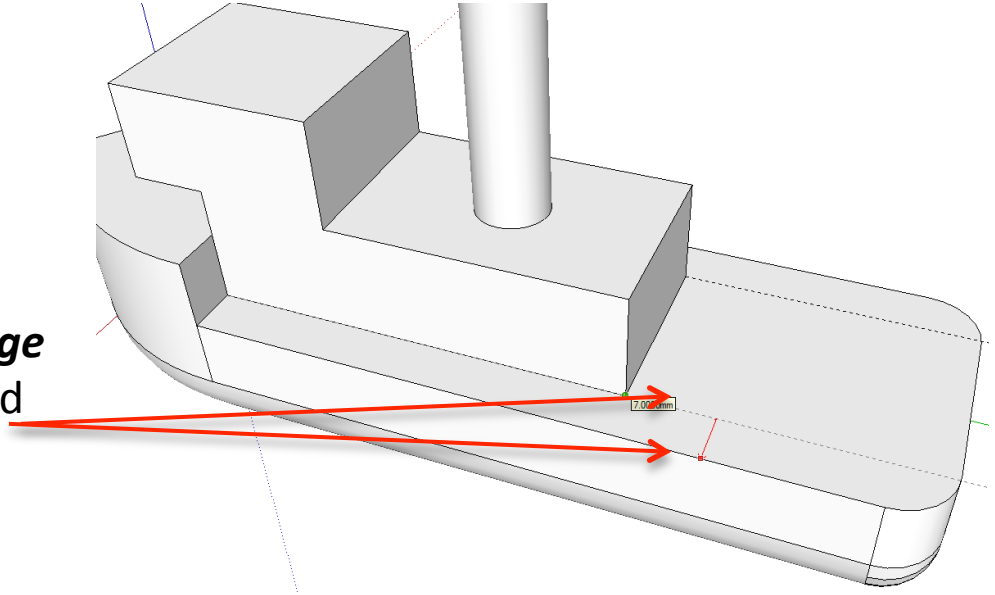
45. Use the ***push pull tool*** to pull the funnel up to a height of your choice.

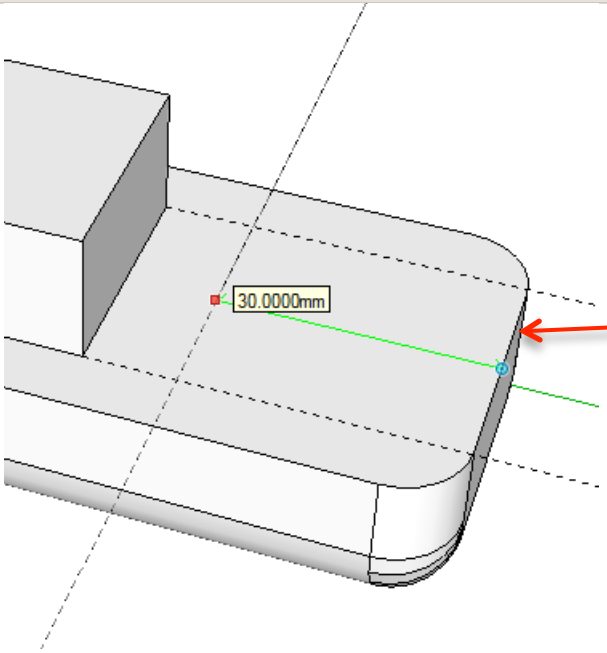




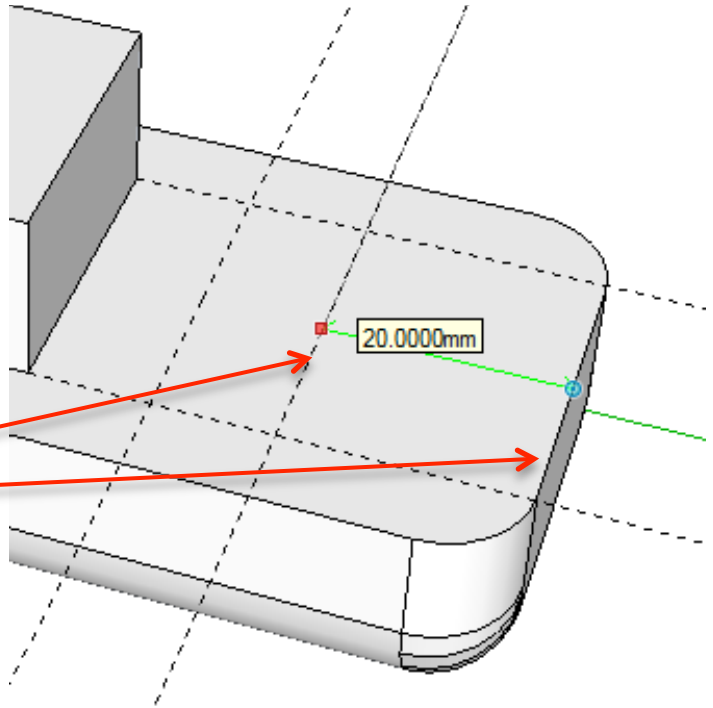
46. Select the ***Tape measure tool*** and snap to the ***SIDE edge*** as shown. Pull in and ***type 7 and enter***

47. Select the ***Tape measure tool*** and snap to the ***SIDE edge*** as shown. Pull in and ***type 7 and enter***

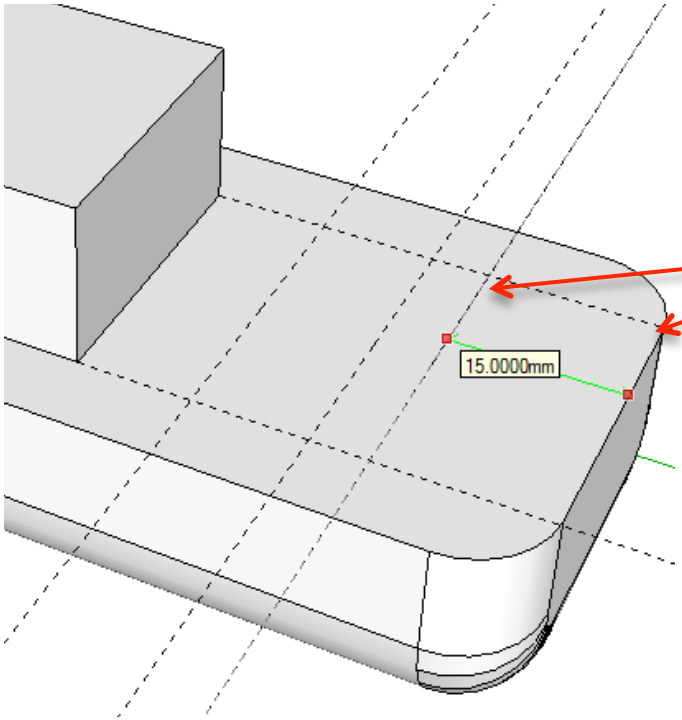




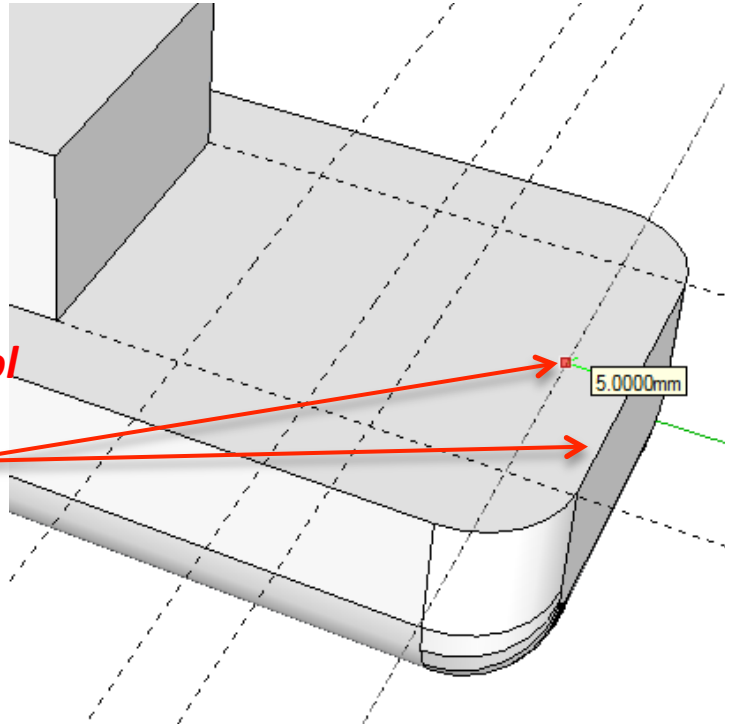
48. Select the ***Tape measure tool*** and snap to the ***BACK edge*** as shown. Pull in and ***type 30 and enter***



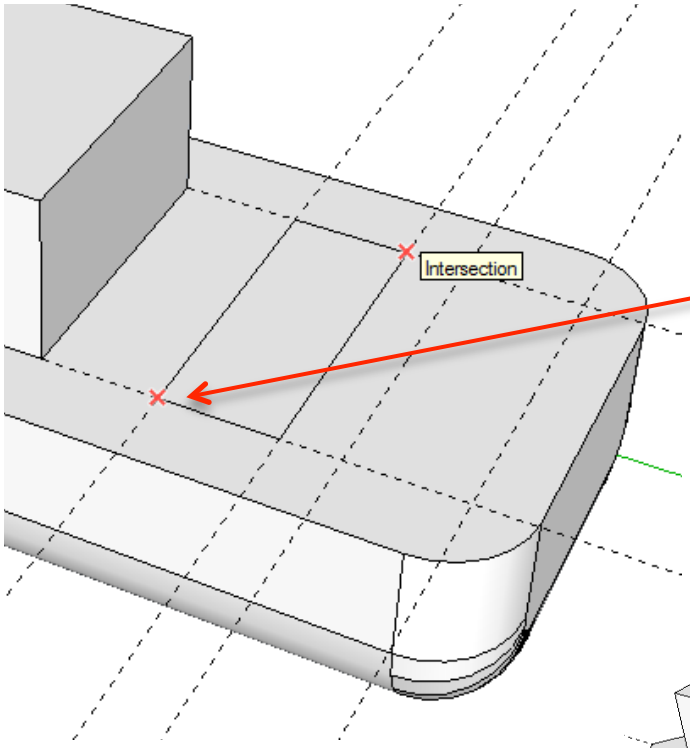
49. Select the ***Tape measure tool*** and snap to the ***BACK edge*** as shown. Pull in and ***type 20 and enter***

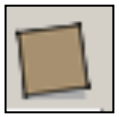


50. Select the ***Tape measure tool*** and snap to the ***BACK edge*** as shown. Pull in and ***type 15 and enter***

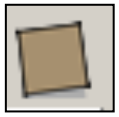


51. Select the ***Tape measure tool*** and snap to the ***BACK edge*** as shown. Pull in and ***type 5 and enter***

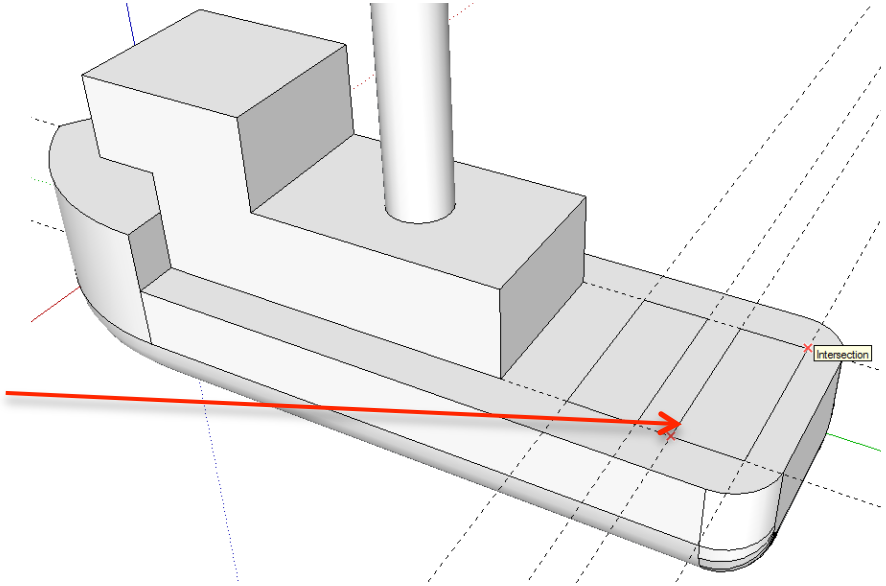


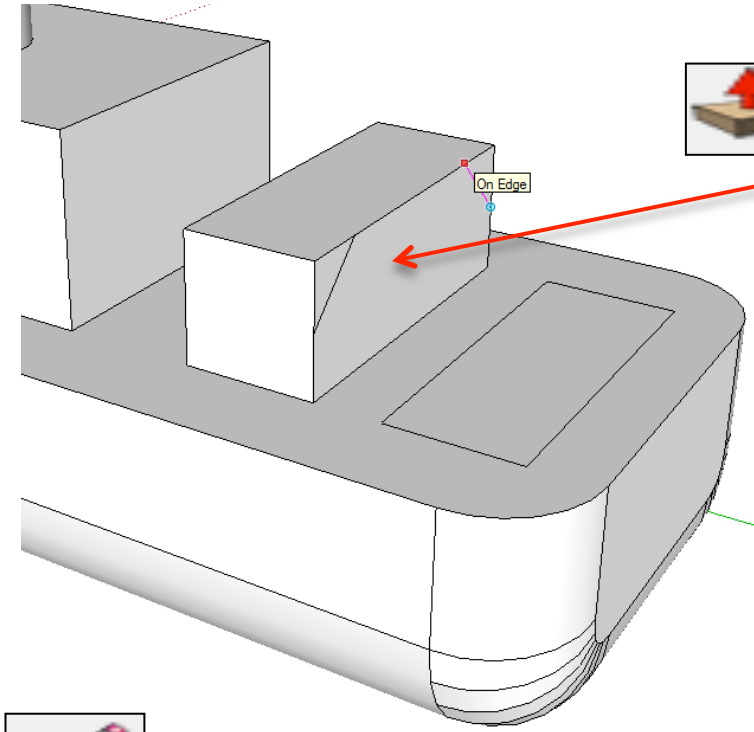


52. Use ***the square tool.***
Starting in the ***TOP left hand corner shown***.
Draw a square.



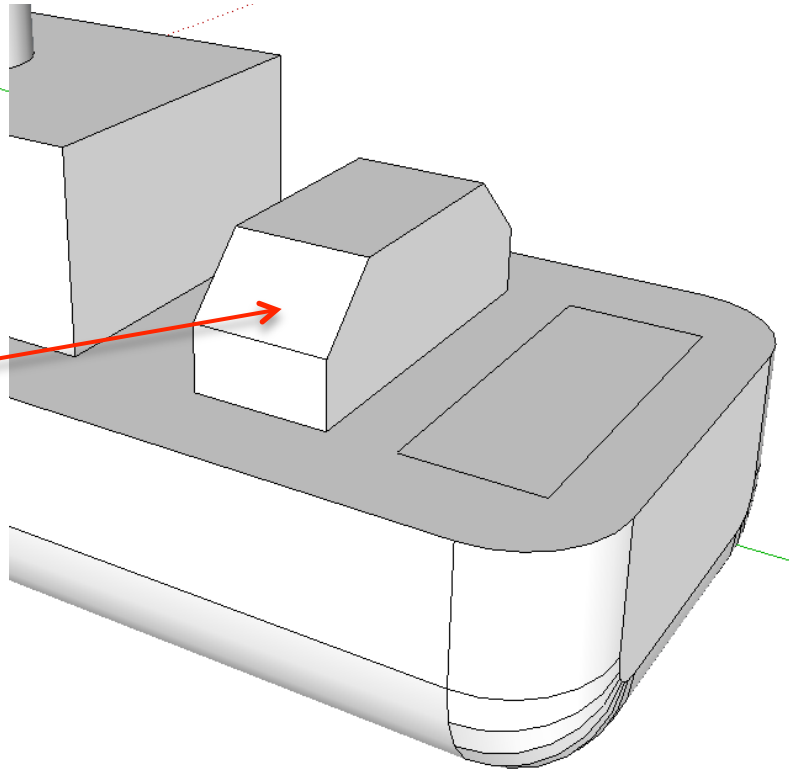
53. Use ***the square tool.***
Starting in the ***TOP left hand corner shown***.
Draw a square.

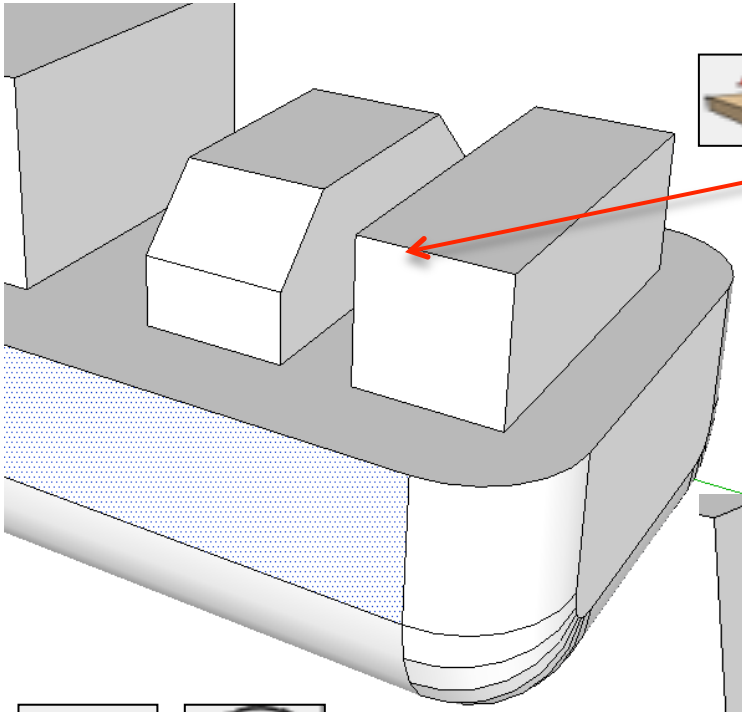




54. Use the ***push pull tool*** to pull the cabin up to a height of your choice.

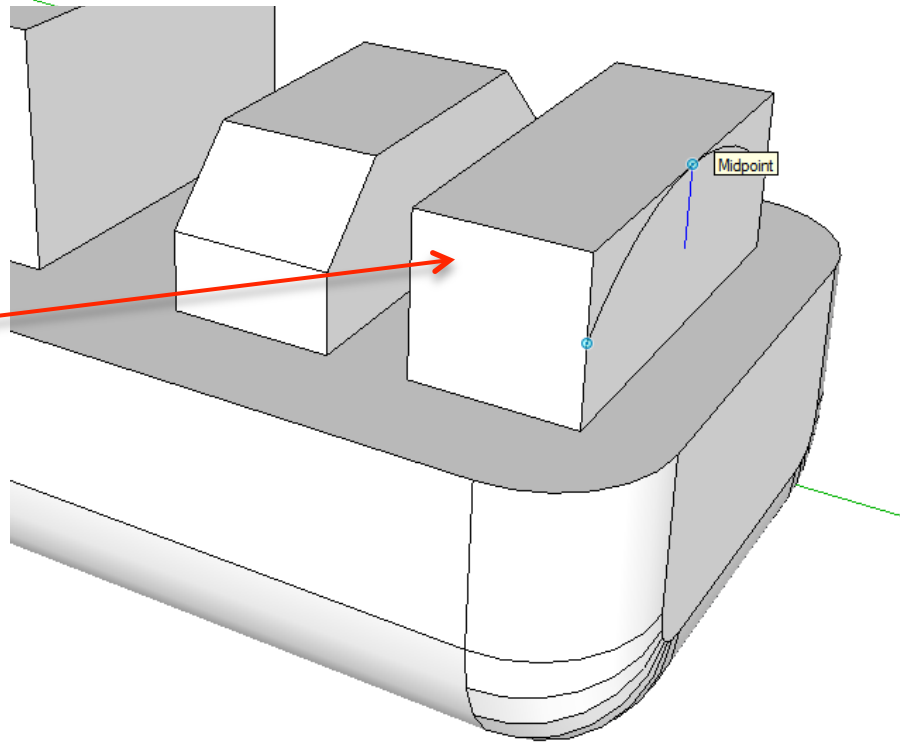
55. Use the ***pencil tool*** to shape the cabin to your own style.

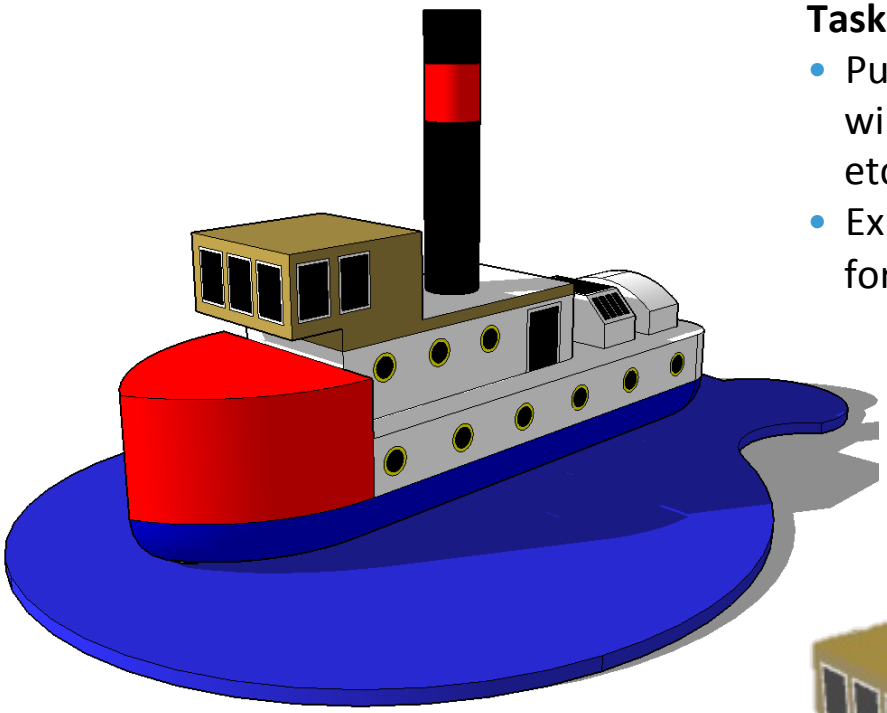




56. Use the ***push pull tool*** to pull the rear cabin up to a height of your choice.

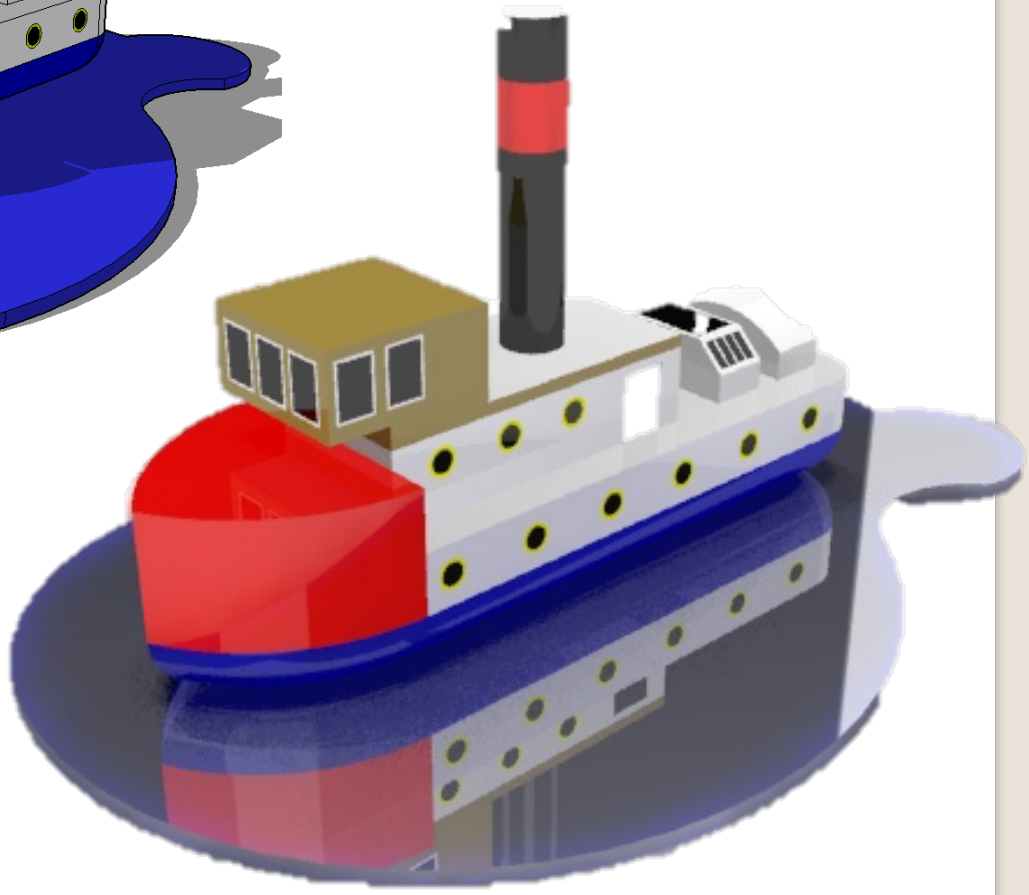
57. Use the ***pencil tool or arch tool*** to shape the rear cabin to your own style.





Tasks:

- Put other details on the ferry such as a windows, portholes and other features, etc.
- Experiment with colours and materials for rendering.



Extension

- Design a wooden toy for a child……..