Design out the box

Time 20-30 mins approx

Level of difficulty ★★☆☆☆

Lesson Objectives…

- To understand the basic tools used in SketchUp.
- To understand the advantages of using CAD
- To be able to successfully use CAD independently to complete a range of tutorials in 2D and 3D
- To develop advanced skills and problem solving skills when using Sketch Up
- To use correct dimensions when using sketch up to draw models that can be 3D printed or manufactured using CAM machines in school (i.e. Laser Cutter, 3D Router).

Lesson Outcomes…

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

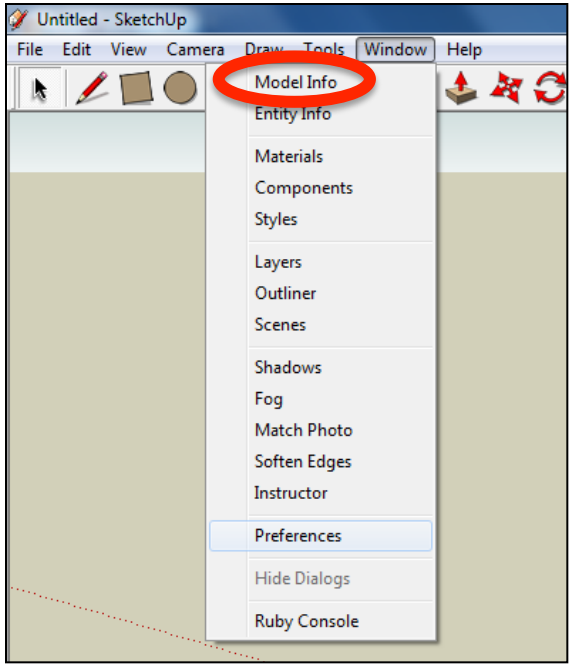
- Use the push pull and move tool
- Learn about centre lines
- Create, Move and Rotate components
- Use the offset tool to make objects and add detail
- Shape and form your design
- Draw your design to the correct size to enable it to be manufactured.

Skills to be used in this project…

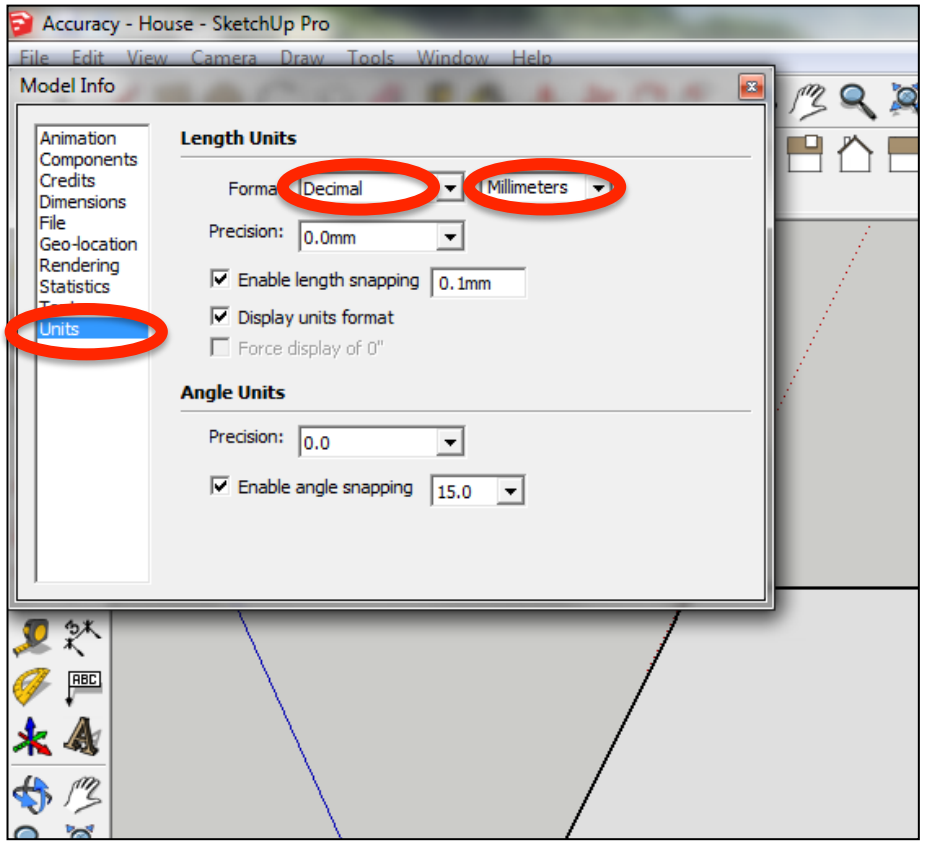
Basic Skills	New and Higher Skills
Zoom tool	Rotate tool
Orbit tool	Move tool
Pan tool	Offset tool
Line tool	Arc tool
Rectangle tool	Follow Me tool
Circle tool	Paint Bucket tool
Eraser tool	Dimensions tool
Push/Pull tool	Making Components

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

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



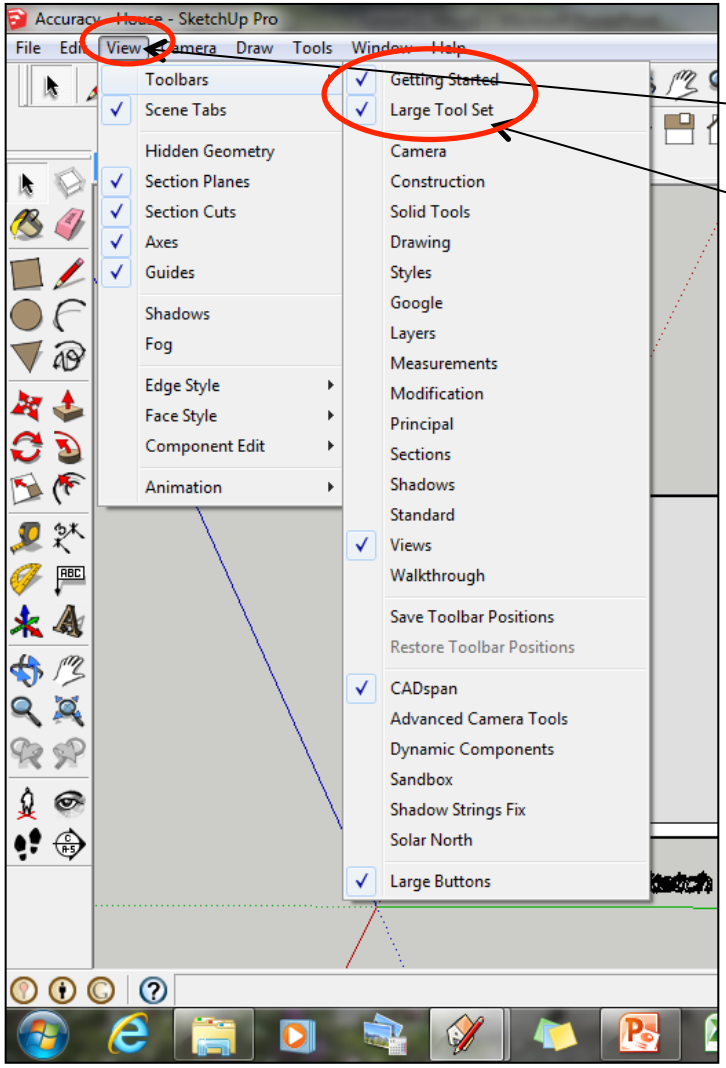
1. Open the sketch up drawing. Once you have opened SketchUp, go to **Window** and select **Model Info**



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

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

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



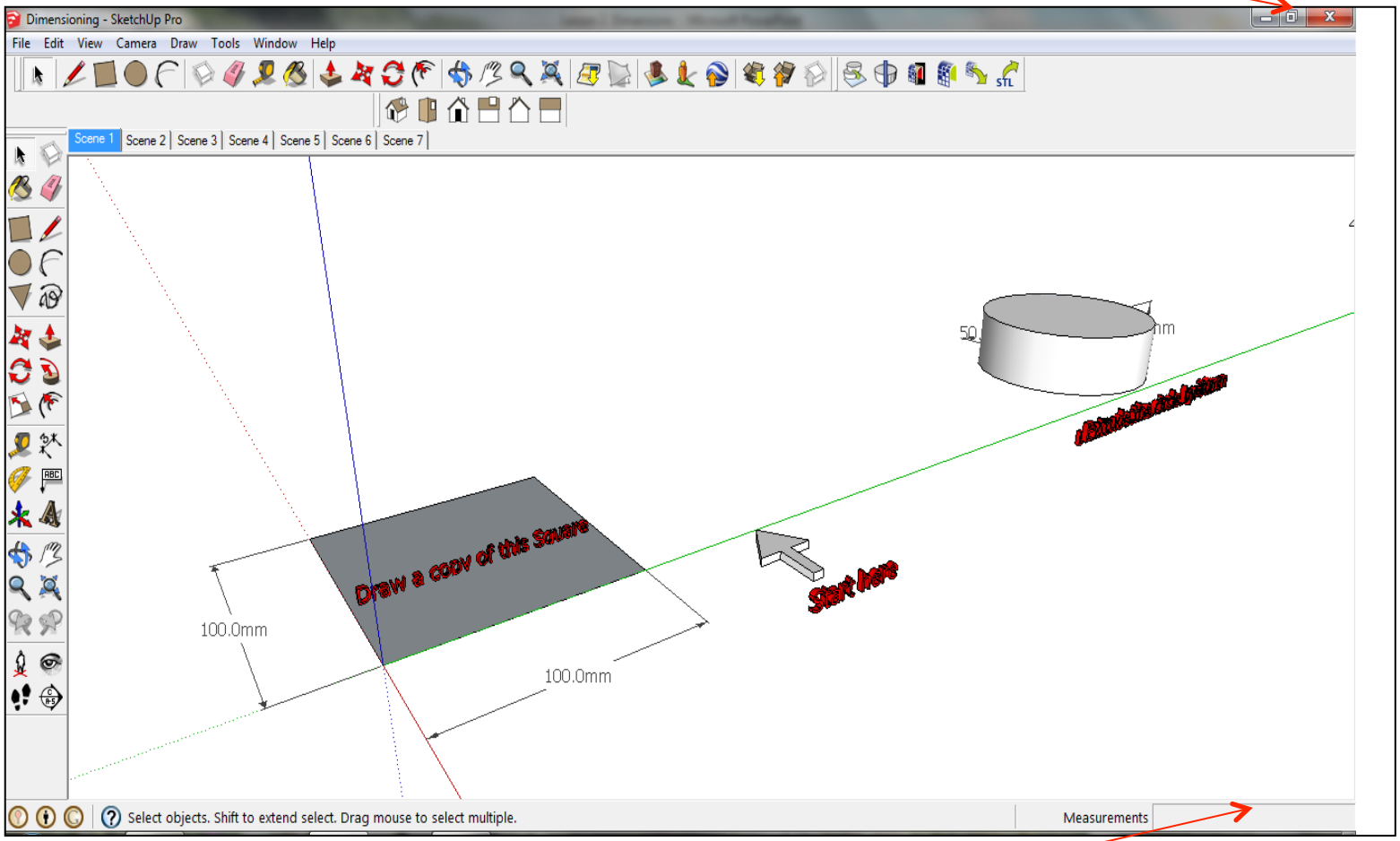
3a Select **View**

3b Tick Getting Started

3c Tick Large Tool Set

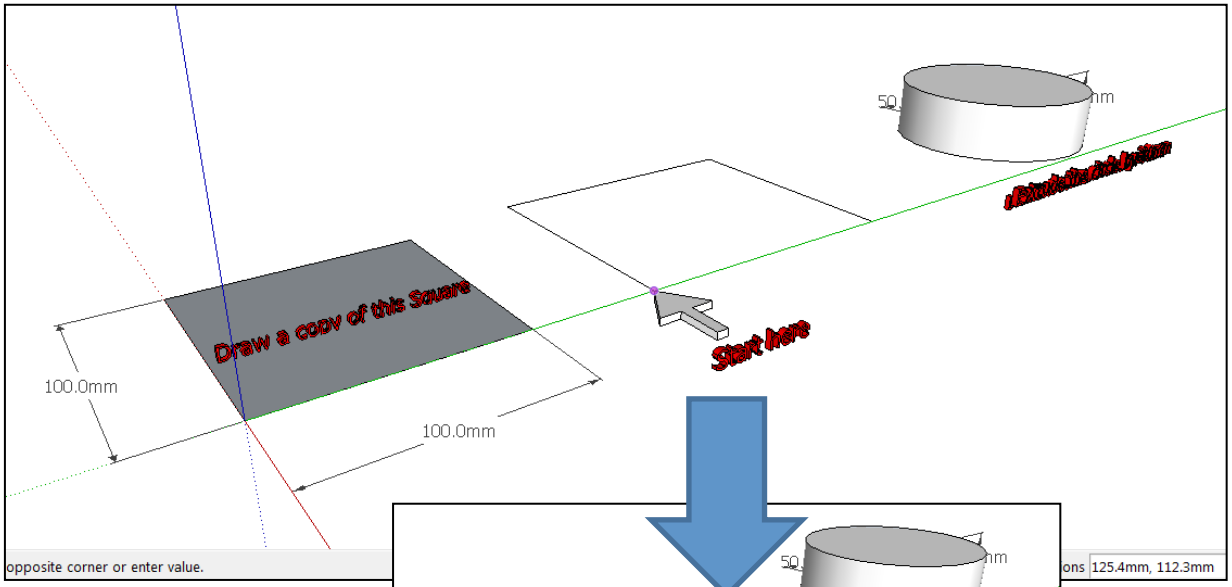
Note**: this will place a tool bar across the top **(getting started)** and the side **(Large Tool Set)

4. Ensure you can see the measurements / dimensions / tool bar in the **bottom right hand corner.** If not click on the **middle square** top right hand corner until it appears

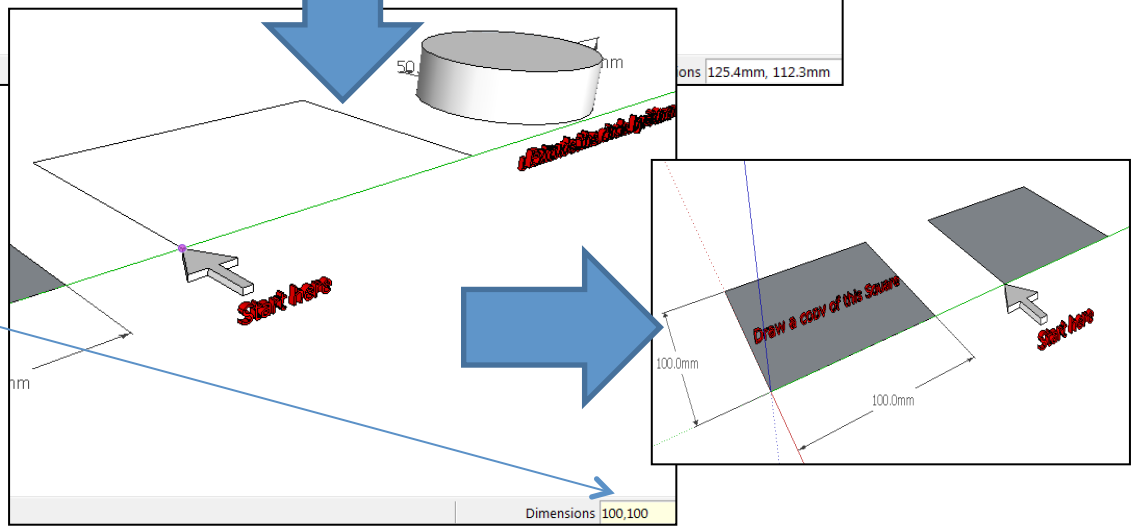


Measurements tool bar

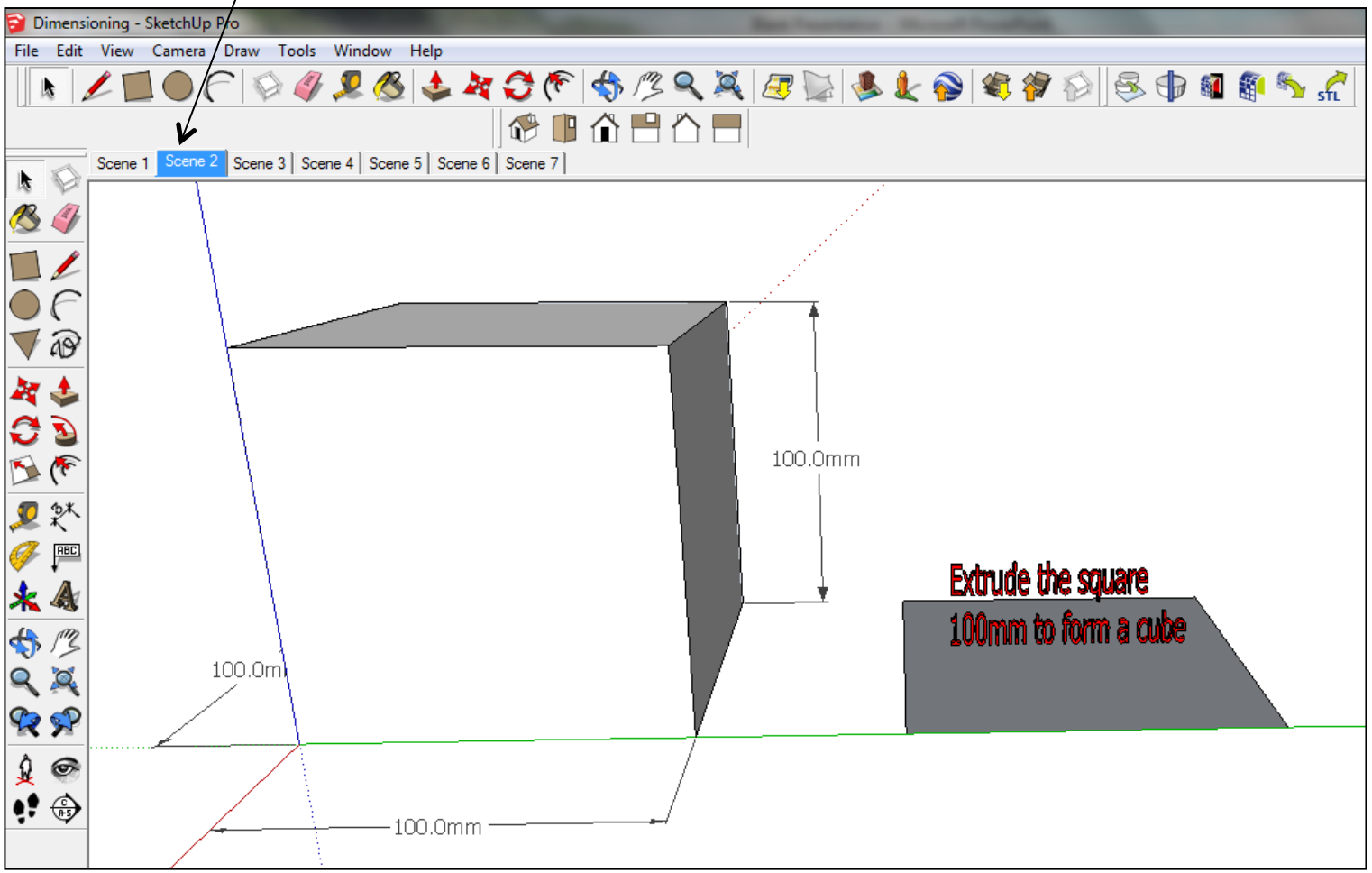
5. Using the **square** tool click on the **start here** arrow. Only click to start drawing the square and then take your hand off the mouse. **The square should not go grey.**



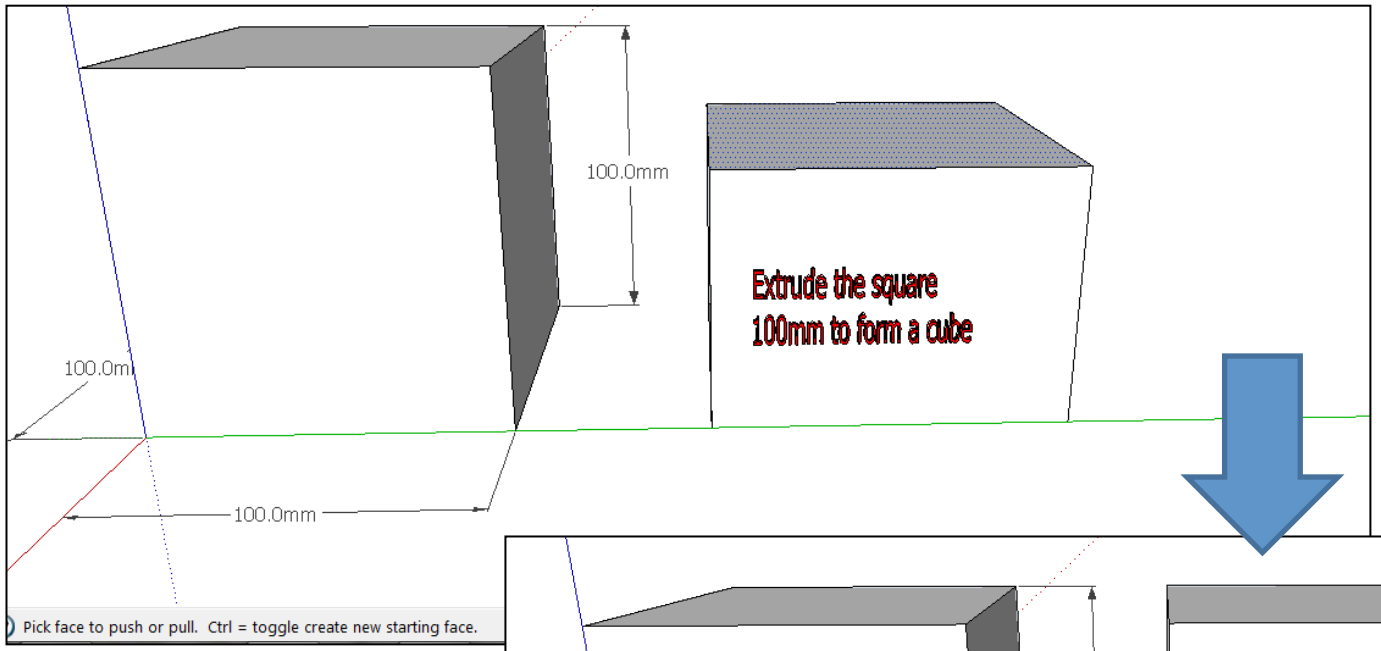
6. Start typing **100,100** and press **Enter.** You have now just drawn a square 100mm x 100mm.



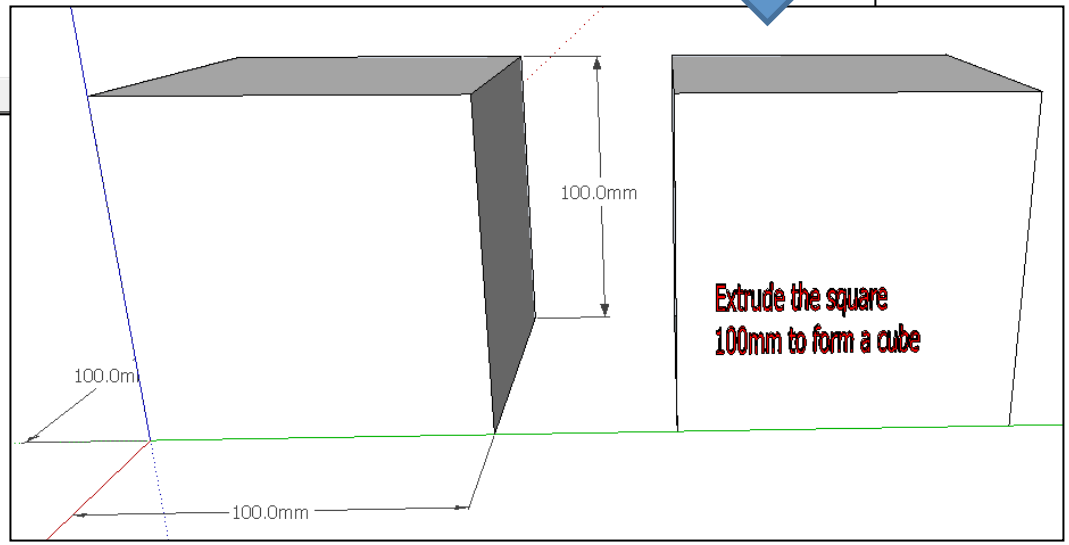
7. Click on **Scene 2**



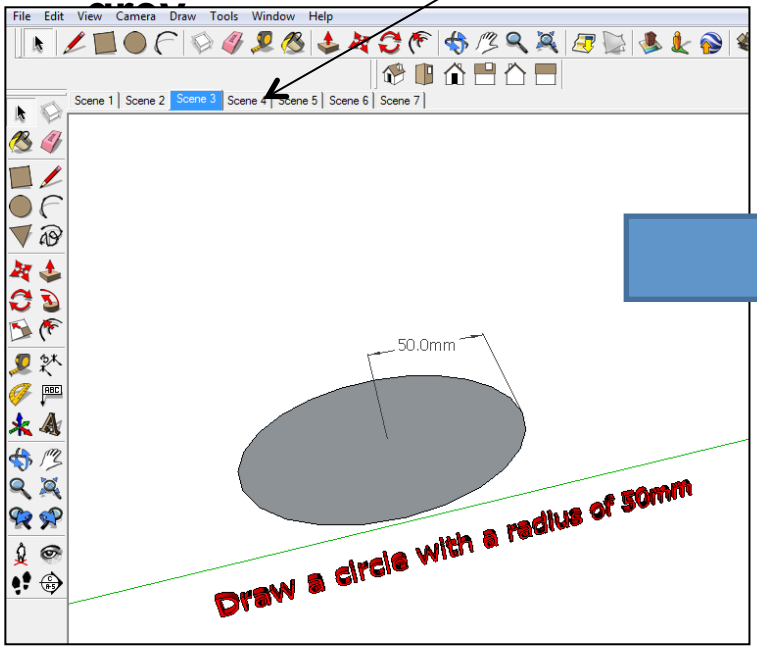
8. Using the **push pull** tool click on the square once to pull it up and then let go. The push pull icon should still be visible.

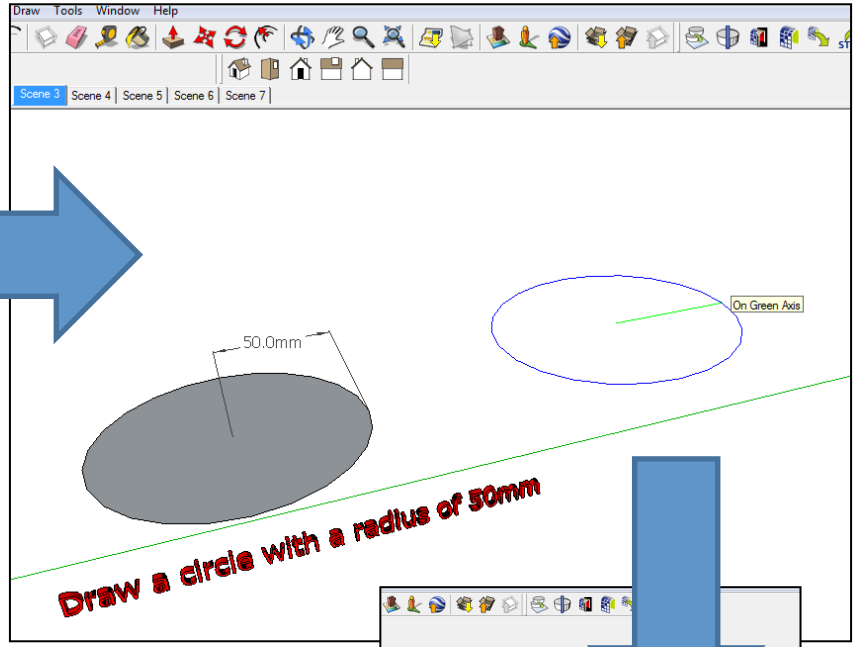


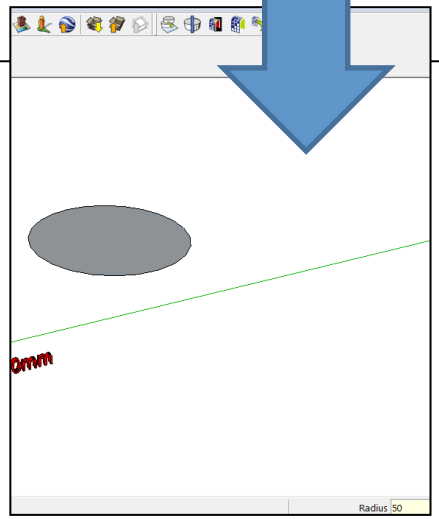
9. Start typing **100** and press **Enter.** You have now just drawn a cube 100mm high.



10. Click on **Scene 3**. Using the circle tool. Click once to start drawing a circle. Then take your hands off the mouse. The circle **should not go**

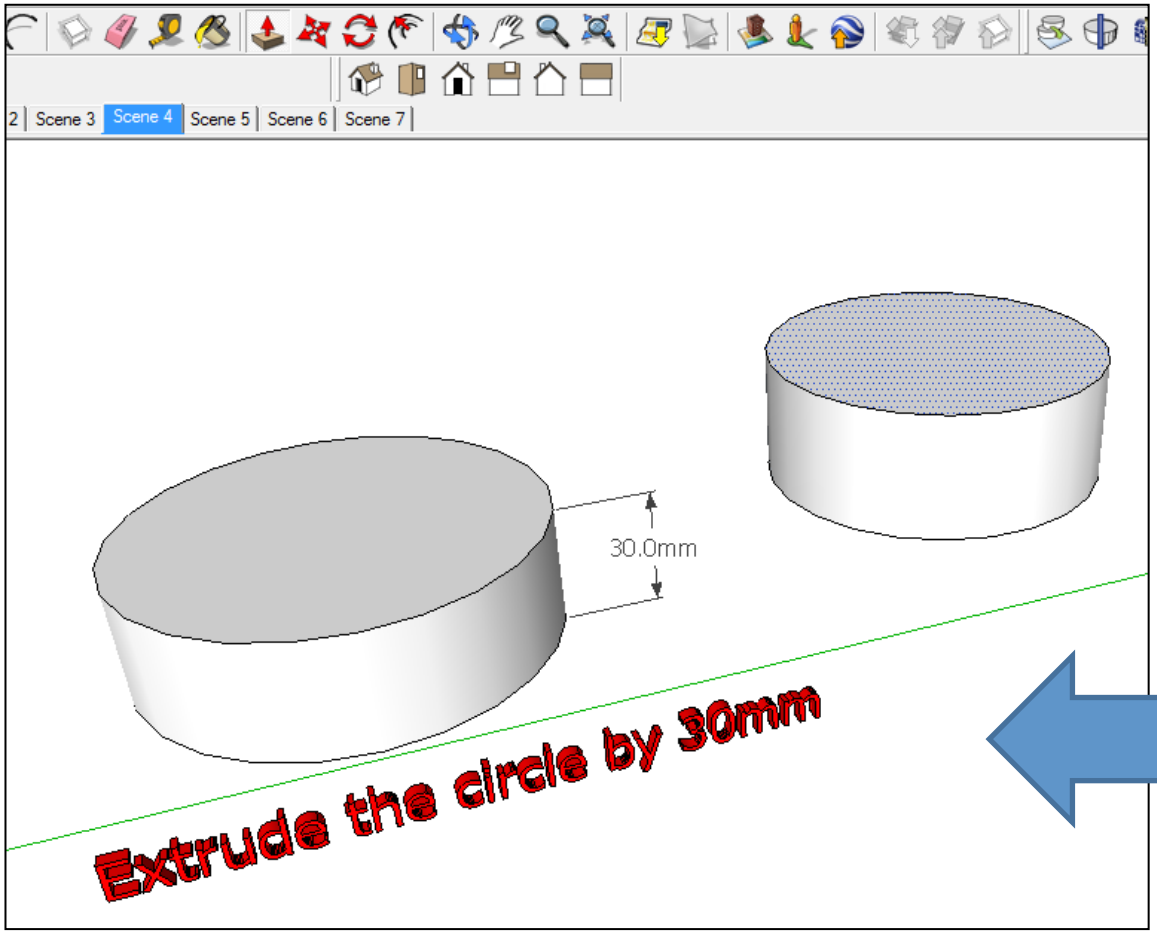






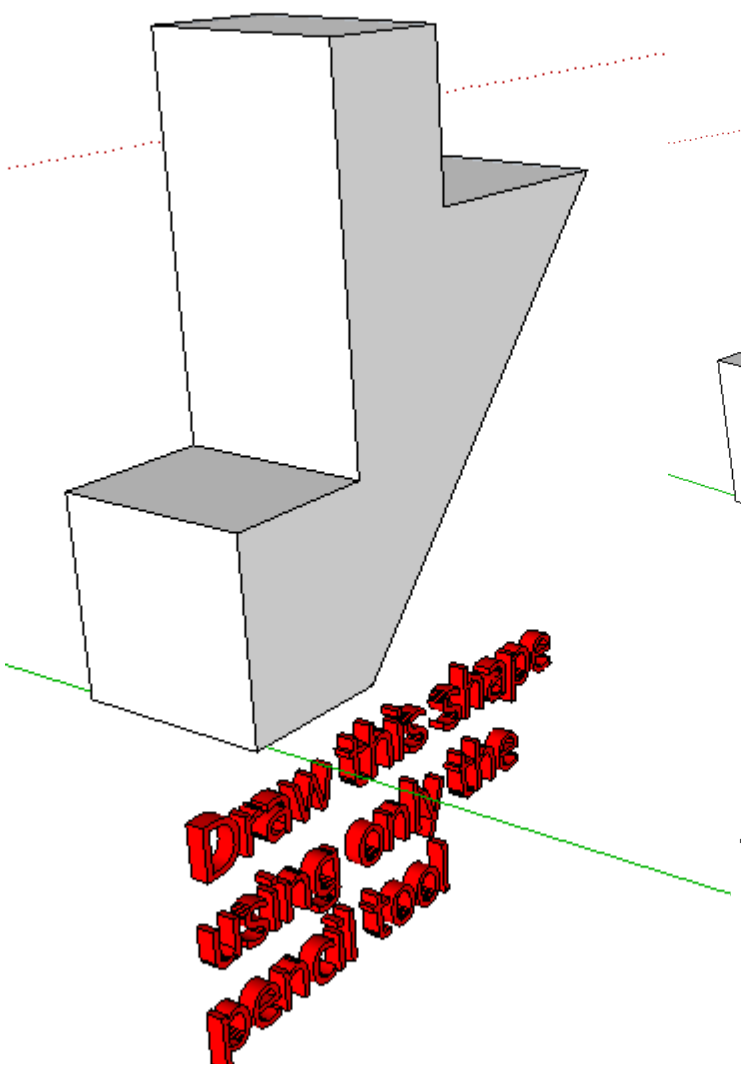
11. Start typing **50** and press **Enter.** You have now just drawn a circle with a radius of 50mm.

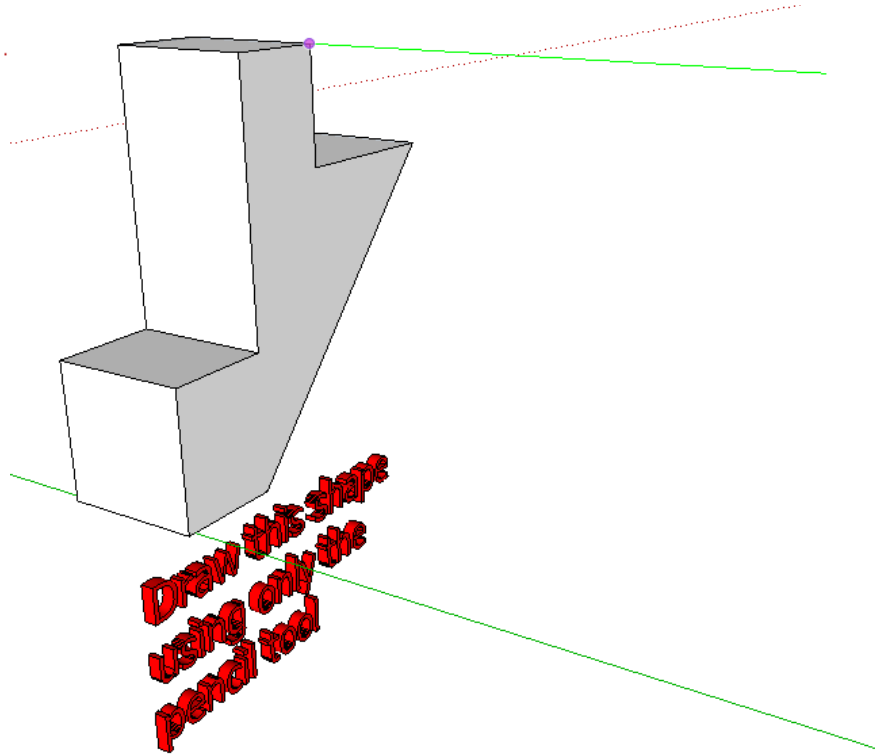
12. Click on **Scene 4**. Using the **push pull** tool click on the circle you have just drawn once to pull it up and then let go. The push pull icon should still be visible.



13. Start typing **30** and press **Enter.** You have now just drawn a cylinder 30mm high.

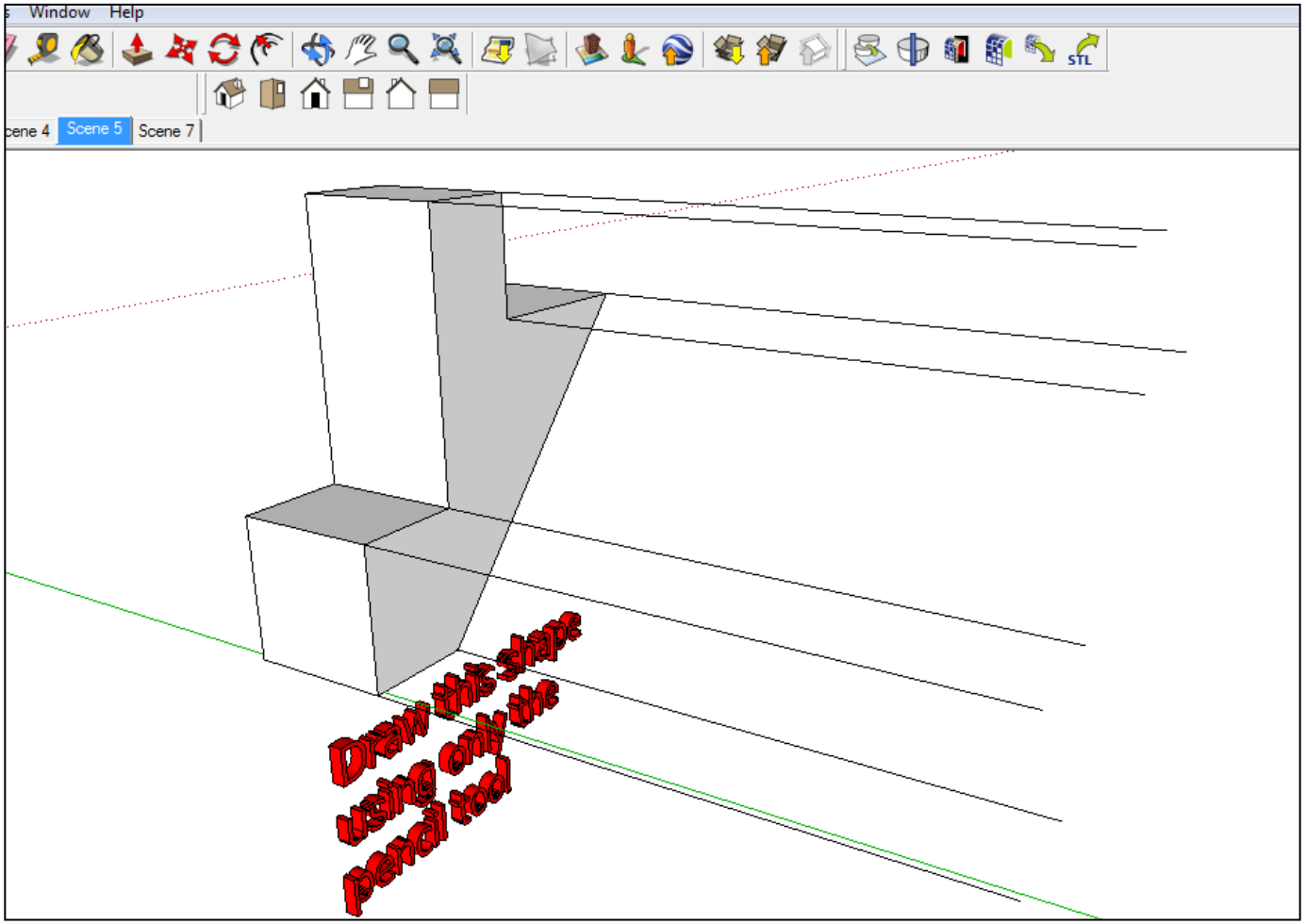
14. Click on **Scene 5**. Draw this shape using only the pencil tool.



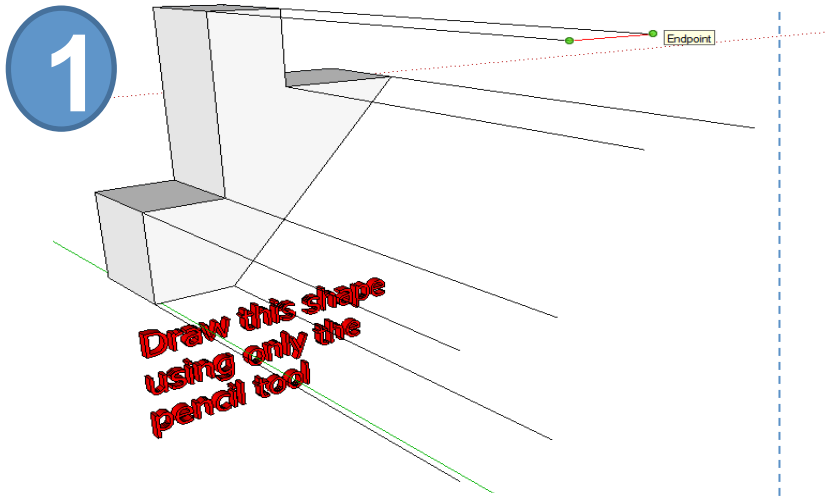


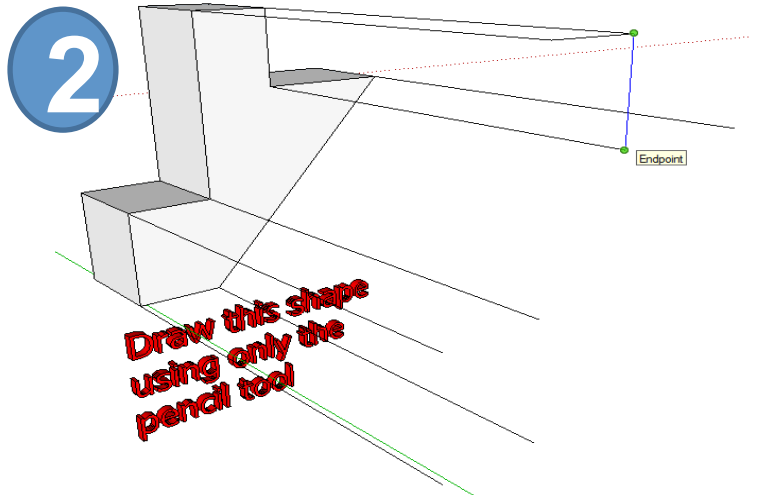
15. Using the pencil tool, starting on one of the corners of the shape draw a pencil line along the **green** axis. Click it once to start drawing and then type in **400** and press **Enter.**

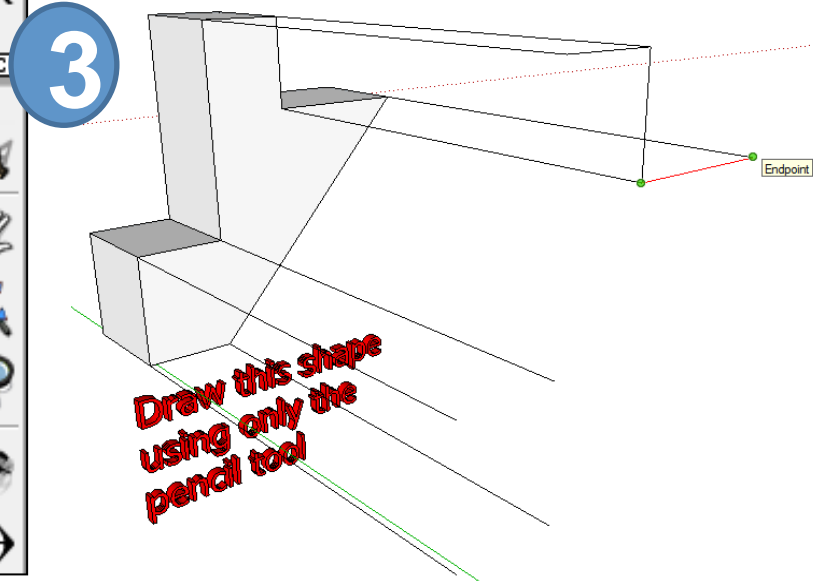
16. Repeat this process for all the corners of the shape. Starting on the corner of the shape draw a pencil line along the **green** axis. Click it once to start drawing and then type in **400** and press **Enter.**

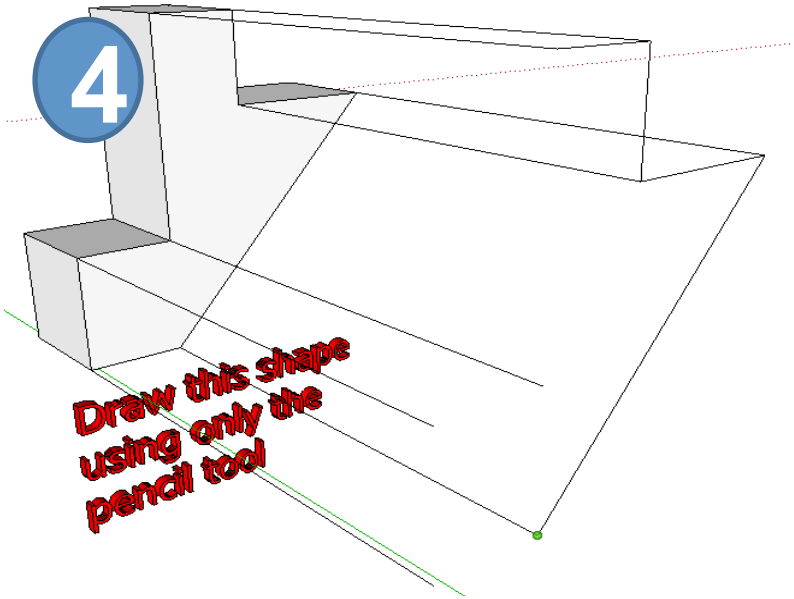


17. This now becomes a case of dot to dot. Starting of on the end of one of the lines, use the pencil tool to draw the same shape behind.

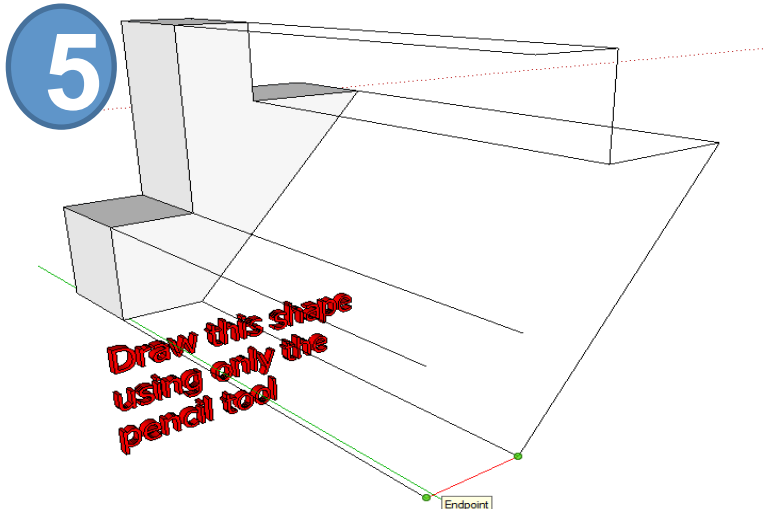


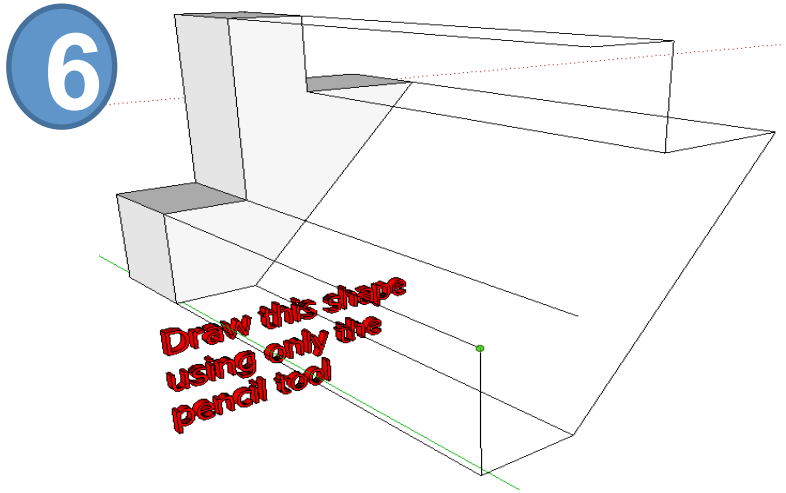


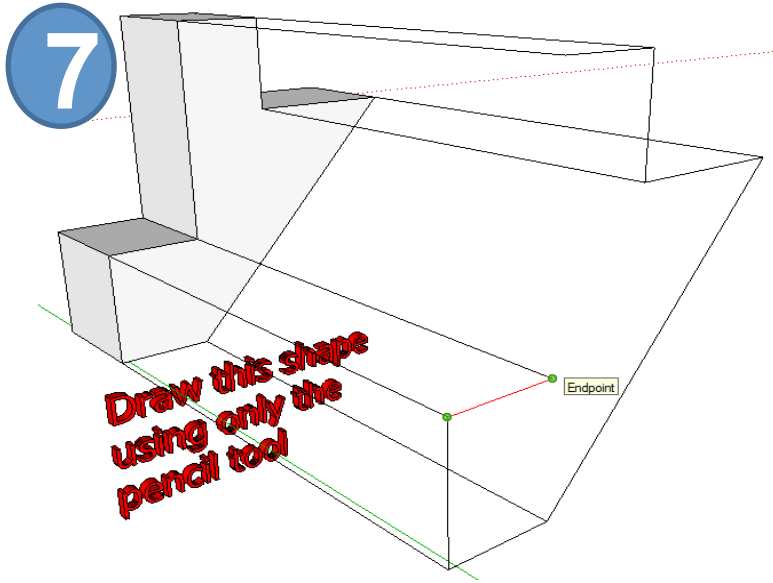


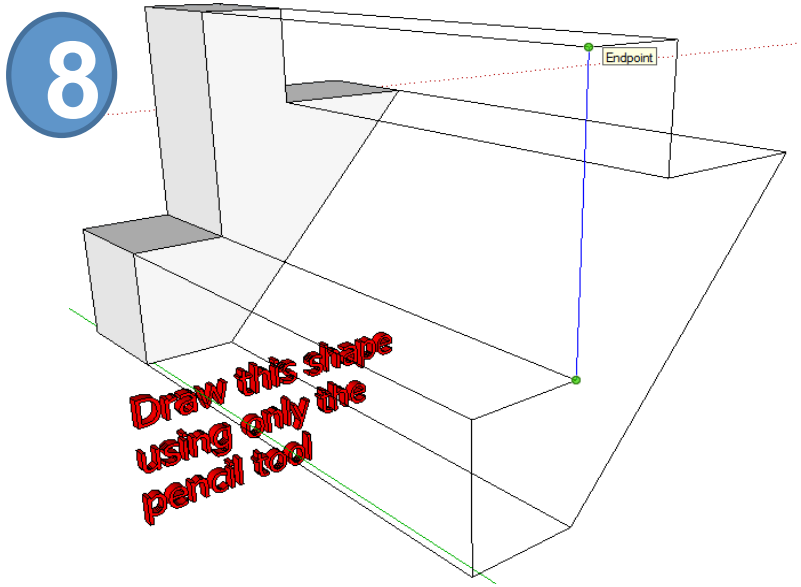


18. This now becomes a case of dot to dot. Starting of on the end of one of the lines, use the pencil tool to draw the same shape behind.

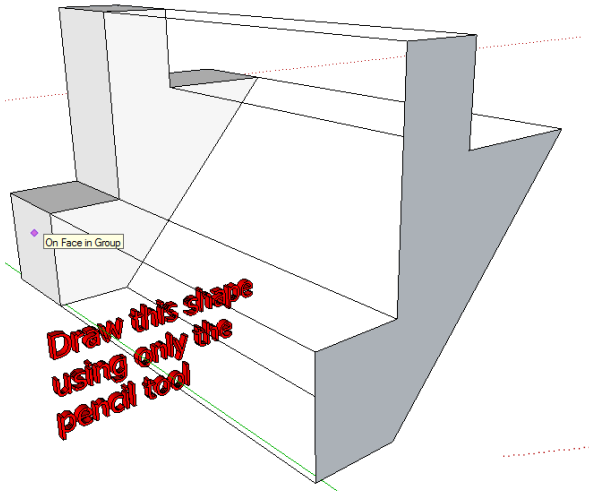




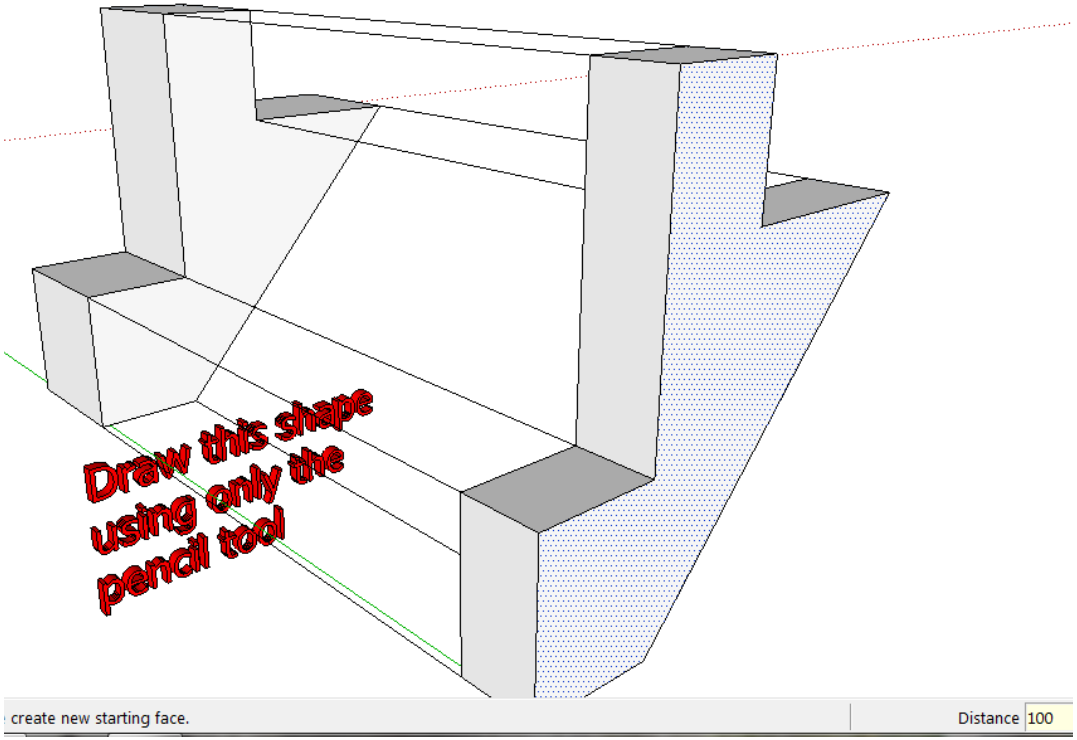




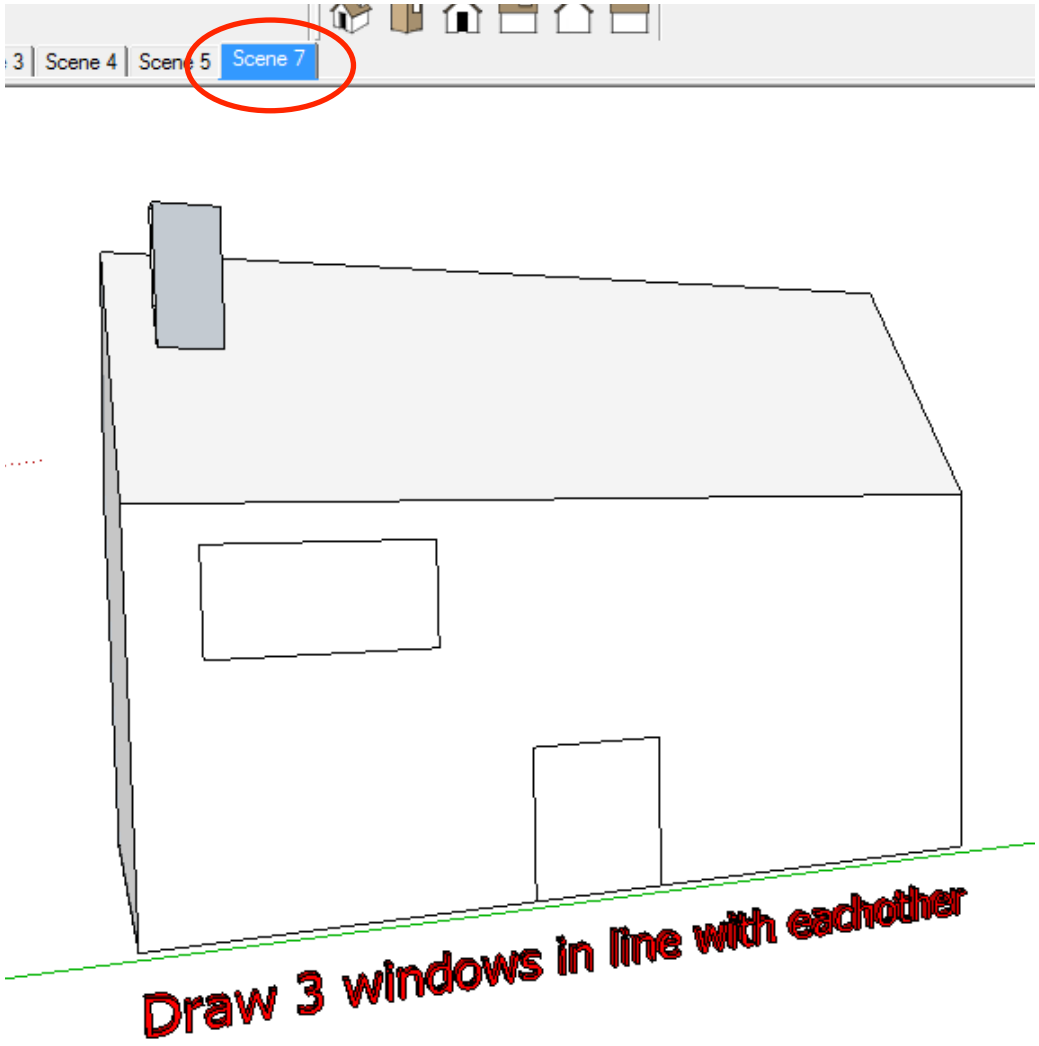
19. Once you have drawn the last line the shape should go **grey** if it has been drawn correctly.

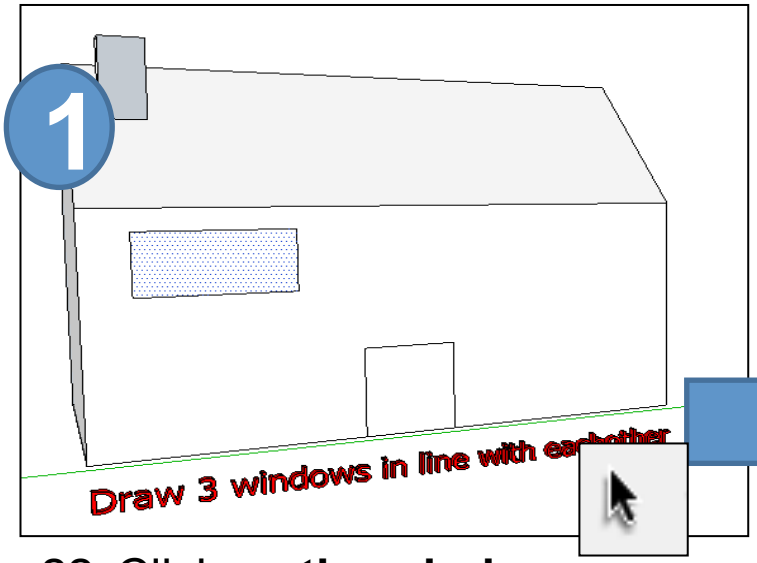


20. Using the push pull tool extrude the shape by 100m.

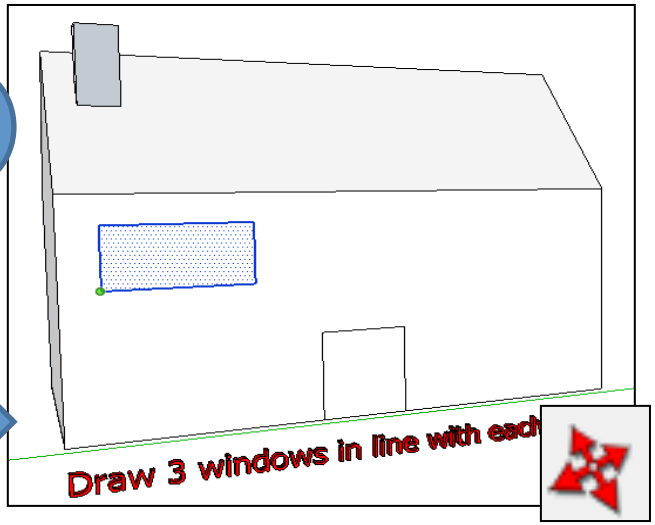


21. Click on **Scene 6**.

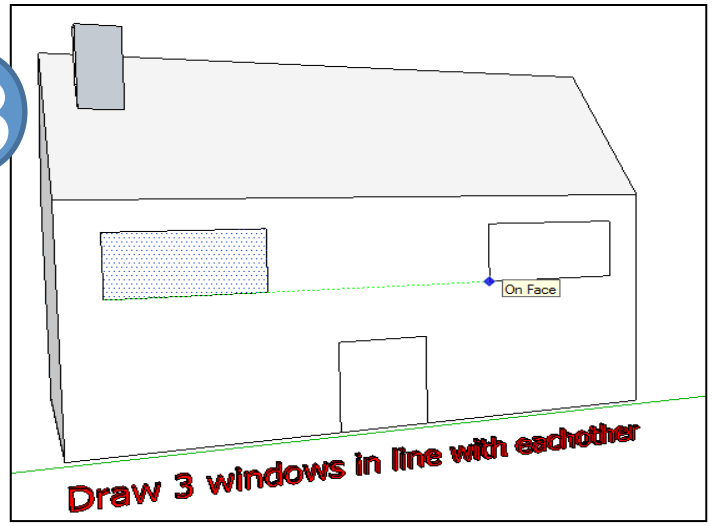




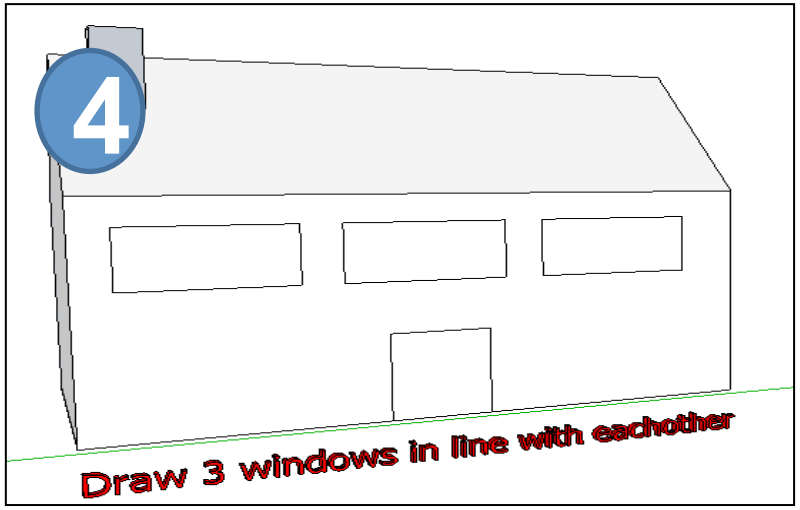
22. Click on **the window**.



23. Use the move tool click on the corner of the window.



24. Press control which in sketch up is **copy.** Move the window to the end



25. Type */* **2** and then enter and another window should appear in the middle