










SketchUp - Reference Sheet



Drawings Tools

Select Tool	Line Tool	Arc Tool	Freehand Tool	Shape Tools	Offset Tool
					
Used to select objects, surfaces, points or materials.	Draw straight lines between two points.	Draw an arc between two points.	Draw a continuous line in any direction or curve.	Draw the shown pre-determined shapes.	Offset a curve by selecting a 2D curve and dragging offset distance.



Drawing Manipulation Tools

Move Tool	Rotate Tool	Scale Tool
		
Move surfaces, lines or objects in any direction.	Rotate surfaces, lines or objects in any direction.	Scale or stretch objects by adjusting pull tabs.

3D Development Tools

Push/Pull Tool	Follow Me Tool
	
By selecting an enclosed surface the shape can be extruded.	Select an enclosed surface to be extruded along a pre-drawn path.

Rendering Tools

Fill Tool	Shadows Tool	Export Rendered Image (JPEG)
		File > Export > 2D Object
Used to select objects, points or materials	Apply lighting and shading to current drawing. Shadows can be adjusted by sliding the date (red bar) and/or time (blue bar).	Save the current view as an image (JPEG, TIFF, GIF).

Short Cuts

View Rotate	Click Middle Mouse Button
View Zoom	Scroll wheel up/down
End Command	ESC
Undo	CRTL + Z
Redo	CTRL + Y

Important Links

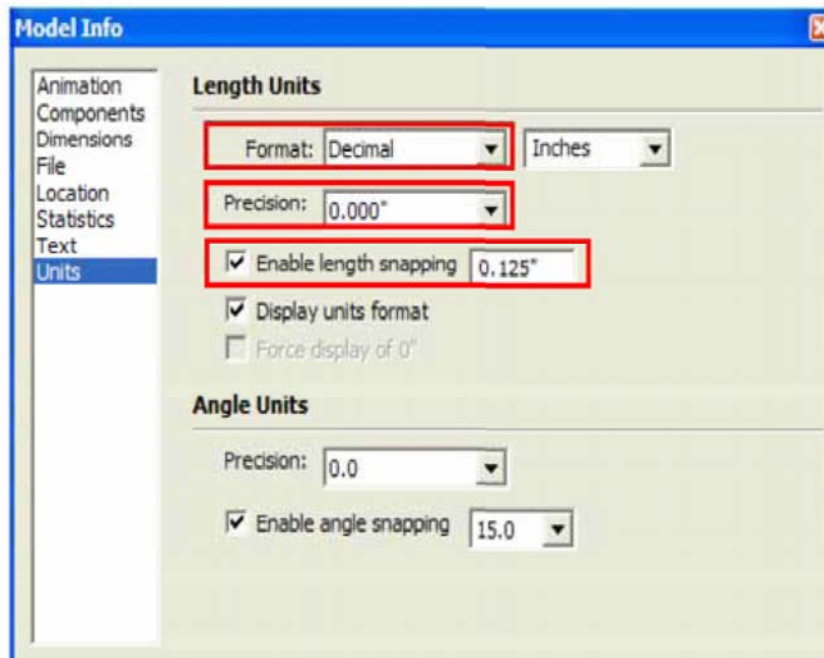
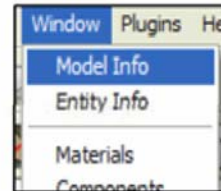
SketchUp Download	http://sketchup.google.com/download.html
SketchUp Models	http://sketchup.google.com/3dwarehouse/
SketchUp Tutorials	http://www.sketchup.com/?section=training

SketchUp - Drawing Setup

Google SketchUp is setup by default to use Architectural Units of measurement. For Invention modeling, we may need to use smaller units of measurement.

How to Setup for Product Drawing













- 1) To set the drawing units to the correct measurements select **WINDOW > MODEL INFO**.
- 2) From the Model Info window, select **UNITS** from the left hand list
- 3) Change **FORMAT** from **ARCHITECTURAL** to **DECIMAL**.
- 4) Change **PRECISION** from **0.0"** to **0.000"**.
- 5) Change **ENABLE LENGTH SNAPPING** from **0.1"** to **0.125"**.

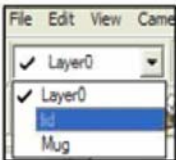


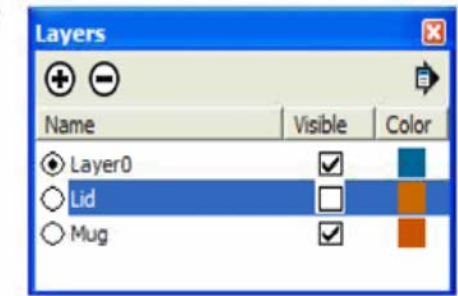
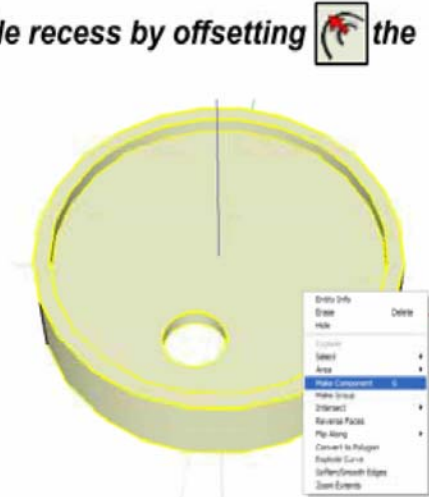
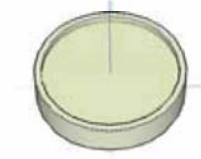
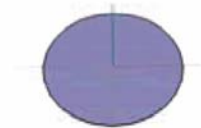
- 6) Hit **ENTER** to accept the changes.

SketchUp - Travel Mug Tutorial

How to Create the Lid












- 1) Start by drawing a circle  with a 1.5" radius
- 2) Extrude  the circle by selecting the circle surface and "pulling" up 0.5".
- 3) Create the lid lip by offsetting  the top surface 0.125"
- 4) Push  the inner surface down 0.125" to finish the lip.
- 5) Rotate view using center mouse button to create the underside recess by offsetting  the circle surface 0.125" and pushing  the surface up 0.25".
- 6) Add a hole to the top of the lid by drawing a circle  on the lid surface.
- 7) Now push  the hole down till it meets the lower surface. (the surface will become blue and tan if at the correct depth and when you left click, the surface will disappear)
- 8) Using the select tool  drag a window over the entire lid to highlight all the surfaces. Right Click and select **MAKE COMPONENT** and enter "Lid" as the name.
- 9) Now move  the lid up 5" so it will rest on the top of MUG when we are finished.
- 10) Next, put the LID on it's own layer. Select **WINDOW > LAYERS** To ADD a layer select the  and name the new layer "LID". Add another layer and call this one "MUG". Turn the LID LAYER visibility off by **UNCHECKING VISIBLE**.
- 11) Now move the LID to the LID LAYER by selecting  the LID. Then in the top left corner from the layer drop down select the LID LAYER.

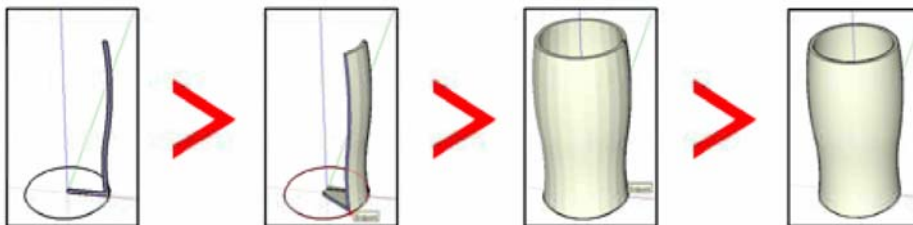

- 12) Our Lid for the travel mug is complete.



SketchUp - Travel Mug Tutorial

How to Create the Mug

- 1) Start by drawing a line  vertically 5" long, then a horizontal line at the top, along the red axis, 1.375" long which appears when you click.
- 2) Draw another line  at the bottom of the vertical segment 1.375" long along the red axis. (Image B)
- 3) To draw the profile of the Mug use the arc tool  by starting the arc from the top end point and ending the arc 2/3rds the way down click your mouse once and then adjust arc; click to create. (Image C)
- 4) Add another arc  from the end point of the previous arc to the end point of the base line. (Image D).
- 5) To finish the profile of the Mug, offset  inward the surface by 0.125".
- 6) Close the profile by drawing a small line  by extending the right vertical curve to the top. Draw  another small line from the base to the left side. (Image E)
- 7) Now DELETE the un-necessary curves by using the select tool  Select the top left corner segments. (Image F) Press Delete.
- 8) Draw a circle  starting at the bottom center and extend to the right end point of the base. Use the select  tool to highlight the inner surface and hit DELETE. (Image G)
- 9) Select TOOLS > FOLLOW ME  and select the profile surface (once highlighted) and drag the profile around the circle till the profile has completely revolved 360 degrees; click to accept.



- 10) Your Mug is now complete.