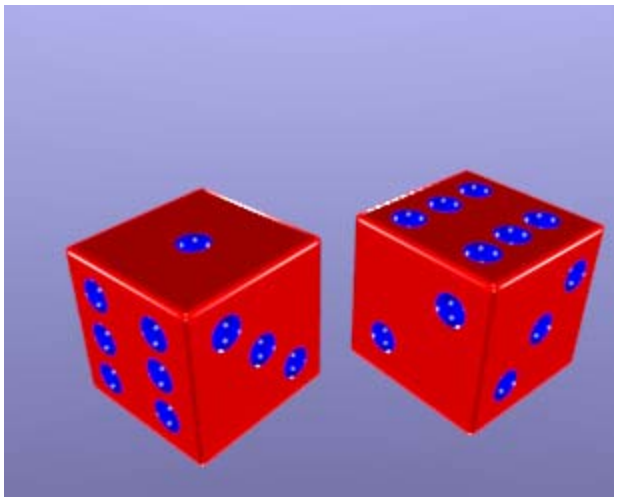
Course: 3D Design
Title: Mesh Modeling – Dice - Boolean
Dropbox File: Dice.zip
Blender: Version 2.45
Level: Beginning
Author: Neal Hirsig (nhirsig@tufts.edu)

Mesh Modeling – Dice – Boolean

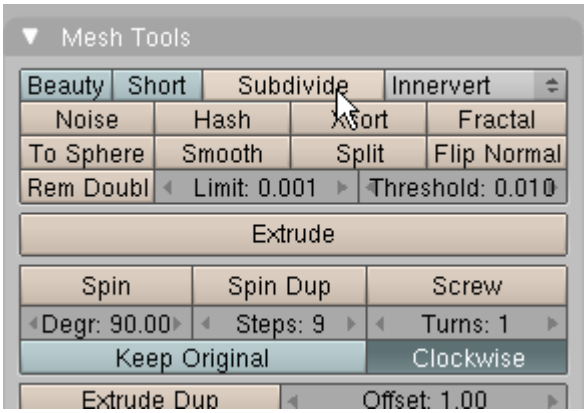


In this tutorial, we'll create a pair of dice in Blender using a Boolean Operation.

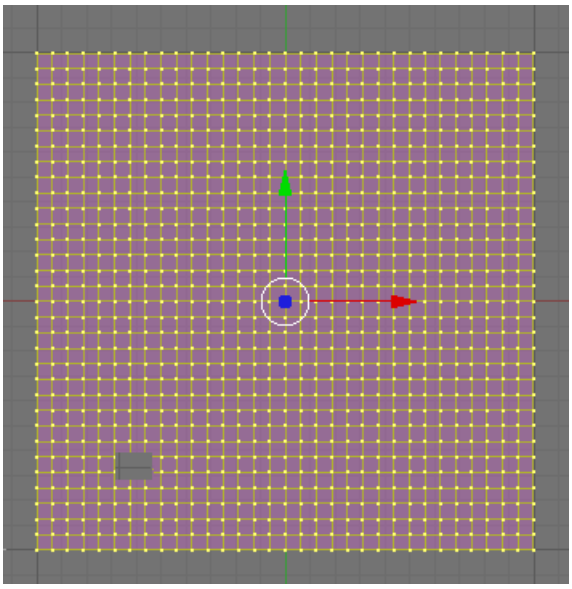
Open MyBlender.blend (or the default if you are using MyBlender as the default Blender file).

We will use the Default Cube Object for this tutorial. If you do not have a default cube, click your 3D cursor in the center of the display and press space / add / mesh / cube.

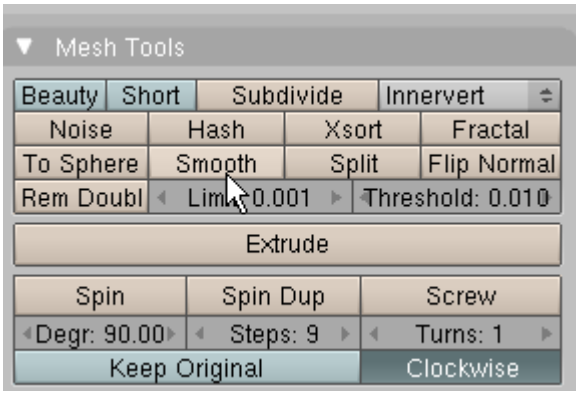
We want the die to have rounded edges. We will do this by first by increasing the resolution of the cube and then smoothing off the edges. With the cube selected press the TAB key to enter Edit Mode (If you have just added a new cube object it will already be in edit mode) . Make sure all of the Vertices are selected (AKEY twice if needed). Press F9 (Editing) if not already selected. In the Mesh Tools Panel press the Subdivide button 5 times.



This creates many vertices on each side of the cube.

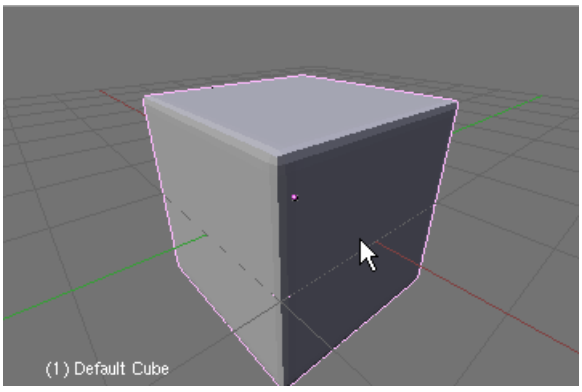


Next, in the Mesh Tools Panel, select the Smooth button four times.



This will round off the edges of the cube.

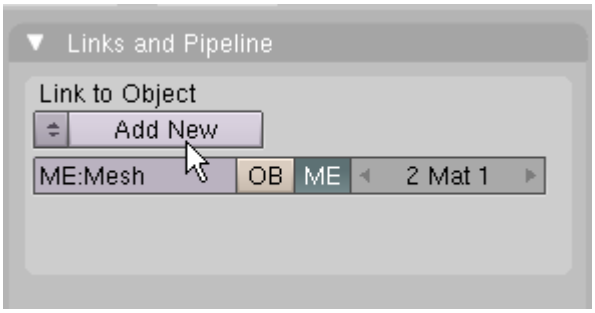
TAB out of Edit Mode and zoom in a bit on the Perspective view to see the beveled edges of the cube.



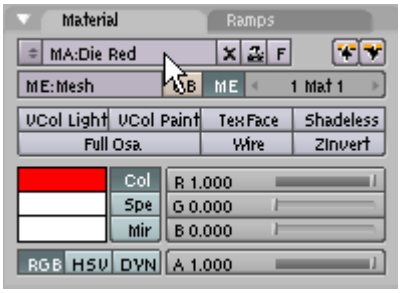
In this tutorial we will be using a Boolean operation which will subtract areas of the cube to form the indentations (dots) on a die. We want the die to be red and the dots to be blue. In Blender when using the “Menu” Boolean operation, when an object of one material is subtracted from an object of a different material the faces remaining of the subtracted object will retain their original material.

This means that we must first add a Red colored material to the cube and add a Blue colored material to the object we subtract from the cube.

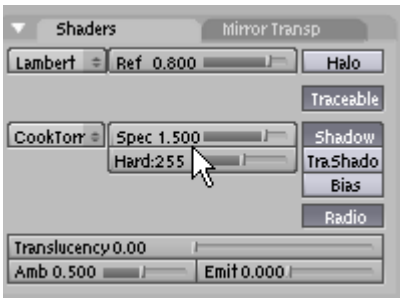
With the cube selected press F5 (Shading). In the Links and Pipeline press Add New.



This displays the Materials Buttons. In the Material Panel, adjust the Red slider to 1 and the Green and Blue sliders to 0. This creates a red color. Name the material Die Red.

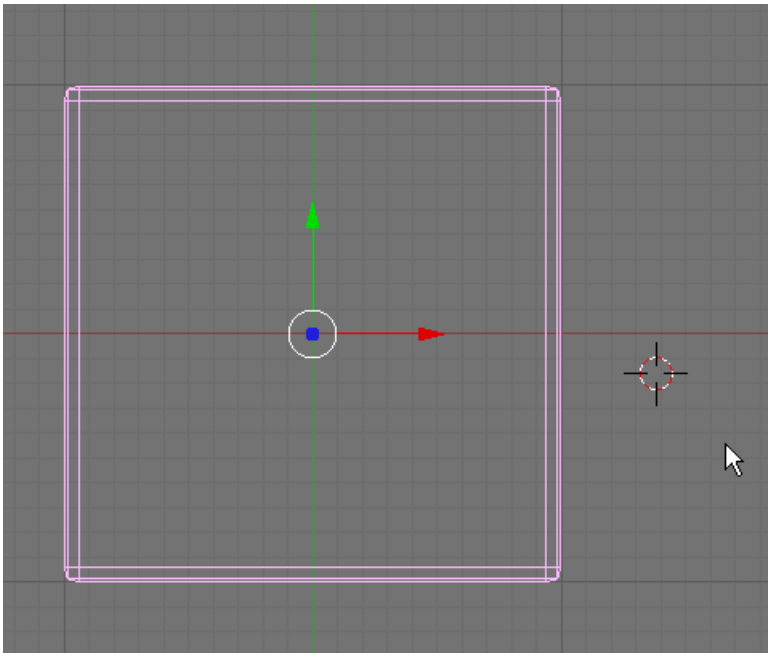


Press on the Shaders tab and set the Specularity to 1.5 and the hardness to 255 (This will give the material a more plastic look)

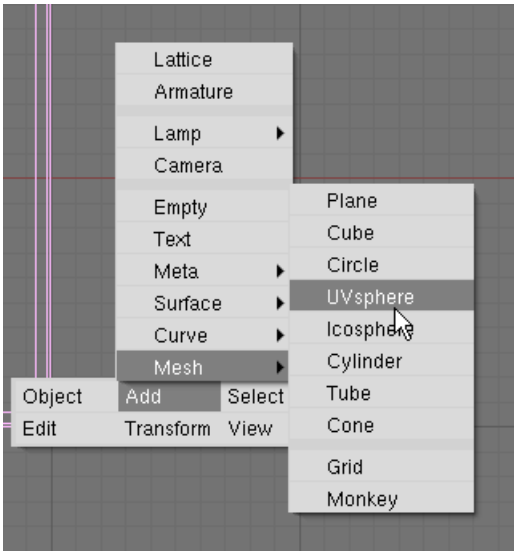


Notice that the material is already assigned to the die. This happened when we selected the “Add New” above.

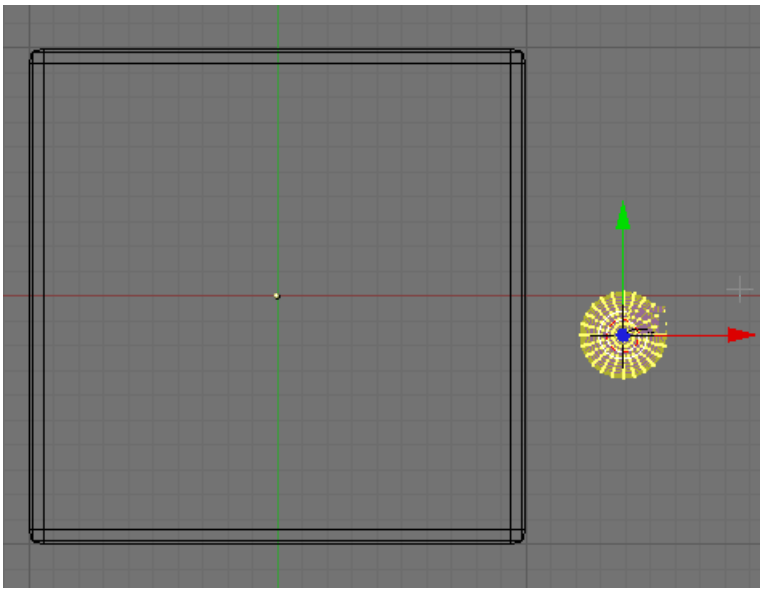
Make sure you are in object mode. Make sure you are in wireframe mode (ZKEY if needed). Your top view should look like below.



Place the 3d cursor outside of the cube and press Space / Add / Mesh / UV Sphere. Use 24 segments and 24 rings.

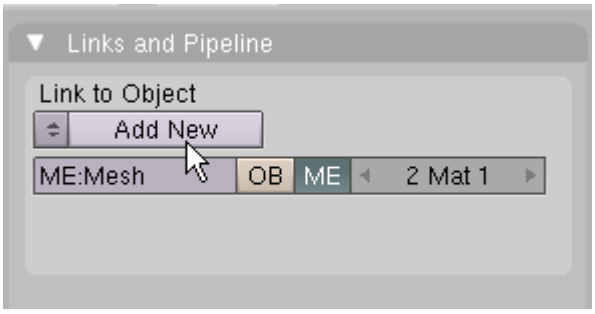


Press the SKEY (Scale) and scale down the sphere as shown below.

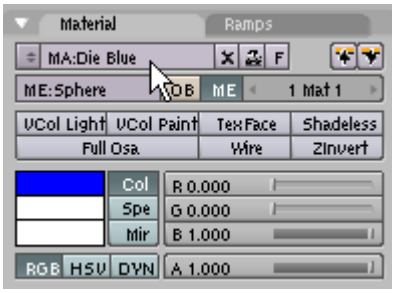


Tab to Object Mode.

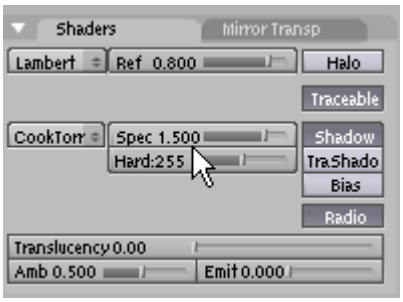
This sphere object will be duplicated and used as the object that will be subtracted from the cube to form the die's dots. Before we continue we need to add the material to this object. With the sphere selected press F5 (Shading) if not already selected. In the Links and Pipelines Panel press Add New.



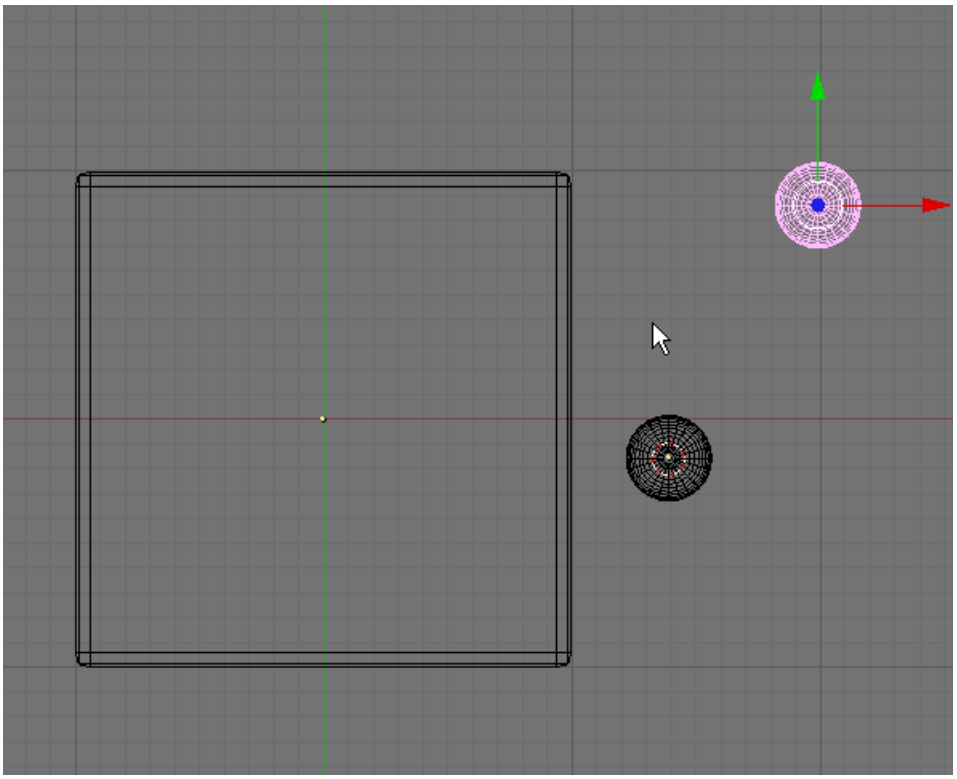
This displays the Materials Buttons. In the Material Panel, adjust the Red and Green slider to 0 and the Blue slider to 1. This creates a Blue color. Name the material Die Blue.



Press on the Shaders tab and set the Specularity to 1.5 and the hardness to 255 (This will give the material a more plastic look)



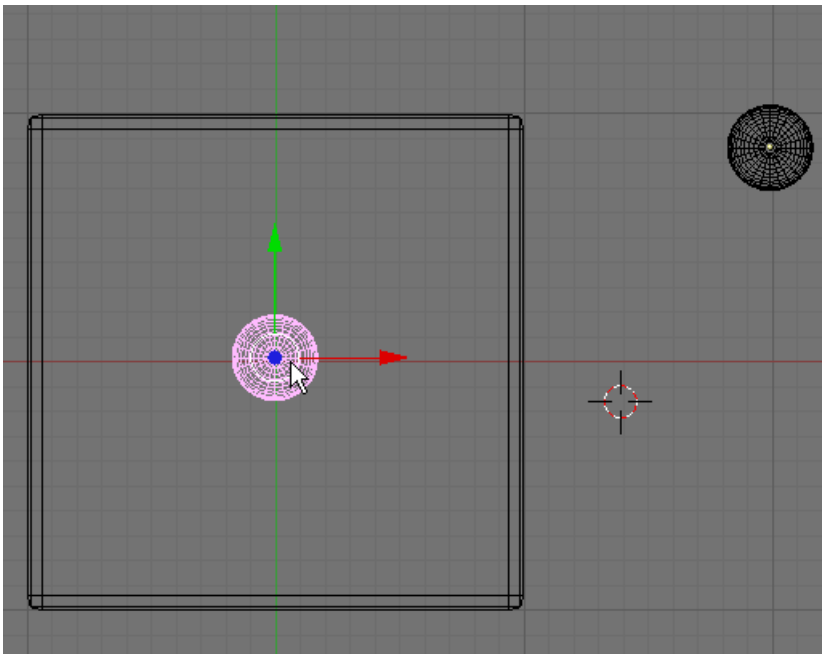
We will need a lot of these spheres to work with. So before we start, select the sphere and press **SHIFT-D (Duplicate)** and create a copy of it moving it to the side as shown.



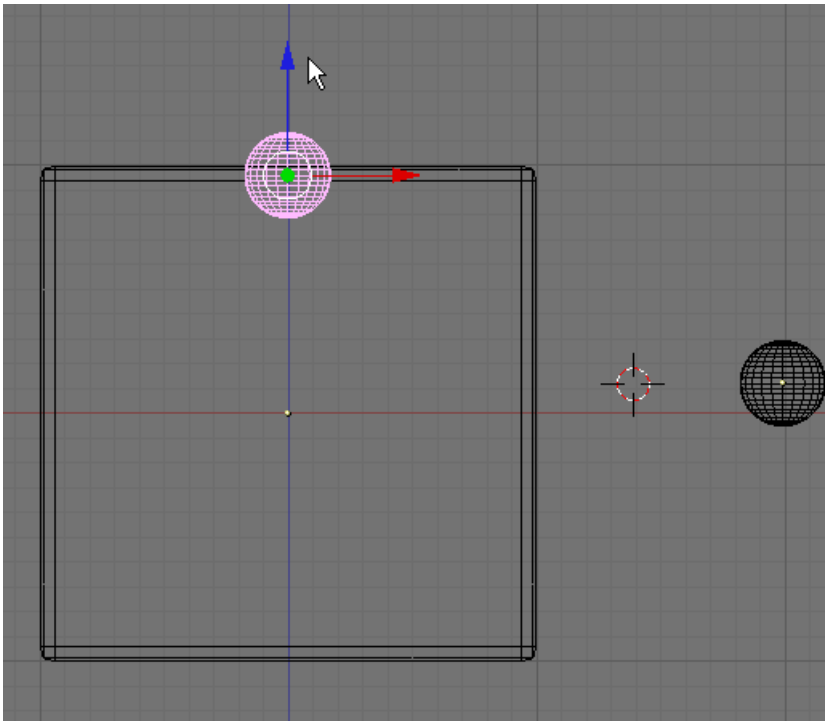
Note that this sphere also carries the Die Blue material.

We will need it later when we start working on the other sides of the cube. Because we are in object mode when creating or duplicating a sphere, they are separate independent objects.

We will now need to place the first sphere on the **top face** of the cube so that half of the sphere is in the cube and half is out of the cube. Press the GKEY (Grab) and move the sphere to the center of the cube as shown.



Switch to **front view** and use the Blue Transform Widget arrow to place the sphere so that half of the sphere is in the cube and half is out as shown.



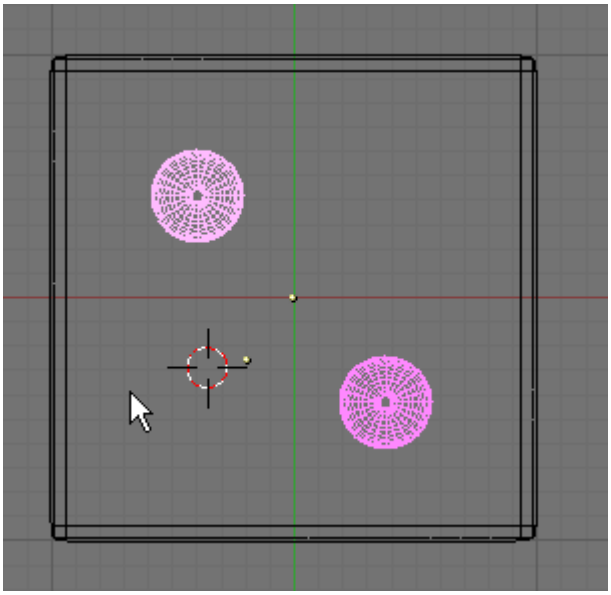
This is the side of the die that will have one dot.

Select the sphere then press the MKEY (Layer Menu). Select layer 2 and press OK

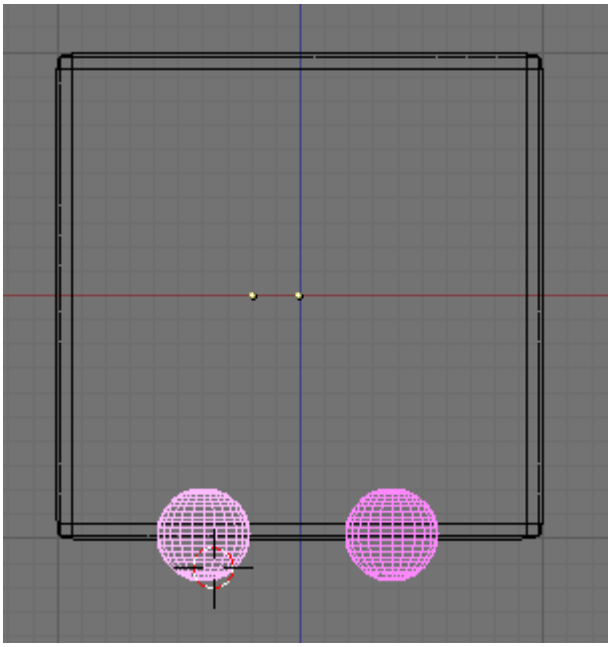
Since layer 2 is not visible the sphere will disappear. We can always get it back by activating layer 2. For now leave it un-activated.

Go to **Bottom View** (CTRL-NUM7). Make two more copies (in object mode) of the sphere from our extra and place them half in and half out of the bottom of the cube. Make sure you use all of the views to place the 2 spheres properly.

Bottom View:



Front View:

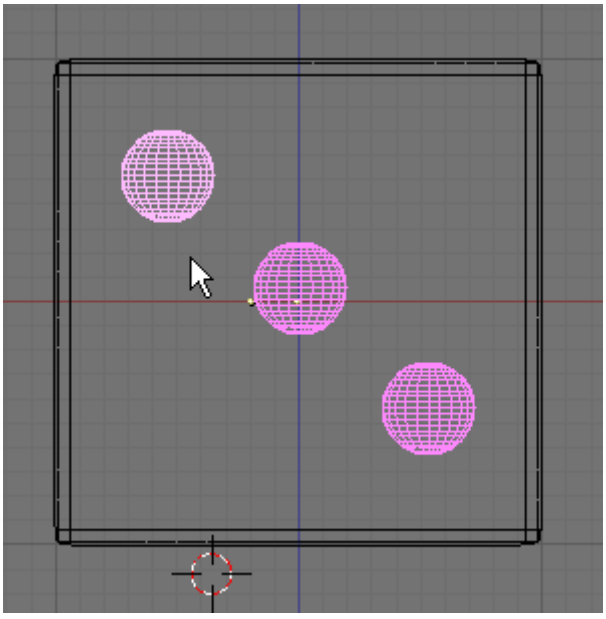


This is the side of the die that will have 2 dots.

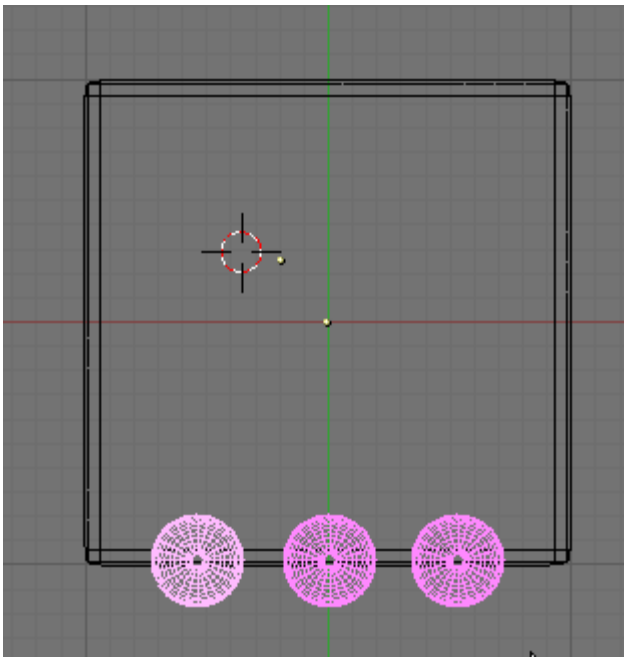
Select both spheres then press the MKEY (Layer Menu). Place the spheres on layer 2 and press OK. They should disappear as layer 1 is the only active layer.

Go to **Front View** (NUM1). Make three more copies (in object mode) of the sphere from our extra and place them half in and half out of the front of the cube. Make sure you use all of the views to place the 3 spheres properly.

Front View:



Top View:



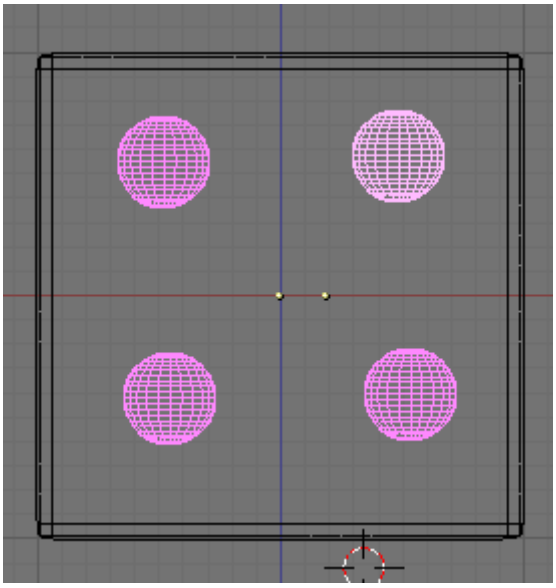
This is the side of the die that will have 3 dots.

Select the spheres then press the MKEY. Place the spheres on layer 2 and press OK. They should disappear as layer 1 is the only active layer.

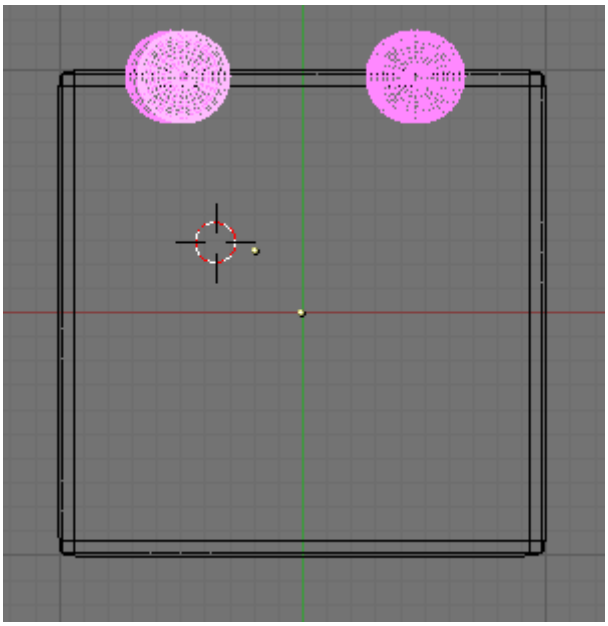
Save your file F2

Go to **Back View** (CTRL-NUM1). Make 4 more copies (in object mode) of the sphere from our extra and place them half in and half out of the back of the cube. Make sure you use all of the views to place the 4 spheres properly.

Back View:



Top View:

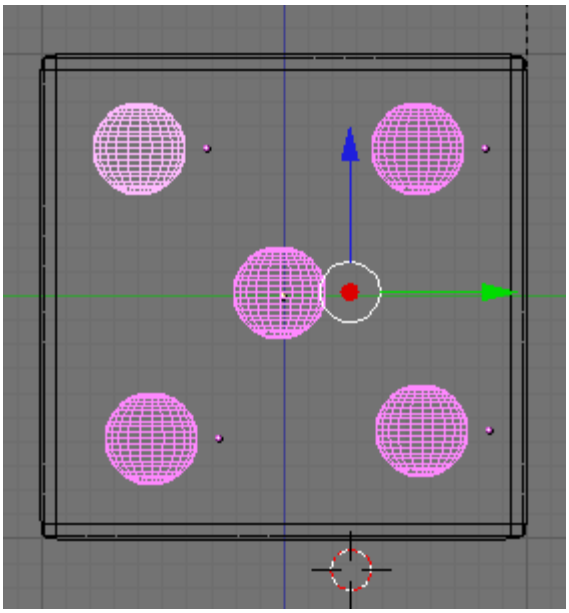


This is the side of the die that will have 4 dots.

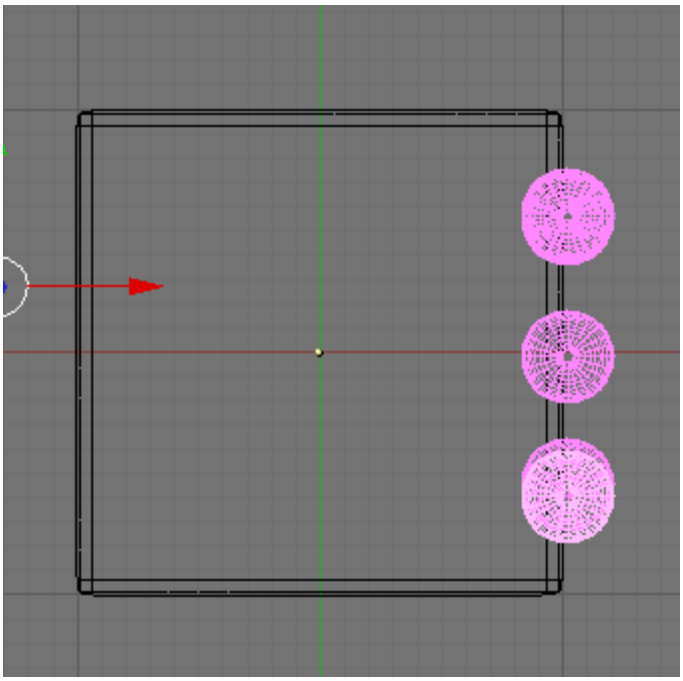
Select the spheres then press the MKEY. Place the sphere on layer 2 and press OK. They should disappear as layer 1 is the only active layer.

Go to **Right Side View** (NUM3). Make 5 more copies (in object mode) of the sphere from our extra and place them half in and half out of the back of the cube. Make sure you use all of the views to place the 5 spheres properly.

Right Side View:



Top View:

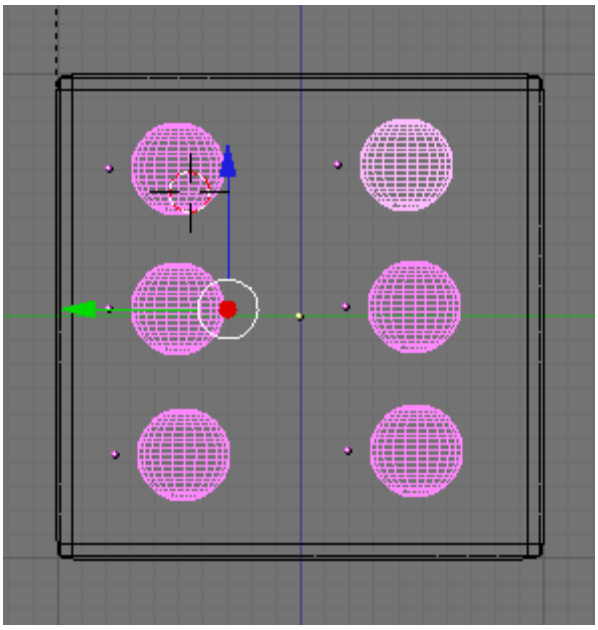


This is the side of the die that will have 5 dots.

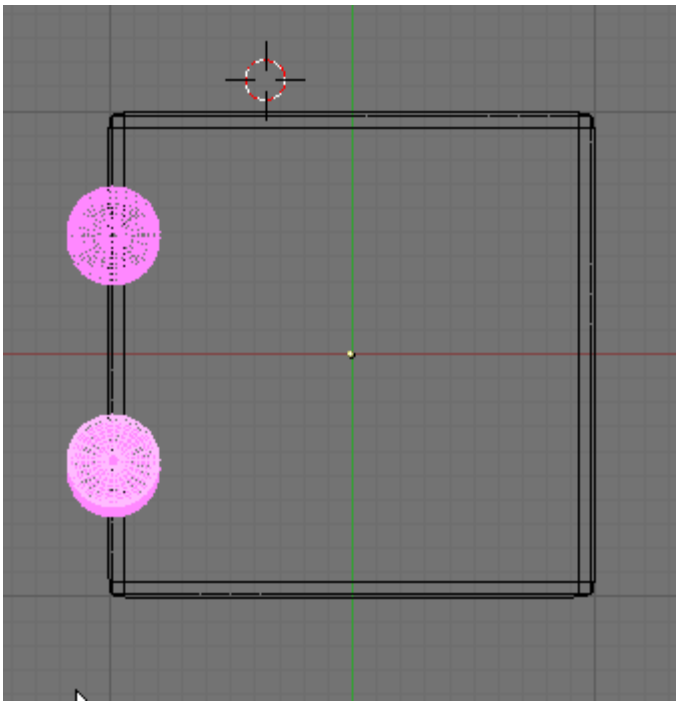
Select the spheres then press the MKEY. Place the sphere on layer 2 and press OK. They should disappear as layer 1 is the only active layer.

Go to **Left Side View** (CTRL-NUM3). Make 6 more copies (in object mode) of the sphere from our extra and place them half in and half out of the back of the cube. Make sure you use all of the views to place the 6 spheres properly.

Left Side View:



Top View:



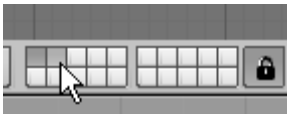
This is the side of the die that will have 6 dots.

Select the spheres then press the MKEY. Place the sphere on layer 2 and press OK. They should disappear as layer 1 is the only active layer.

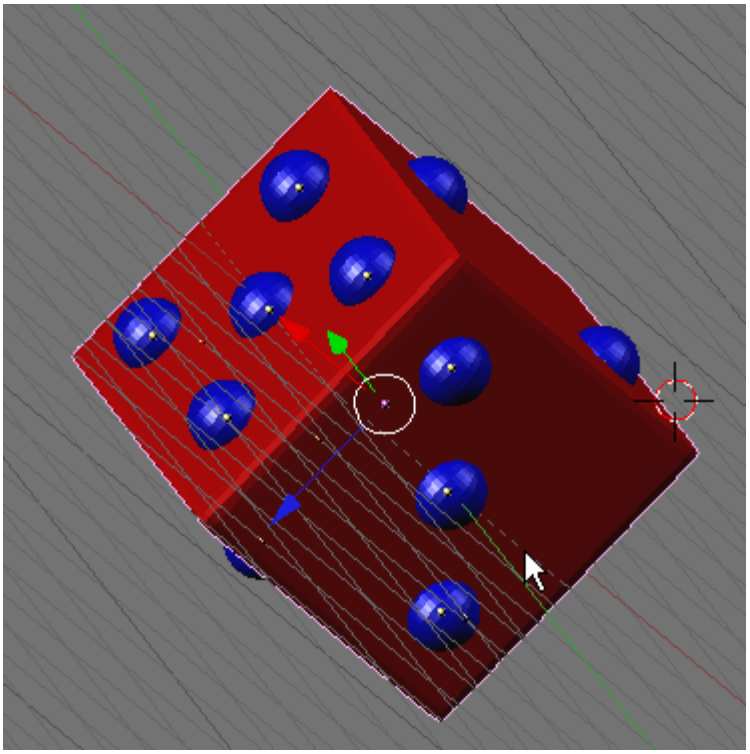
You can now delete the “extra” sphere we were using to duplicate

Save your file CTRL-W

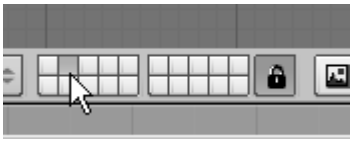
Turn on layer 2 (You can add to the active layers by shift-LMB clicking the layer 2 button)



Press the ZKEY to enter shaded mode. SHIFT-MMB and drag your die around (rotate the display) to see that the spheres are all correctly placed.



Press the ZKEY again to return to wireframe mode. Switch to Front View (NUM1). Select layer 2 alone.

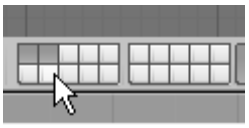


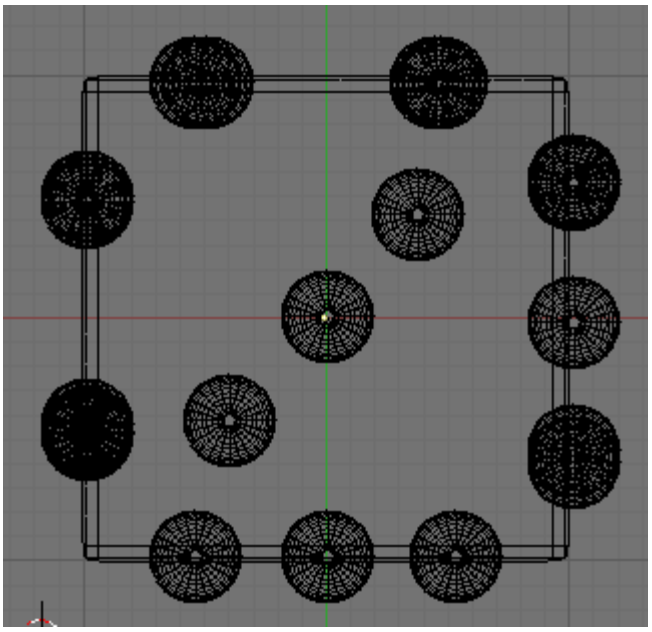
Select all of the spheres (AKEY). Press CTRL-J. (Join) Select Join Selected Meshes.

All of the spheres are now one object. (Located on layer 2).

CTRL-W. Save your Blend file

Activate layers 1 and 2. **Make sure nothing is selected** (AKEY if needed)





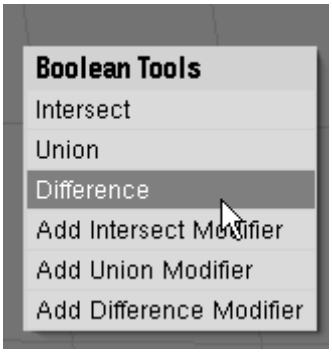
We are going to perform a Boolean operation called “Difference”. That is, we will subtract from the cube the area occupied by the spheres leaving indented “dots” on the die. Boolean operations are generally CPU intensive. It is always a good idea to save your file before performing any Boolean operation.

There are two ways to add a Boolean operation in Blender. We will use the “Menu” system because it will transfer the colors from one object to the other. (The other method is to use the “Modifier” method.

To do this we must select the objects in a particular order.

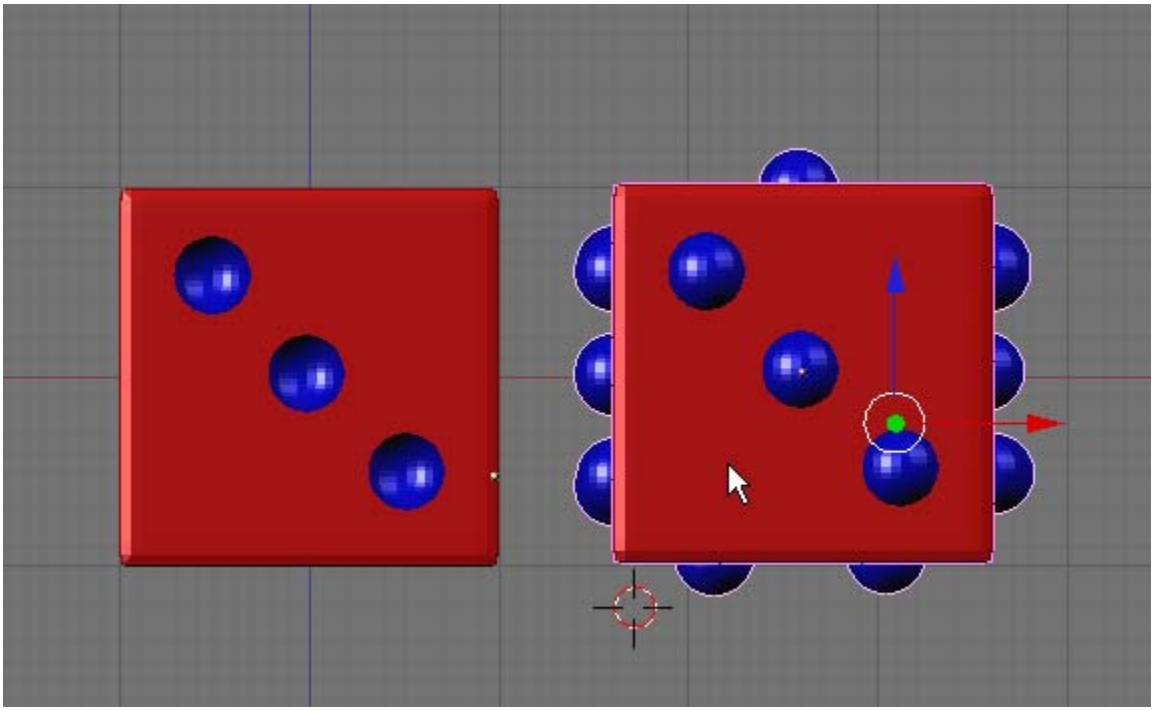
First select the spheres, then add to the selection the cube, by holding down your shift key and right-clicking on the cube

Press the WKEY (Boolean). This displays the Boolean Menu. Choose “difference”

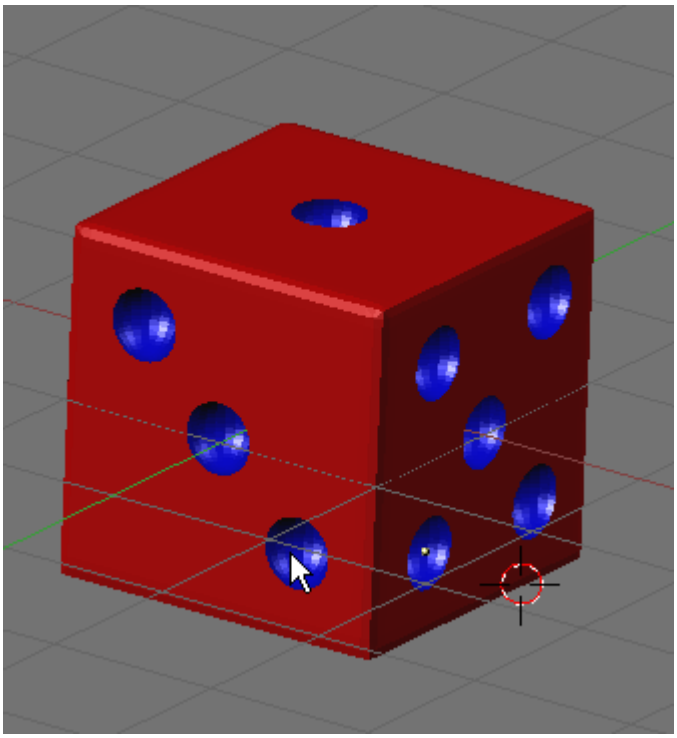


Boolean operations require intensive computing. It will take awhile for your computer to calculate all of the vertices, edges and faces. An hourglass icon will be displayed as this calculation is going on. The hourglass icon will disappear when it is finished.

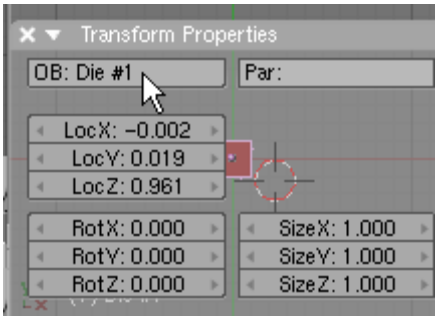
A “Menu” driven Boolean operation **never** affects the original operands, the result is always a new Blender object placed on top of the original operands. When the operation is complete go to shaded mode (ZKEY). Select the cube and grab it (GKEY) and move it away from the original operands.



You can now select the original cube and spheres and delete them leaving the die cube with the indented “dots” (Remember this new die is located on layer 2)

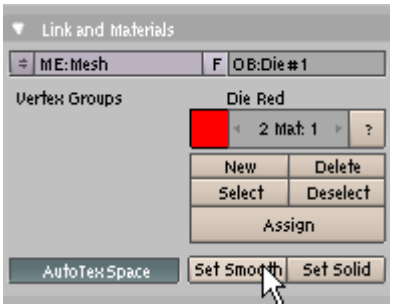


In the Transform Properties name this object Die #1

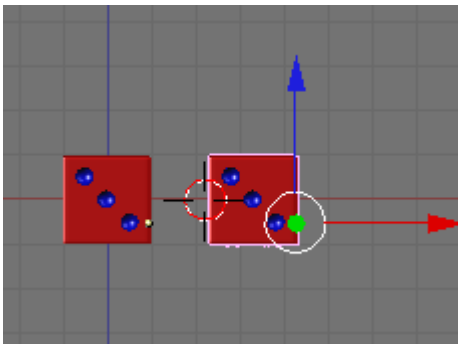


Notice that the name also appears in the Outliner Window.

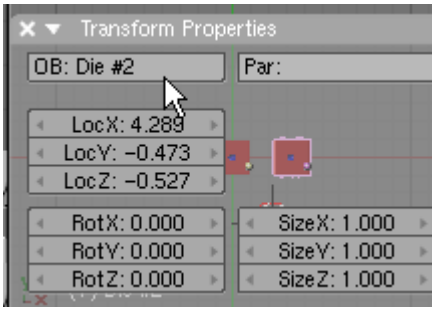
Press F9 (Editing) if not already displayed. Make sure Die#1 is selected. In the Link and Materials Panel, press the Set Smooth button. This will smooth out the rounded parts of the die



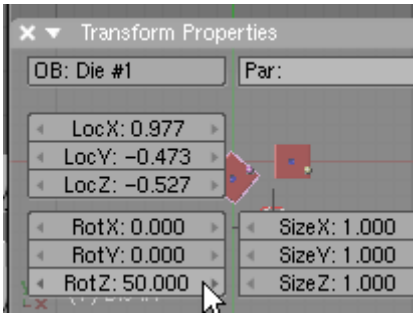
With the Die #1 object selected, press SHIFT-D (Duplicate) and make a duplicate copy of the die and move it to the side.

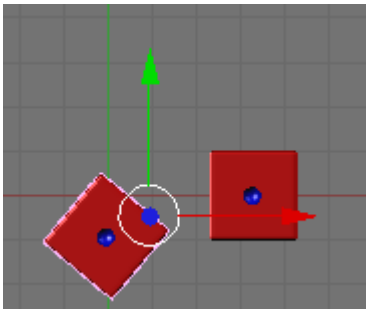


Name this object Die #2

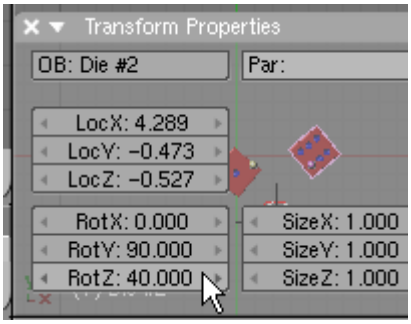


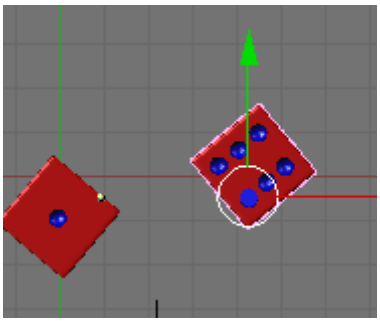
Switch to top view (NUM7). Select Die #1. In the Transform Properties set the ROT Z: (Rotation Z) to 50 degrees.





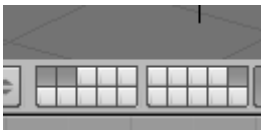
Select Die #1. In the Transform Properties set the ROT Z: (Rotation Z) to 40 degrees and the ROT Y: (Rotation Y) to 90 degrees.



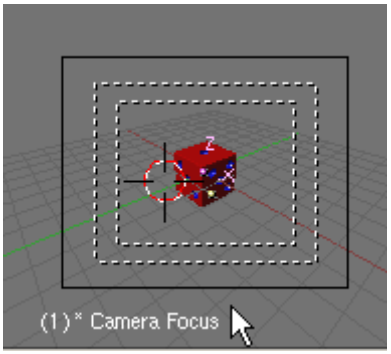


CTRL-W. Save your Blend file.

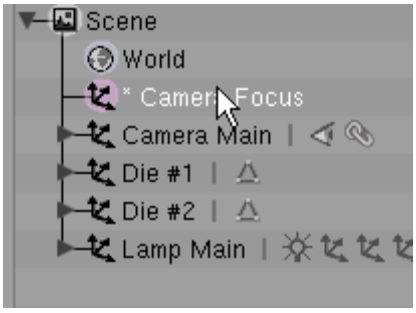
Add layer 10 to the scene. This layer contains the camera and the camera focus empty object.



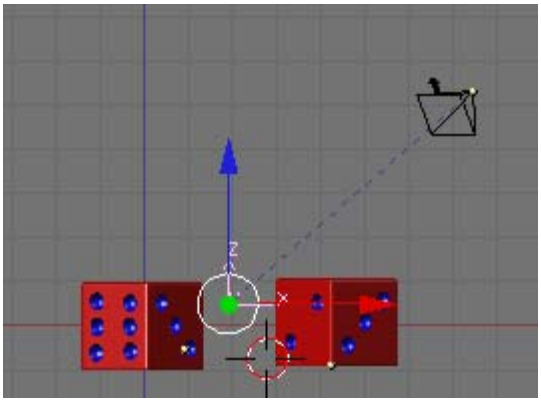
Click in the Perspective viewport on the bottom right and change it to camera view (NUM0).



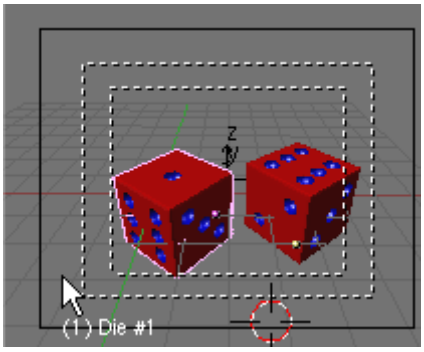
Switch the main 3D viewport to front view (NUM7) if it is not already displayed. Select Die#2 and move it down a bit in the view to make it level with Die#1. Select the Camera Focus object in the outliner window.



Press the GKEY (Grab) and place the Camera Focus between the two dice. (The camera will follow)

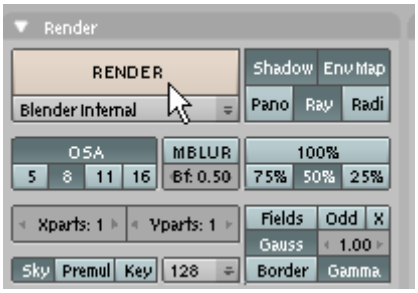


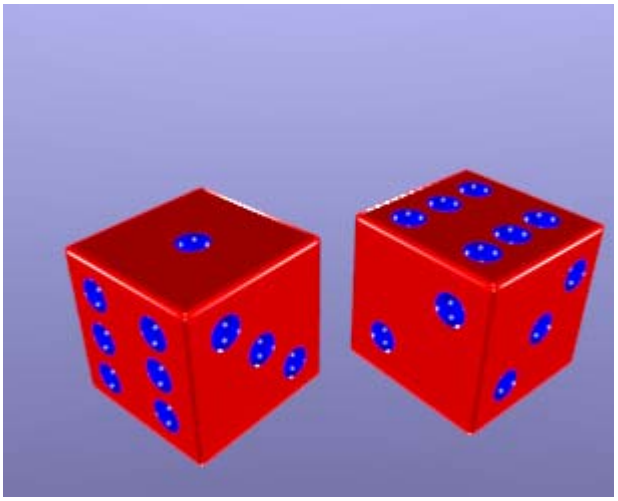
Now select the camera and using the front and top views, position it so the camera view looks something like shown below. (You may want to grab the dice and bring them closer together.)



Add layer 20 to the active layers. This layer contains the lighting set-up.

Press F10 (scene). In the Render Panel press the Render button (or press F12).





If you want to save the image of this rendering press F3. Select the destination folder and name the file Dice.jpg (Note: you must add the .jpg file extension). Then press the Save JPEG button.

The image file will be placed in the directory you choose as the destination.

A finished copy of this tutorial file name DiceComplete.blend is located in the Dice.zip file.