

BRYCE 5 Mini Tutorial

How to Create a Facetted Mirror

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HTML Version
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Detail of «Figuras y Luces» by Caperh >



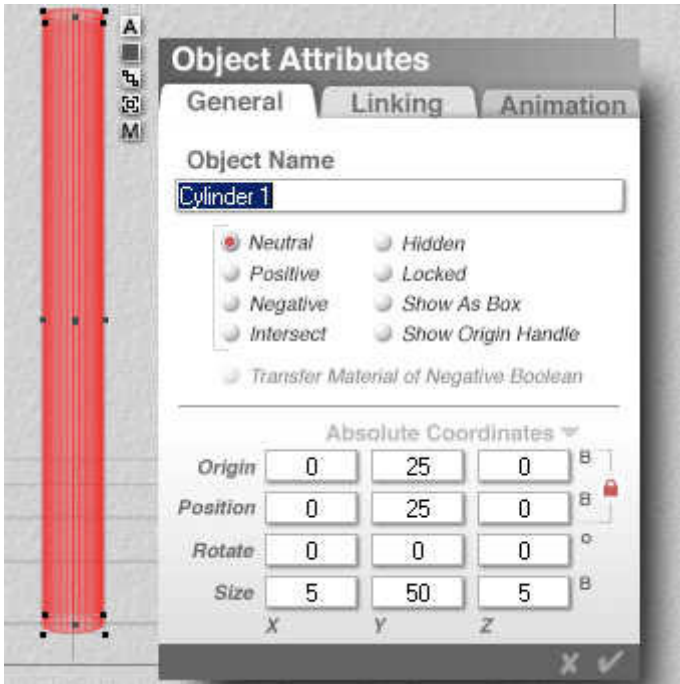
The initial technique constructs a sphere from cylinders. The object to create a facetted mirror with simple means is readily accomplished.

In a second step, another technique is used, which creates a hollow sphere from 2D-Disks. Within that sphere, other objects and / or lights may be placed.



The position of the camera is of no importance. For these examples, the position is assumed to be at $X=0.00$, $Y=30.00$, $Z=-100.00$. All rotate angles set to 0° and the field of view (FOV) 60° .

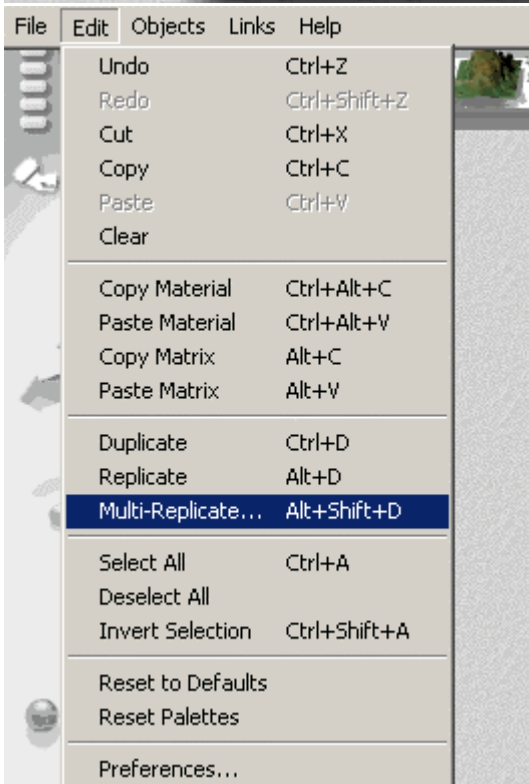
For the first part, create now a cylinder.



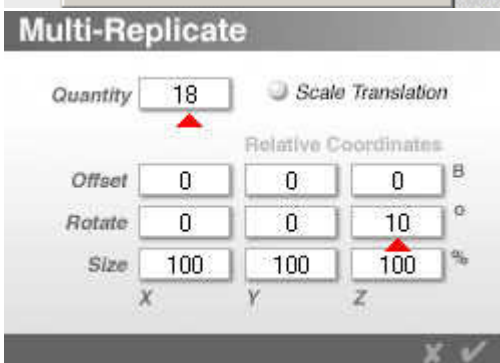
Set the **Attributes** to the values shown here. The ratio diameter to length controls the coarseness or fineness of the facets.

Approximately, it can be said that if either the length is doubled or the diameter made half, the rotation angle will also be half.

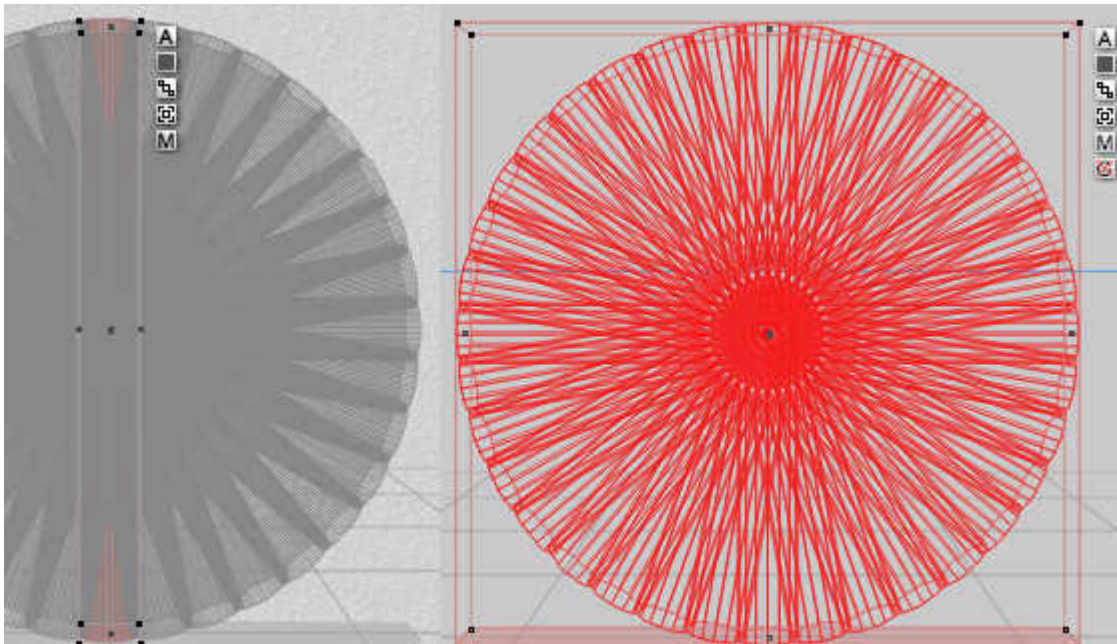
The diameter and the rotation angle control the size of the space between the facets. This can still be adjusted later, though.



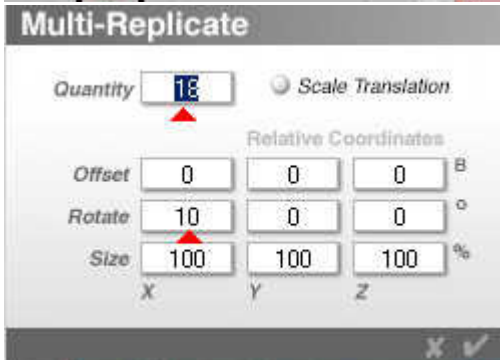
With the cylinder selected, open from the Edit menu the Multi Replicate function or press the key combination [Alt][Shift][d].



Set the values in the dialog as shown. This will create 18 cylinders, each one rotated by 10° in the Z-axes. You will get a wheel made of cylinders.

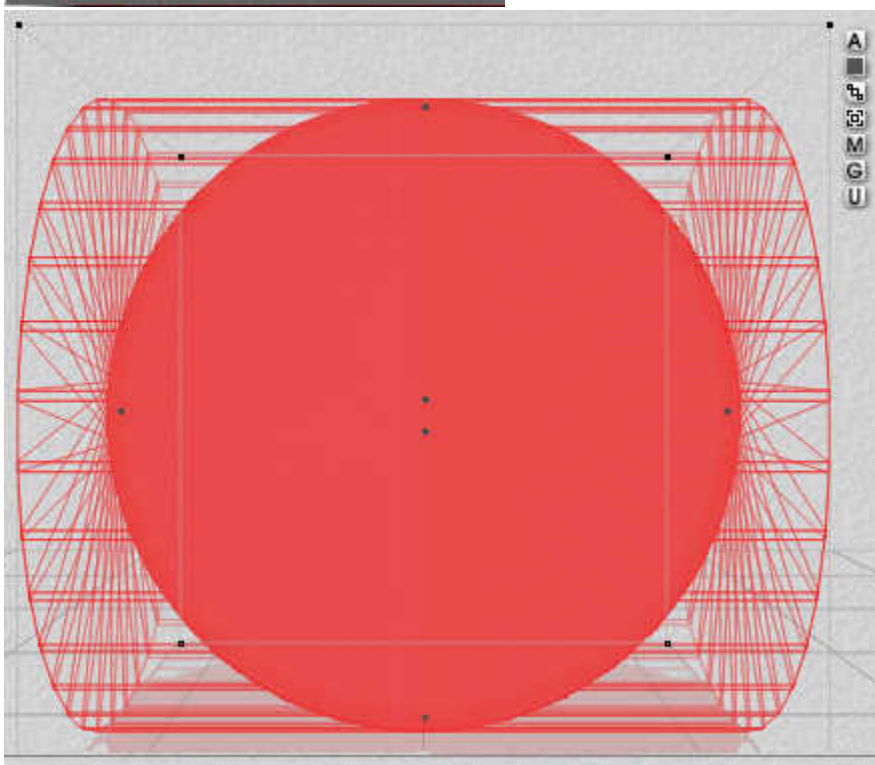


Select Cylinder 1 (left part of picture) and delete it, it is twice here. Then, select Cylinder 2 to 19 and **Group** them.

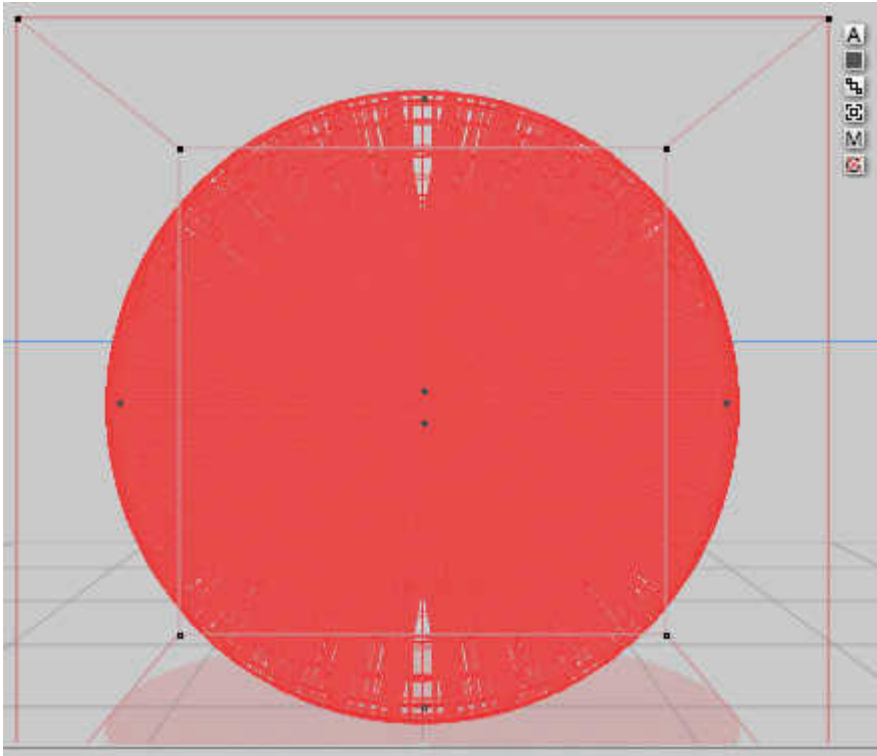


Open the Multi Replicate dialog once again and set the values as shown. This will create 18 groups of cylinders, each one rotated by 10° in the X-axes. You will get a sphere made of many cylinders. It may take a moment ...

Select Group 1 and delete this double ring just like you deleted the double cylinder before.



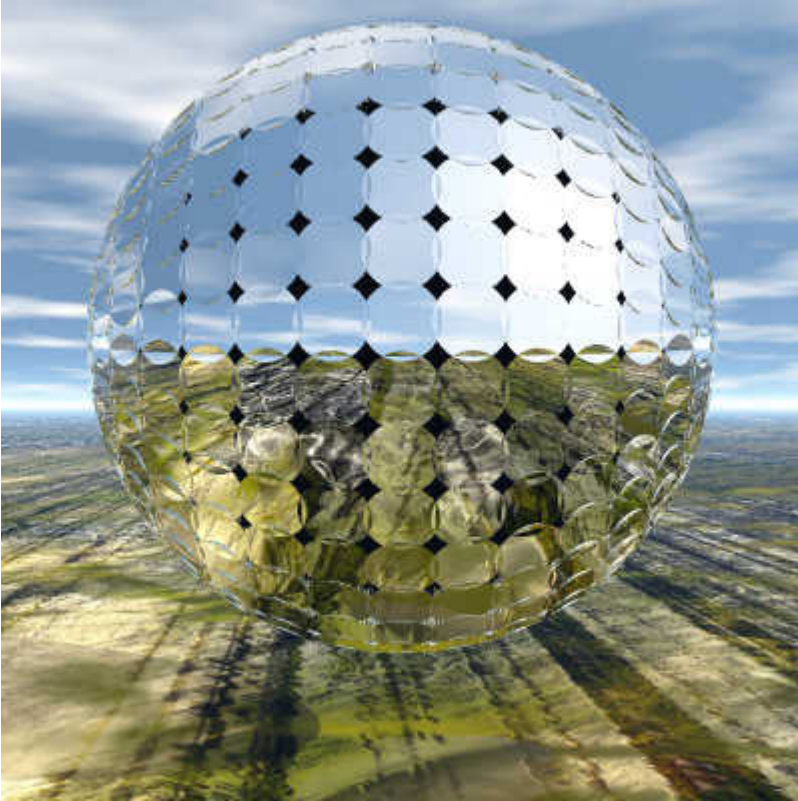
Now, select all remaining groups: Group 2 to 19. Un-group this construct. You should get all cylinders separately.



As soon as all groups (wheels) are un-grouped, all cylinders are selected separately (Cylinder 20 to 343). Now, group these and your faceted sphere is ready. It consists of $18 \times 18 = 324$ cylinders.

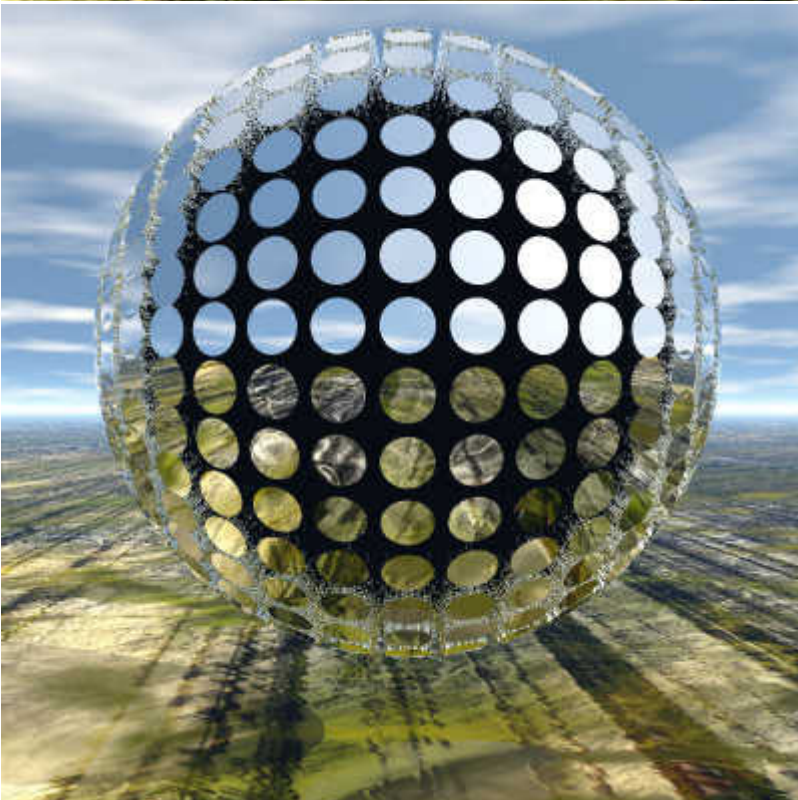


Give the sphere a mirror material as shown.



The sphere with the mirroring facettes, as we built it here, rendered. The sphere with the grouped cylinders can be scaled as you desire.

If you would like to make the end part of the intersecting cylinders smaller to increase the space between them, you have to un-group them first (they are kept selected) and then they can be scaled together individually. This assures that all cylinders are scaled in the same way. After scaling, group them together to a sphere.



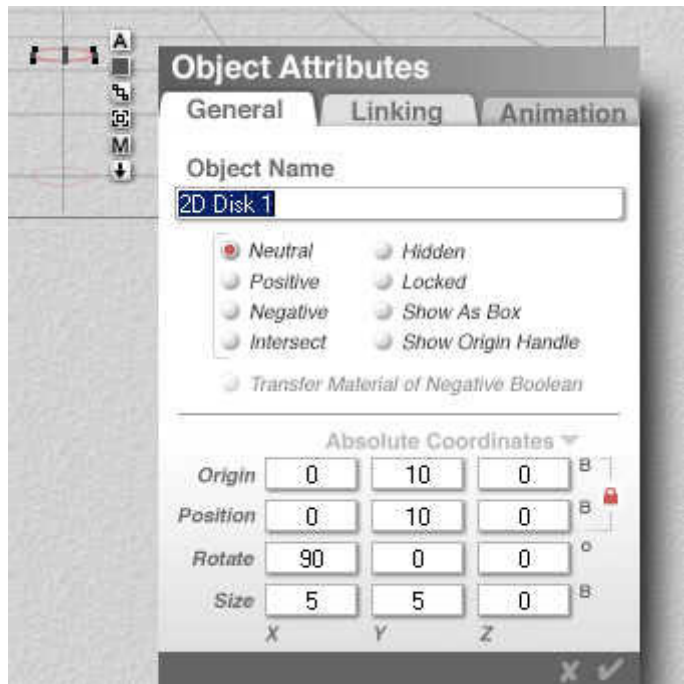
Do you remember? The first cylinder had the size $X=5.00$, $Y=50.00$, $Z=5.00$. After the un-grouping, X and Z were set to 3.50 . This is the result: size of sphere remained, the facettes are smaller, do not intersect anymore and the space in between is accentuated.

The sphere was rendered in bright ambient light on purpose to show a drawback of this method: the round faces of the cylinder's sides also act as mirrors. Therefore, this method asks for a rather dark environment.

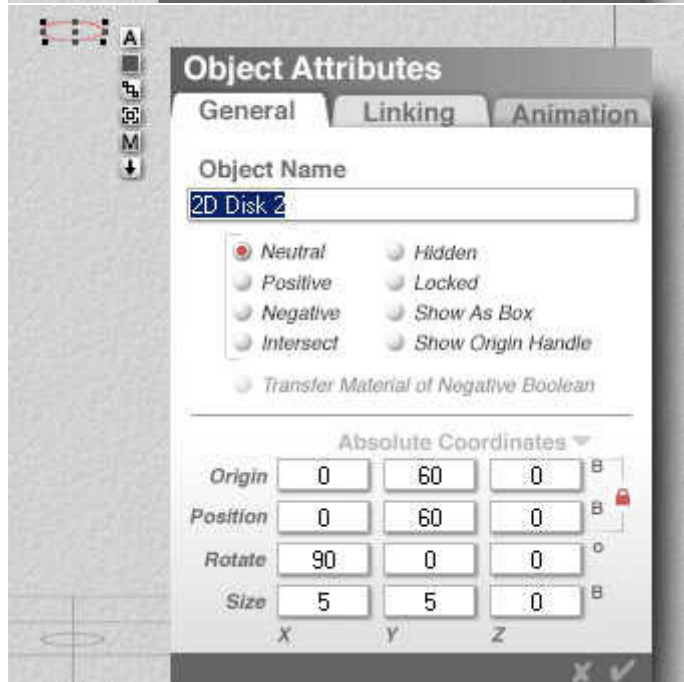
The second part shows another method which does not have this limitation.

Hollow Mirrors with Facettes

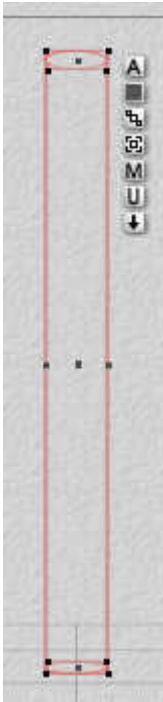
Instead of using cylinders, we will do it with round 2D Disks. Thus, only the end walls of the «cylinders» are used and these are grouped to an invisible cylinder. The rest works as above.



Create a 2D Disk and set the **Attributes** as shown at left. The face is rotated in the X-axes by 90° and appears as the bottom face of a cylinder.



Copy the 2D Disk [ctrl][c] and [ctrl][v] or create a second one. Set the attribute of this one as shown at left. This will be the upper face of the cylinder. The height or length of of this «cylinder» is $60 - 10 = 50$ and hence the same size as the cylinder was.

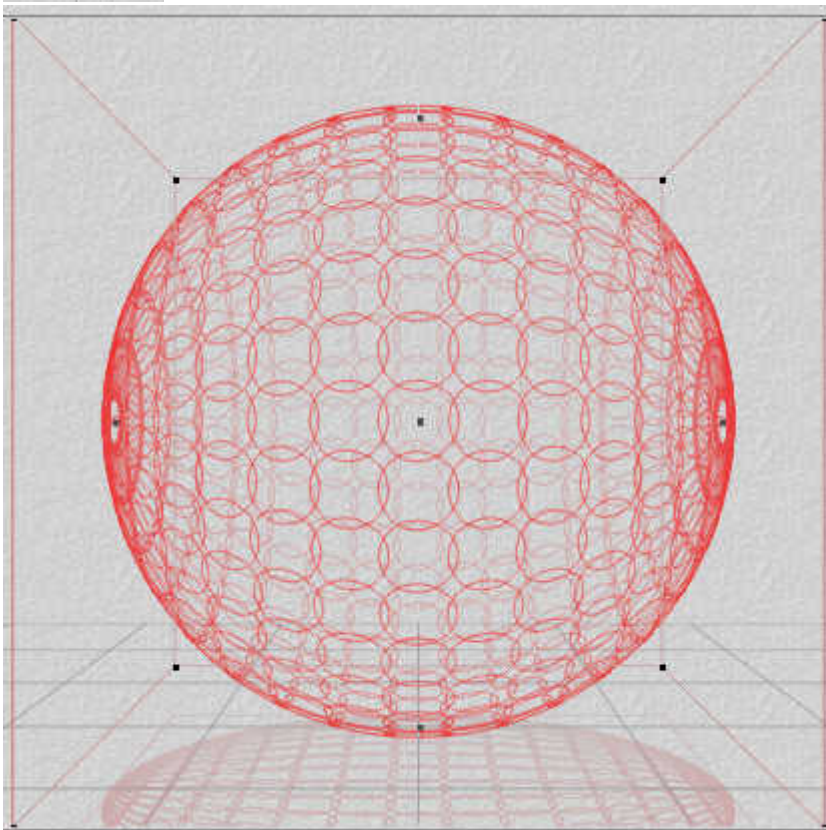


Select this «cylinder», open the Multi Replicate dialog and set the values as you did for the cylinder above. Then, select Group 1 (the first cylinder) and delete it.

Now, select all remaining groups (Group 2 to 19) and group them together. Open the Multi Replicate dialog anew and set the values as you did for the cylinder-wheel above. After a moment, you will see the sphere in the wire frame view.

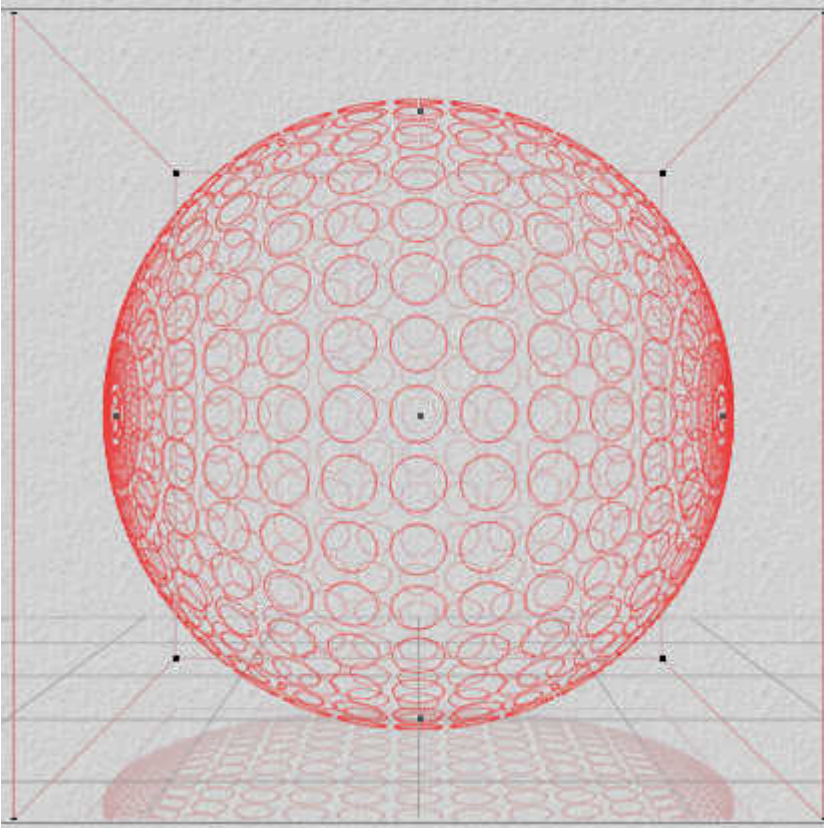
Select Group 20 and delete it. Then, select the remaining groups (21 to 362), un-group them and group all 2D Disks (39 to 538).

You just finished the hollow sphere. Give the group of 500 2D Disks the mirror material shown above.

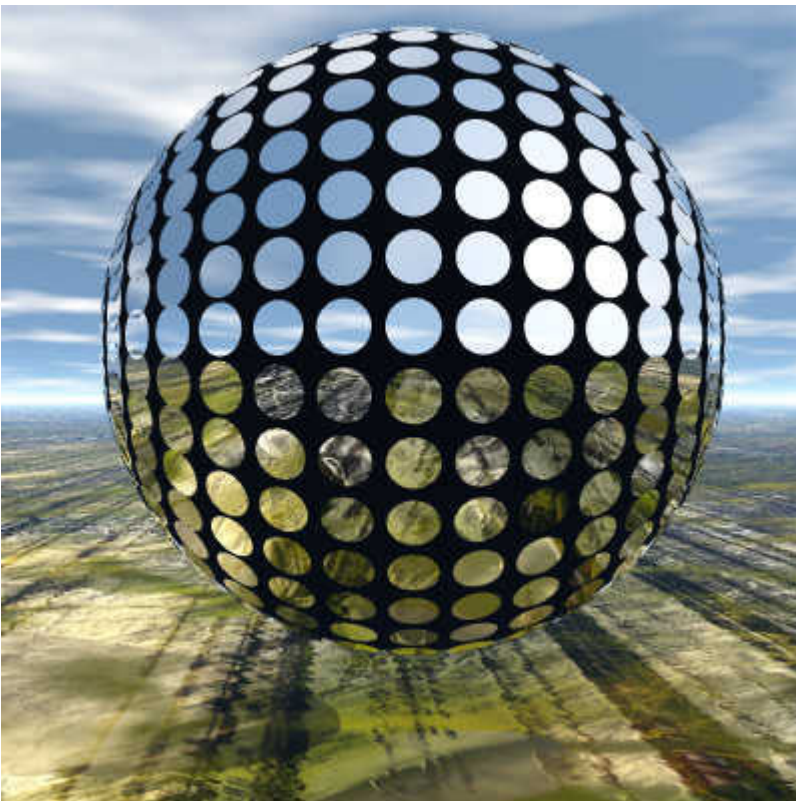


In this view, it becomes obvious that the disks intersect.

Un-group the construct. The disks stay selected. Change the X and Y values from 5.00 to 3.50 and re-group them together.



The sphere looks the same as the one that was constructed using cylinders. It is hollow, however. The disks do not intersect.



The size of the sphere is X / Y / Z each 50.00. A black sphere with the size of X / Y Z each 49.50 was set in the centre of the facette sphere.

This sphere was rendered under the same conditions as the sphere made of cylinders. The spaces between the mirrors stays completely black, even in this bright light.

There is absolutely no reason, why you cannot use 2D Faces instead of 2D Disks. Experiment with more 2D-Disks and with less. If you use only 18 Disks for the initial wheel (20°) and set an ordinary sphere into the hollow one, play with the size of the inner sphere and see what happens when it intersects with the Disks.