

# ***Blender Introductory Course***

## ***Lesson 6***

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# ***MATERIALS***

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**Material = diffuse colour  
+ specular colour**

- An object's visibility is simulated by separating its colour into:



diffuse colour + specular colour => combined  
(object's colour) (light reflectivity)

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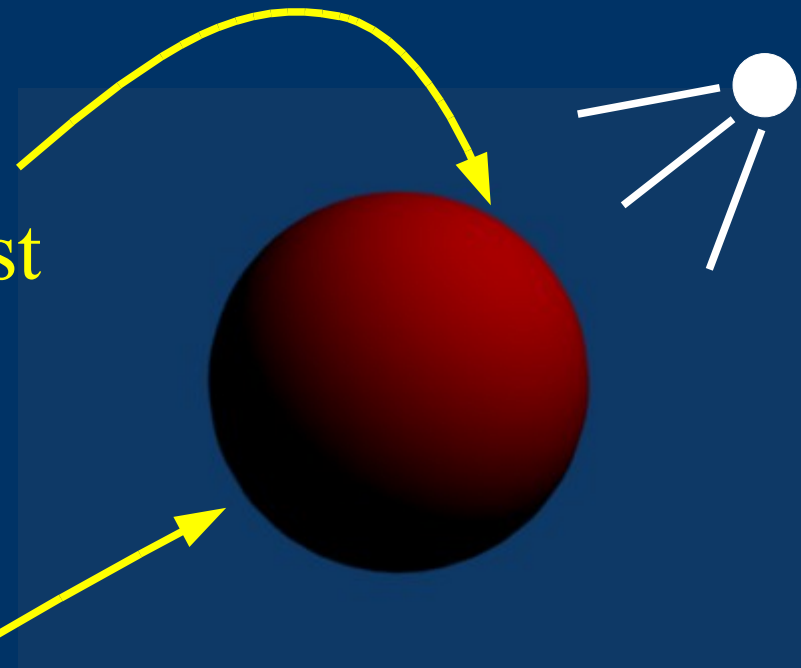
# Diffuse shaders

- A diffuse shader shows:

**more** of the object's colour  
where the light is the **brightest**

and

**less** of the object's colour  
where there is **less light**

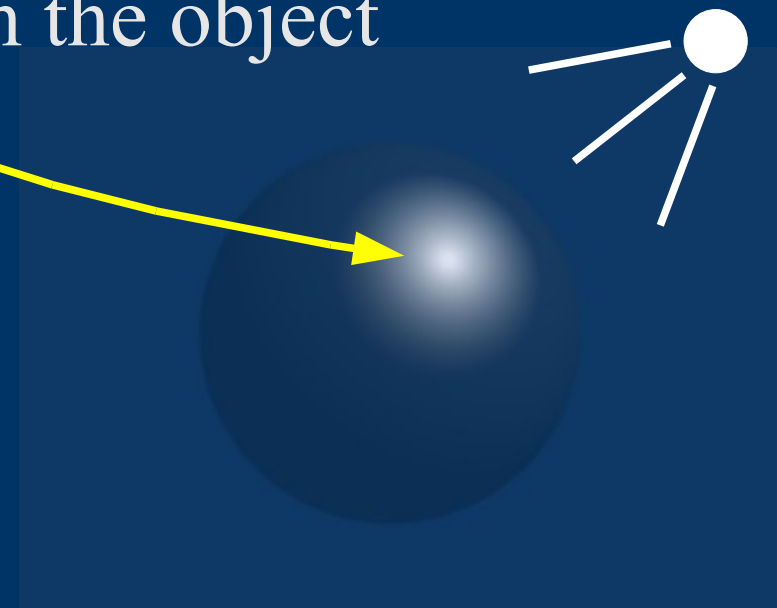


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# Specularity

- Specularity is the amount of light *from the source* (e.g. lamp) that is reflected from the object
- It has *nothing* to do with the *object's* colour
- You can change the specularity colour



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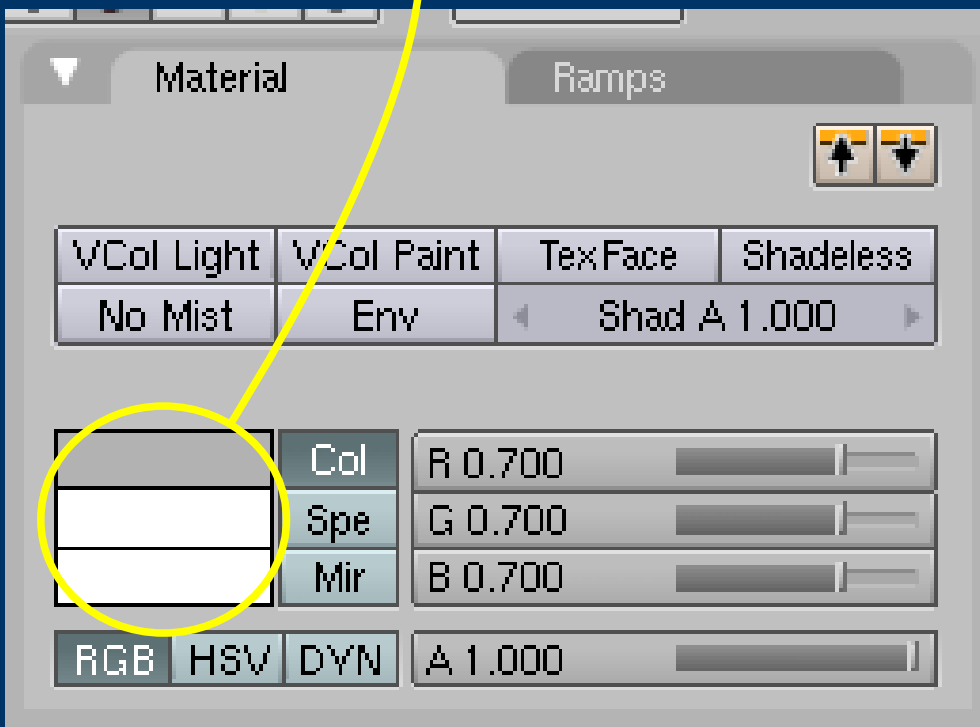
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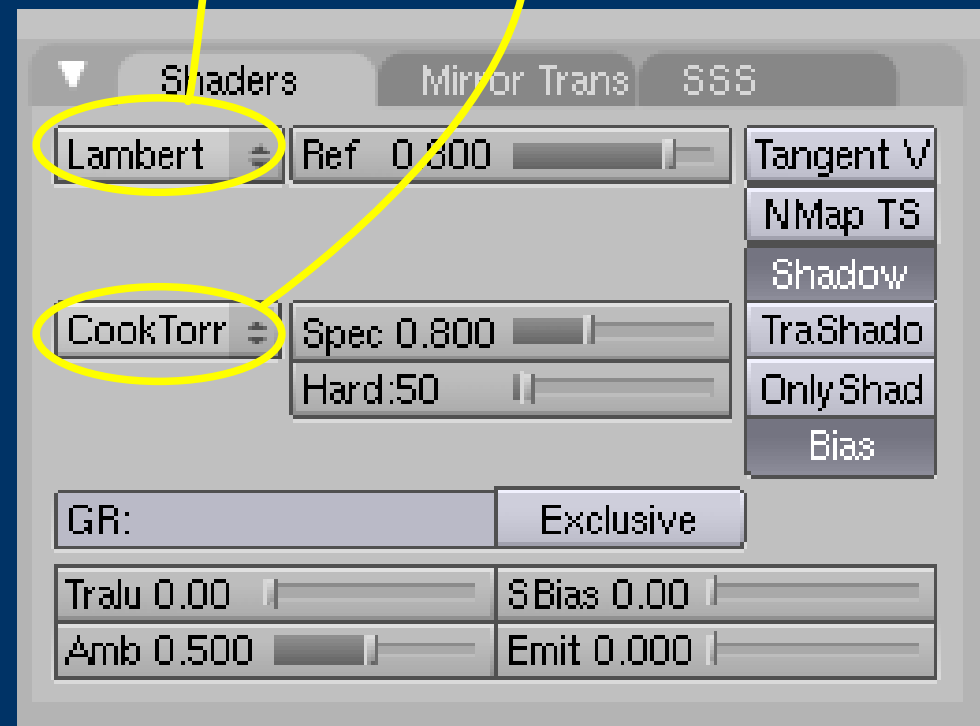
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# F5 in Blender

## Set colour

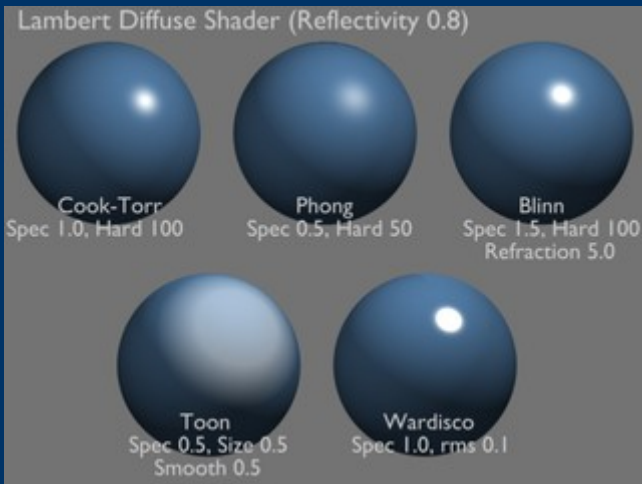


## Shader & Specularity

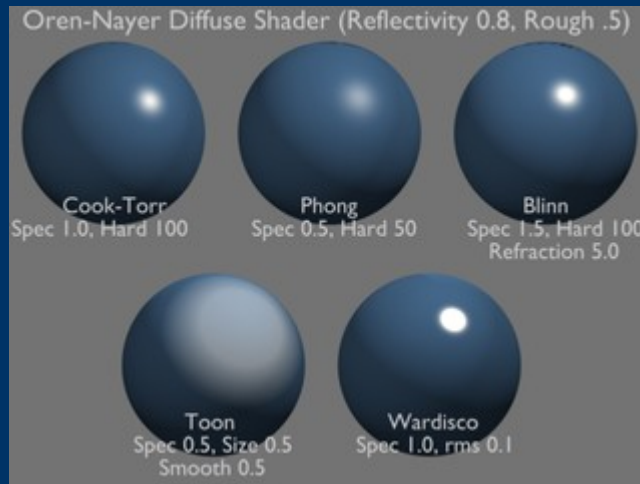


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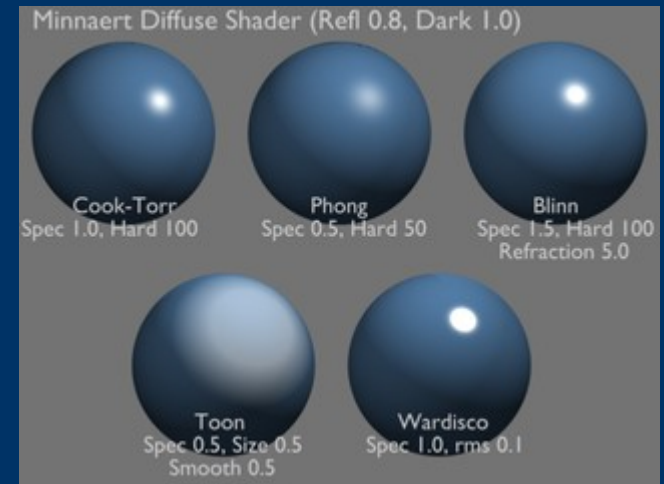
# Shaders combined with specular



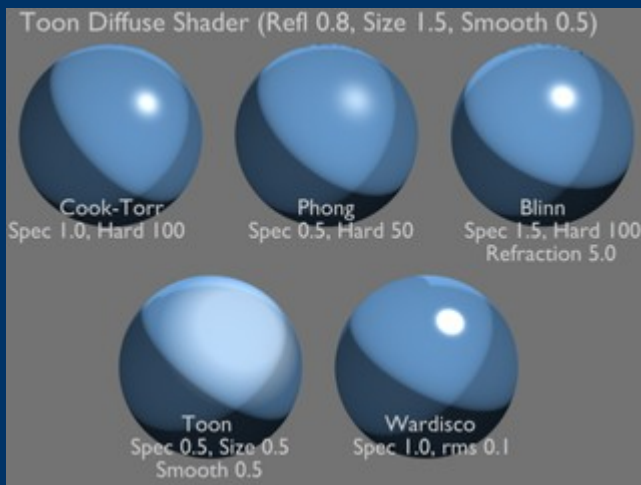
Lambert



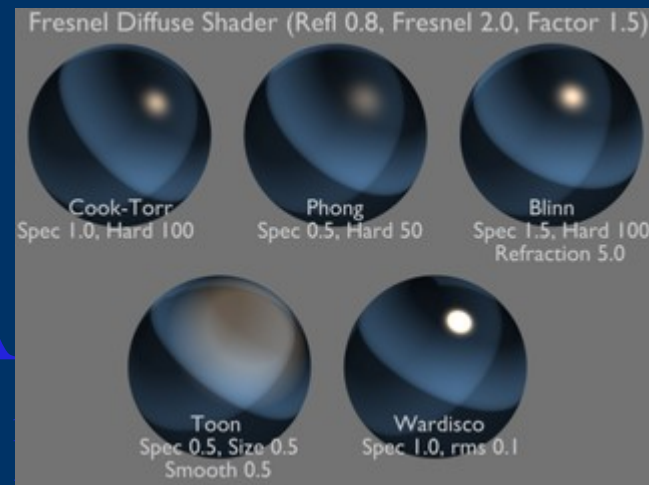
Oren-Nayer



Minnaert



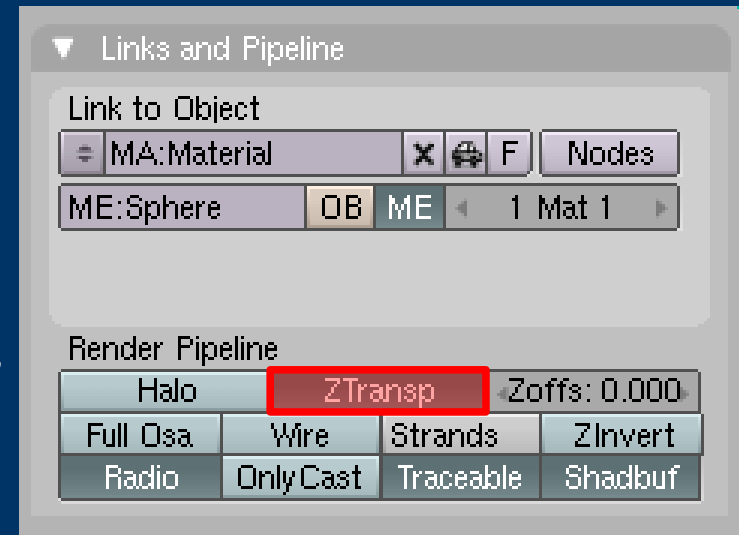
Toon



Fresnel

# Transparency

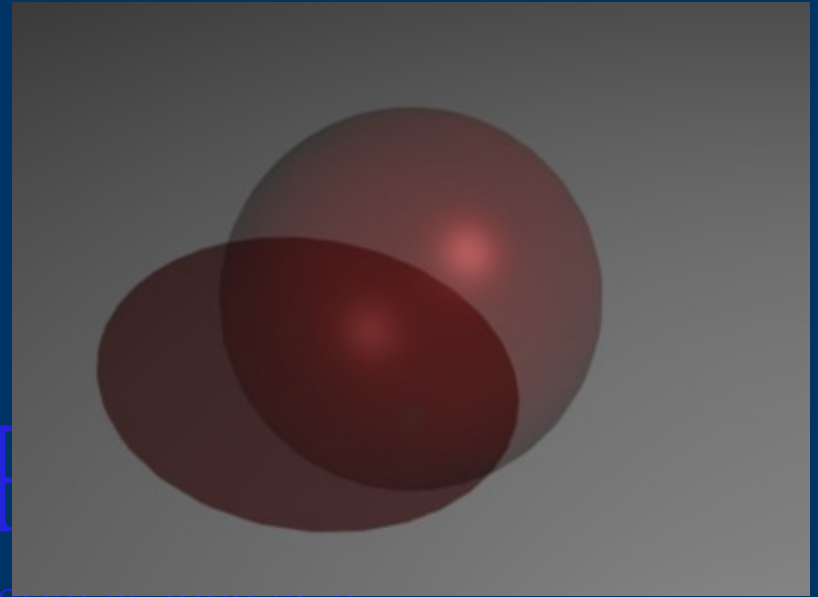
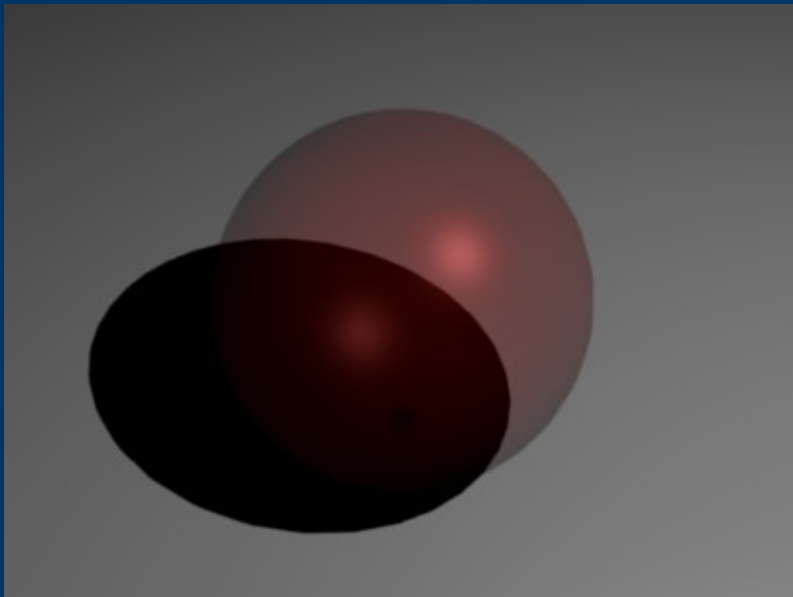
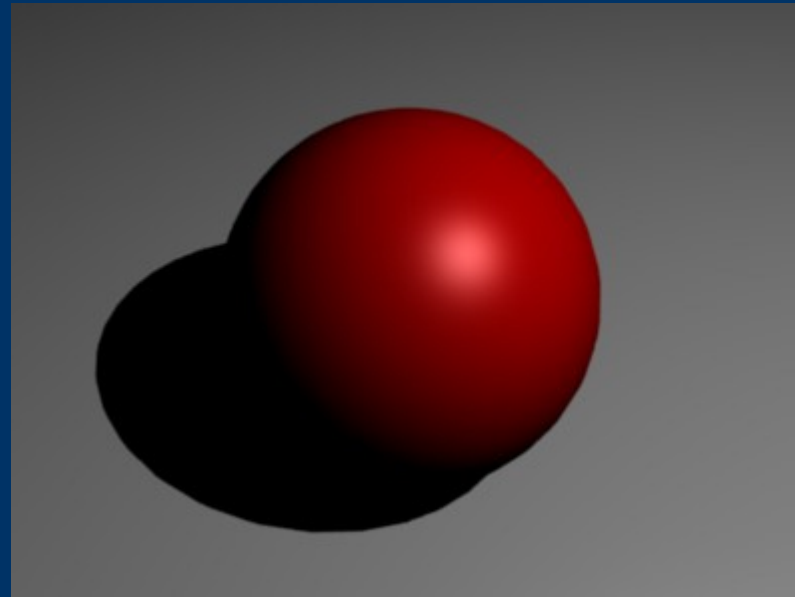
- Transparency (of transparent object):
  - Set Alpha (A) < 1
  - *Make sure you enable “Ztransp”!*
- To make the *shadow* be transparent on the *receiving* material, ensure that “TraShad” (Transparent Shadow) is enabled in the *receiving* material's Shader tab.



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# Transparency

Normal:



20% Alpha

...and with "TraShadow" enabled

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# *Emitter and shadeless*

- Emitter: Set Emit value  $> 0$   
Causes material to “glow in the dark”
- Shadeless: object is not impacted by light (e.g. specular) or shadows from other objects. Handy for background images/videos on objects.

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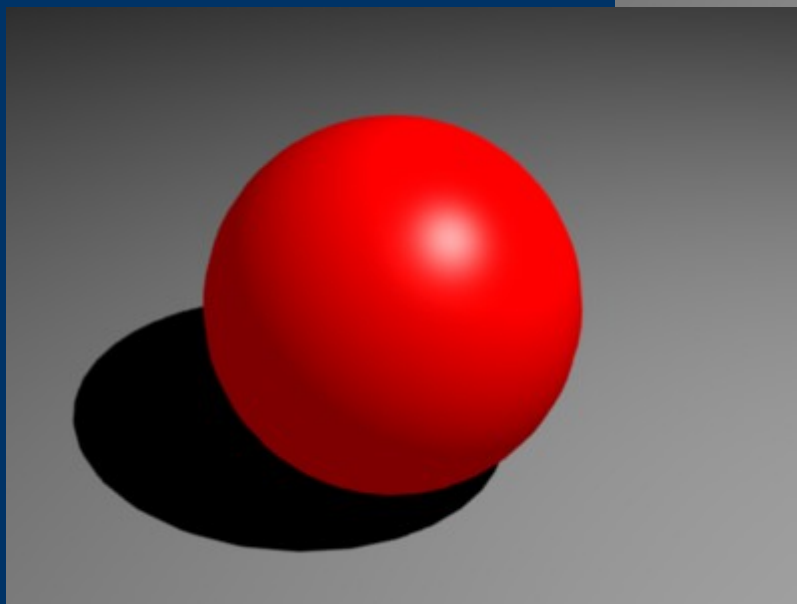
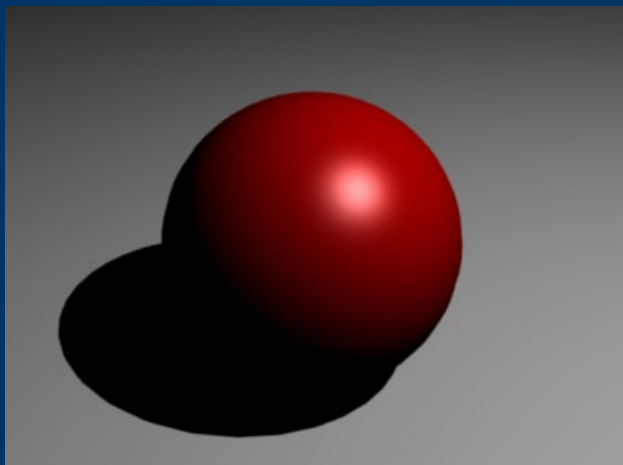
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# *Emitter and shadeless*

Normal:



50% Emit (glow)



Shadeless (no spec or shadow)

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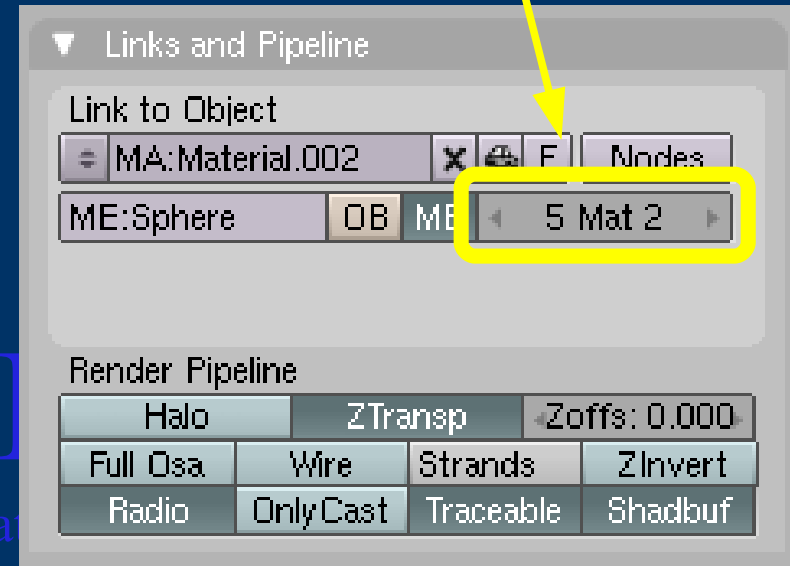
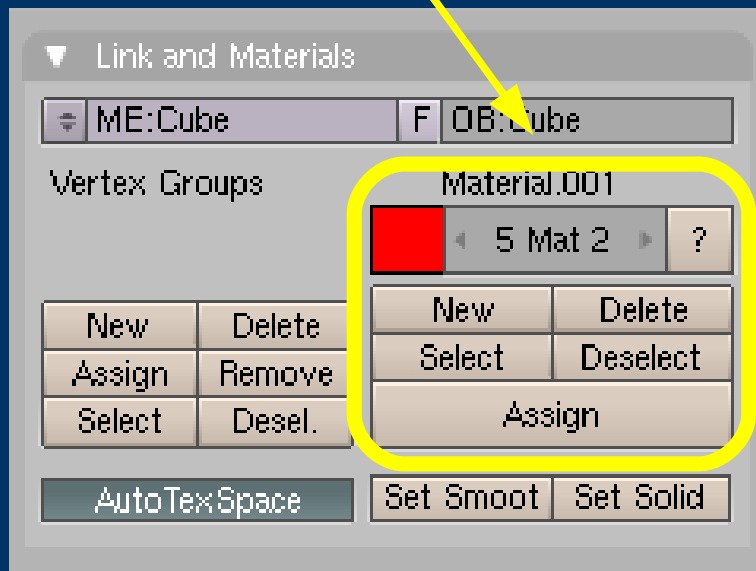


## Rendered Model:

- Transparent glass
- Background plane with photo (trees) done as “shadeless”

# Multiple materials per object

- Blender supports up to 16 materials per object
- Material identified by indices, both in:
  - Editing panel (F9) – where a new material can be added
  - Material panel (F5)



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# Materials are added to faces

- *After* creating the basic material for the object (in the *material* panel **F5**), up to 16 materials can be created for the object in the *editing* panel (**F9**)
- The materials are allocated by:
  - Ensuring that the correct material (index) is selected in **F9**
  - In the object's *edit* mode, select the faces to which the material is to be allocated
  - Assign the material to the faces by clicking the “Assign” button in **F9**

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# Editing (F9): materials panel buttons

- **New**: creates a new material. This does *not* automatically allocate material to any faces
- **Delete**: deletes a material and its index
- **Assign**: assigns the material (index) to the associated *selected faces* in the object's edit mode
- **Select**:
  - First, ensure no faces are selected (use **AKEY** or “Deselect” button)
  - Pressing “Select” displays the faces (in object's edit mode) *already assigned* to the selected material index
- **Deselect**: de-selects any selected faces, but does NOT unassign.

# Procedure for adding multiple materials to objects

- Use **F5** to create default material as normal
- Go to Editing buttons (**F9**), Links & Materials tab:
  - FIRST create new material, using “**New**”
  - Change colour (now or later)
  - In *edit mode*, select faces to assign material to and click “**Assign**”
- Create next material using “**New**”:
  - Change colour
  - In edit mode, make sure *no unwanted faces are selected* (use **AKEY** or **Deselect** button), then select faces to assign material to and click “**Assign**”... etc.

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# Only ONE material per face

- *NB!! Faces can only be assigned ONE material*
- If the same faces are assigned to another material (index), then:
  - The faces are allocated the *last* assigned material
  - The faces are *unassigned* from the material it was previously assigned to
  - Check by going back to material it was previously assigned to. Click “**Select**”: those faces will not be selected anymore

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# Multiple materials: tips & review

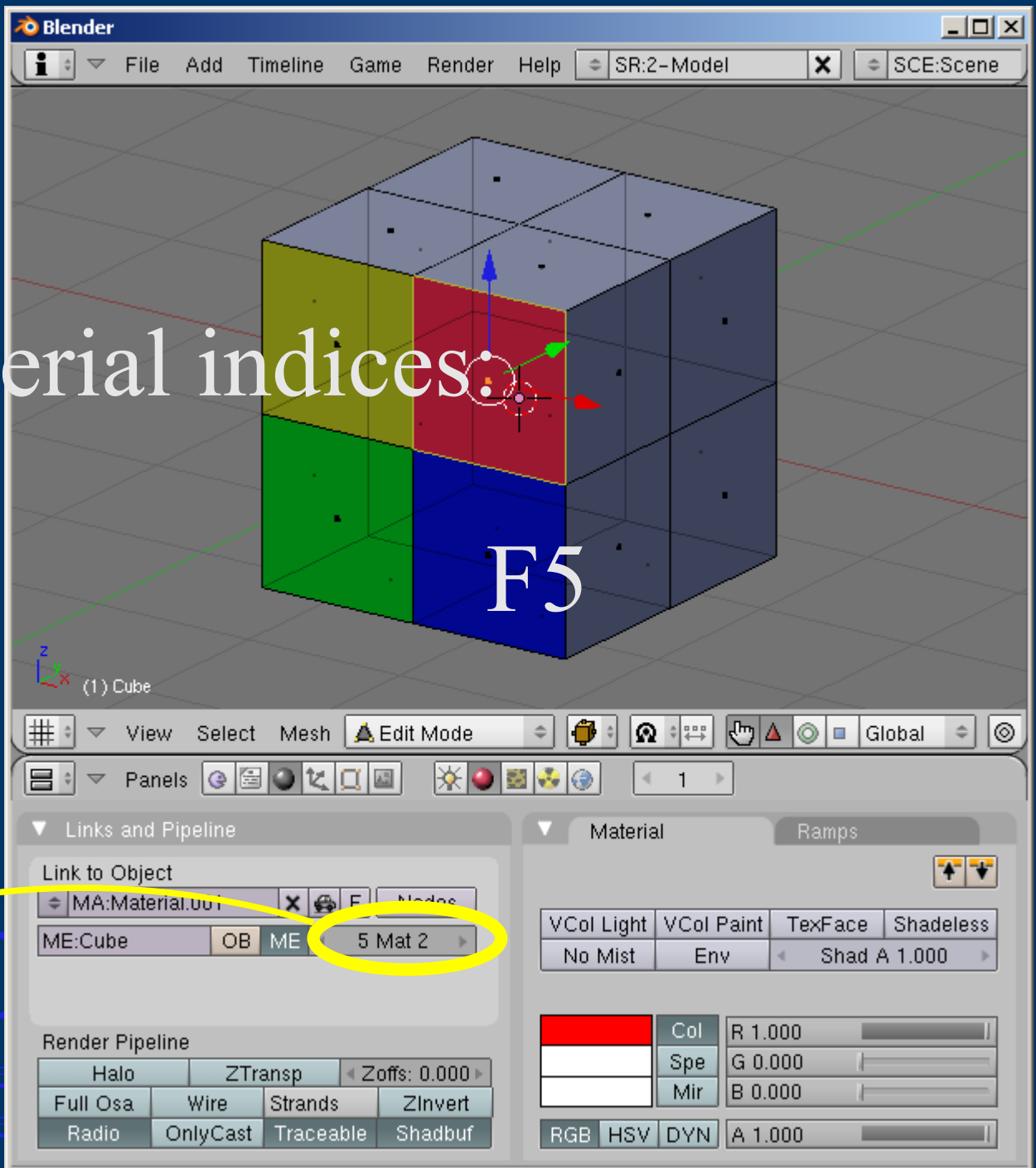
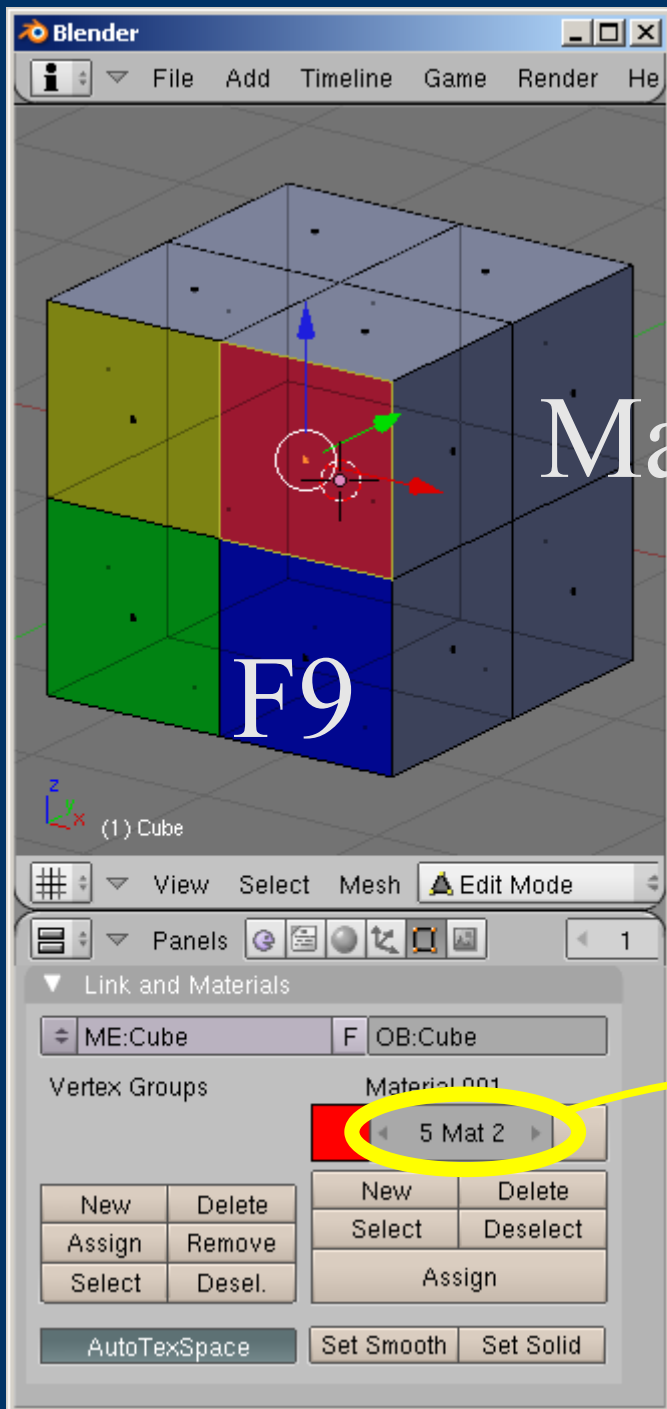
- You can assign existing colour to additional faces afterwards by selecting the faces and clicking “Assign” (new assignment overrides any old ones)
- Find out to which faces a colour is assigned by selecting colour and clicking “Select”. To avoid confusion, first *clear* any selection with the *A-Key*
- *Rename and refine material attributes* in **F5** – but make sure you are referencing the *correct material index!*

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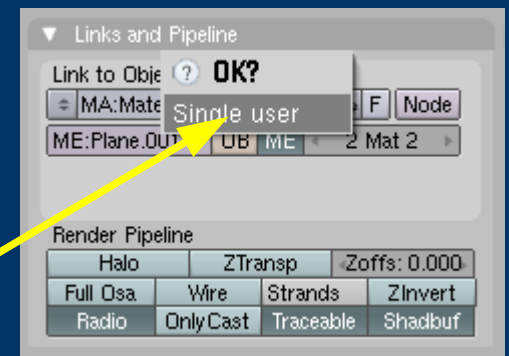
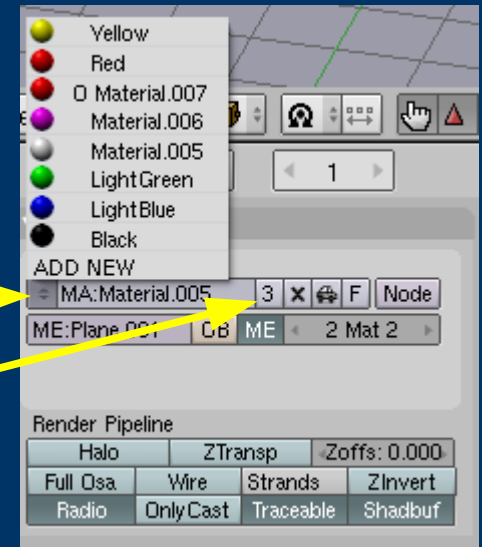


# Material indices:



# Same material on multiple objects

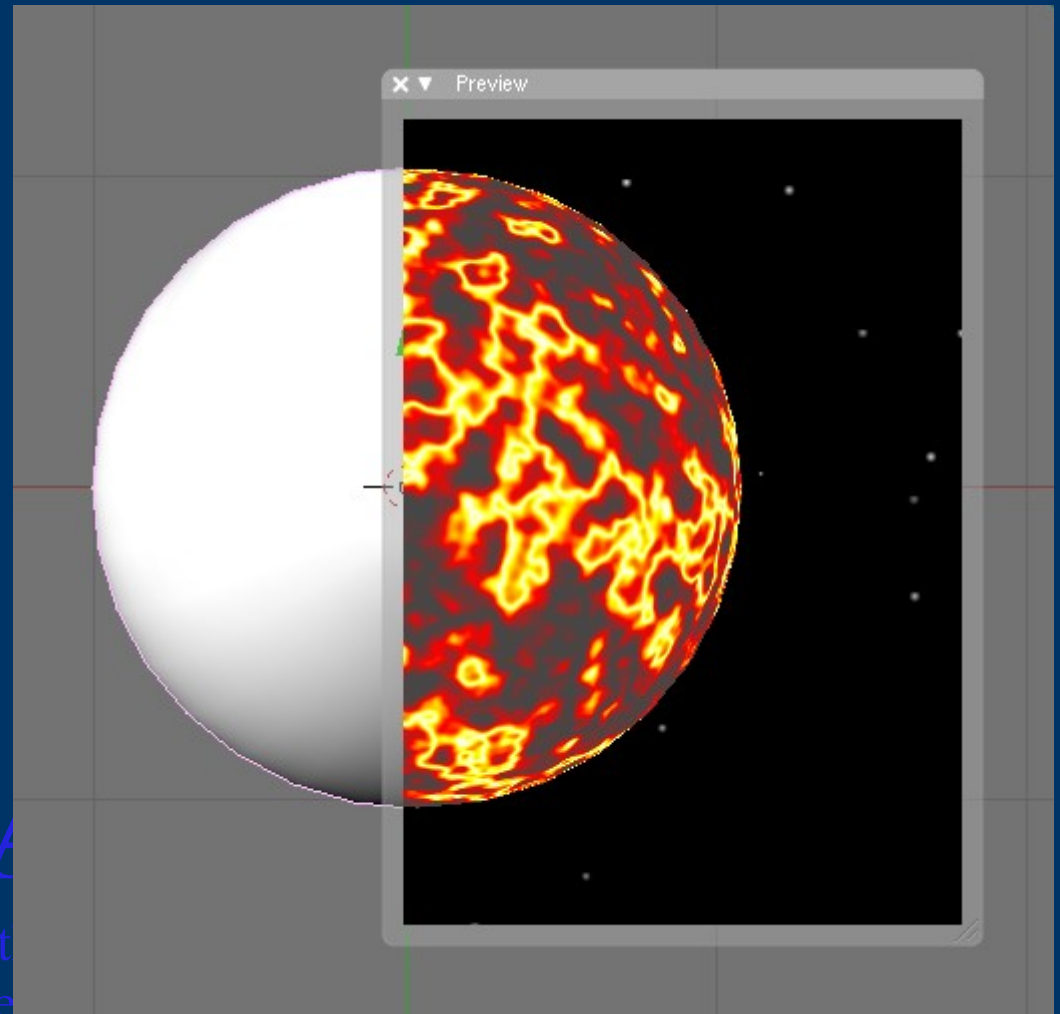
- On a new object, merely select an existing material from the list
- The material shows the number of users of that material
- If you want to change the material, *it will affect the material on ALL other objects that use the same material...*
- ...unless you make a single user copy of the material by clicking on the “number of users” button



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# Material preview

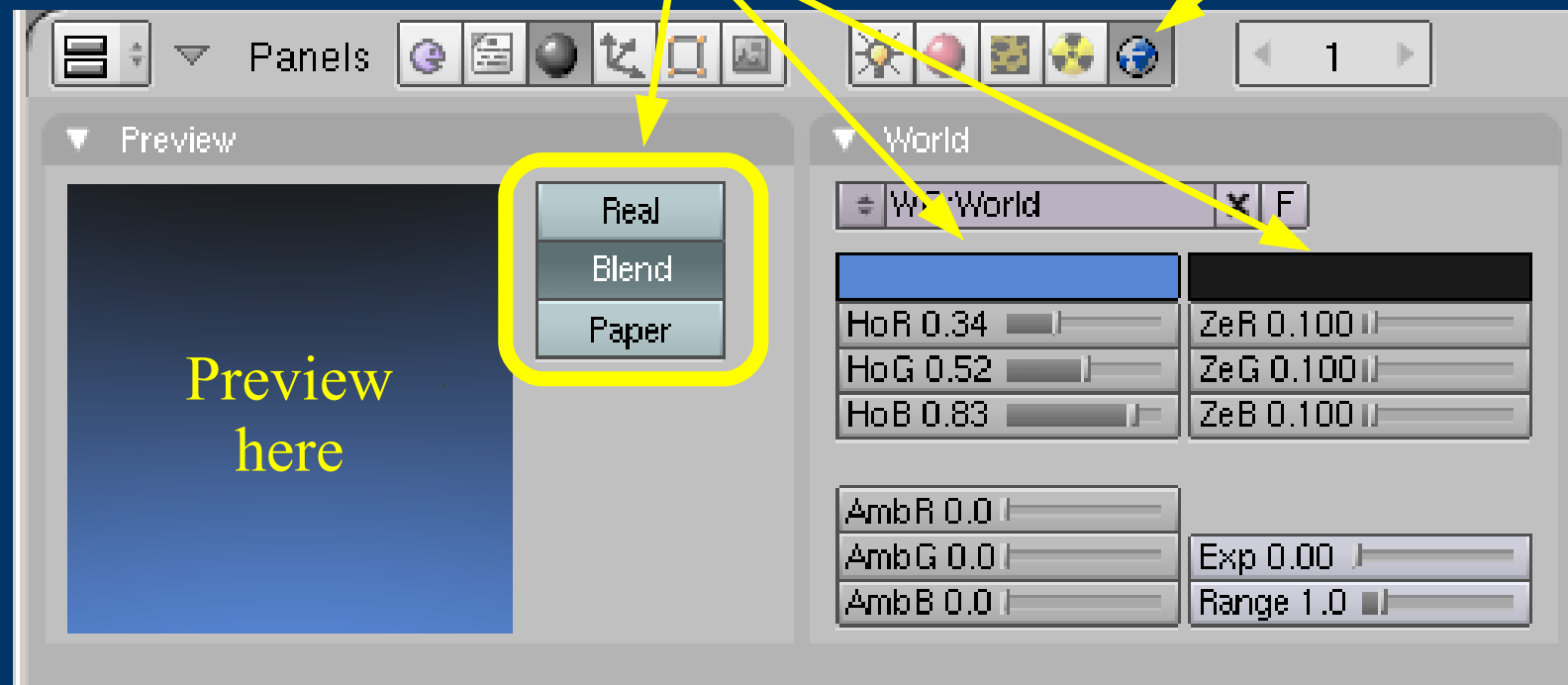
- Material Preview = Shift+P-Key
- Best in Object mode
- If preview does not update, move it slightly or change its size



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# Changing your world's colour

- Change the world's colour by pressing the “world” button or shortcut **F8**
- Change colours here



# Self-teach: Preparation

We have not learnt this yet, so before you start:

- Make sure you have at least one light (or more) in the scene – away from the object (not inside it):
  - Space -> Add -> Lamp -> Lamp
  - If the light is too light/dark, select the lamp and change the Energy by pressing **F5**
- Make sure the camera is aimed at the object by pressing **NUM0-KEY**. Move it if necessary
- Render by pressing **F12**
- Once rendered, you can save the rendered image by pressing **F3**

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# Self-teach 1: Allocating colours to faces

- Create a cube. Give it a colour
- Give every face another colour, e.g. red, blue, green, yellow, purple, white (tip: edit mode: F5 and F9). Save the file
- Make a copy of the cube and move it away from the original
- On the 2<sup>nd</sup> cube, make opposing faces the same colour, i.e. the 2<sup>nd</sup> cube will only have 3 colours. Remove any unnecessary colours. Save the file.
- Render
- Change your background colour and re-render.

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# Self-teach 2: Colours to faces and changing material attributes

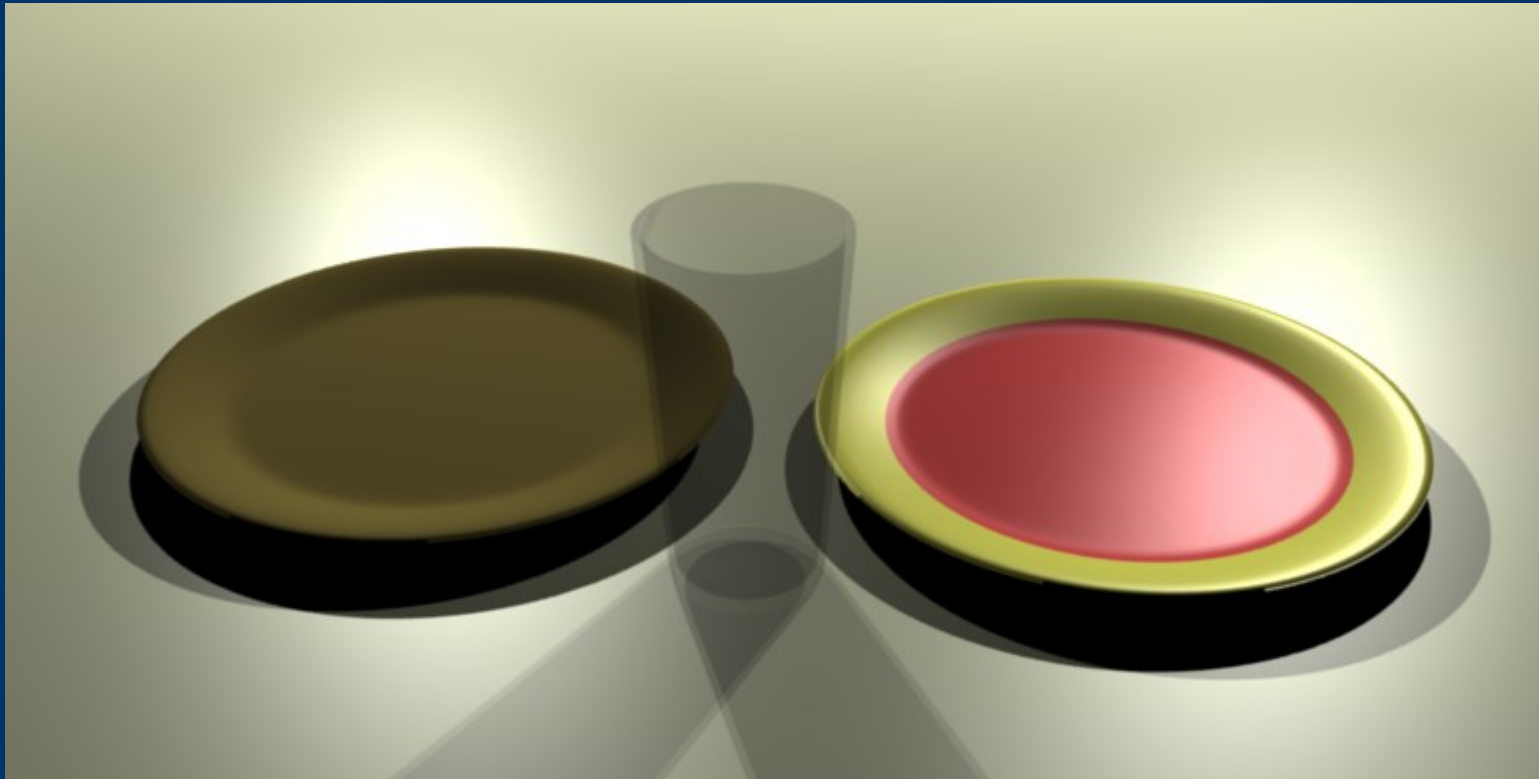
- Model a plate and a glass on a flat plane. Both should have thickness (i.e. not only a flat plane):
  - Give the plate an earthy-brownish non-enamelled colour (Tip: low level of specularly). Save the file
  - Copy and move the plate. Change the colours to be different inside and outside – ONLY for the second plate. Change the specularly to give it a very enamelled (shiny) feel. Save file
  - Make the glass transparent. Ensure that the glass's shadow is also transparent
- Render the image
- Example on next page

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# Example of plates and glass



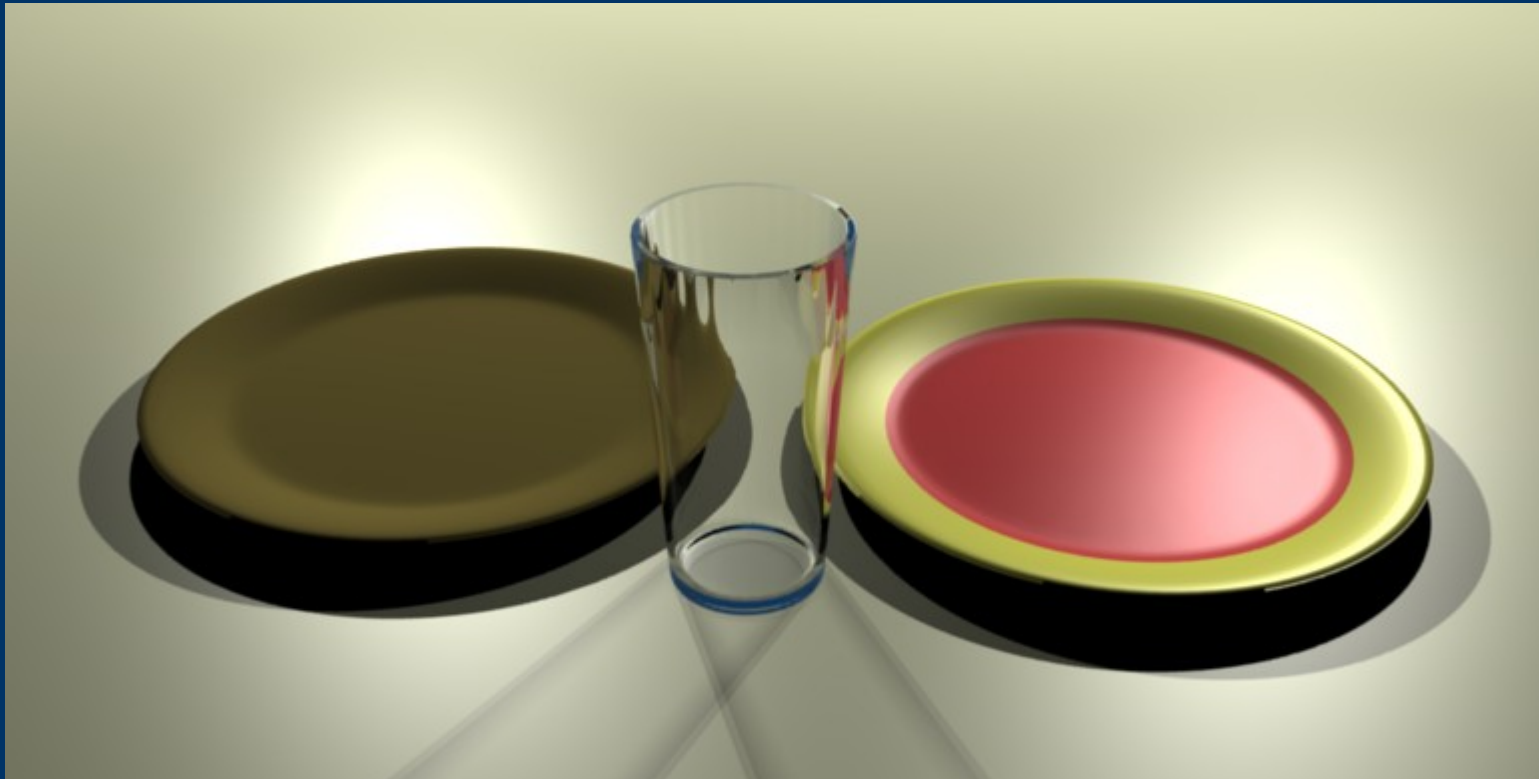
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- (But a glass doesn't *really* look like this)

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# *What a glass should really look like*



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- To fix the glass, read up on more advanced mirroring and transparency... & let's talk next time

## *Self-teach 3: Rubik's cube*

- Make a Rubik's cube like the one (duplicated and rotated) shown here.
- The tricky part is extruding the faces...

