3d Modelling:

Blender - Kick-off

iT Centre Learning

iT services

UNIVERSITY OF OXFORD

The small print

Prerequisites

Time in the workshop is precious – it is an opportunity for you to interact with the workshop leader and other participants through questions and discussions and to share your experiences and concerns. To make the most of this time we sometimes ask you to carry out learning activities ahead of the workshop so that everyone comes into the class with the same basic knowledge. We keep this prior learning to a minimum and often make use of online videos. Online videos provided through LinkedIn Learning can be accessed free of charge by University members anytime, anywhere, through a browser or app.

Your course booking will tell you if any prior learning activity is required. If you don't have an environment where you can do this learning, you can come along to one of our LinkedIn Learning sessions. These are a quiet space where you can work through videos or other workshop resources.

If you arrive for a workshop without having done the prior learning, the workshop leader may suggest that you come back on another session.

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About the workshop designer

Carl Wenczek is a very experienced architectural illustrator and an expert in 3d modelling and 2d imaging. He is a Director of his own small company and over the last 18 years has built long lasting relationships with his clients, creating 100's of illustrations and helping them convey their ideas and designs.

Running parallel to his commercial work, Carl is also a part-time lecturer in multimedia and has been teaching at Oxford University's IT Services for the last 17 years, delivering courses in Photoshop, Illustrator, InDesign, After Effects, Blender, GIMP, Inkscape and digital photography.

Carl also coaches Paddlesport (kayaking, canoeing and stand up paddling) and Indoor Climbing. These sports are often coached in demanding and dynamic environments and require a calm persona!

Revision history

Version	Date	Author	Comments
1.0	November 2019	Carl Wenczek	First version
2.0	May 2020	Carl Wenczek	Adapted to workshop format, added and updated further information
2.1	May 2021	Carl Wenczek	Moved Learning Objective 04
2.2	August 2022	Carl Wenczek	Removal of L.O. 15, 16 and 17

About this workshop

3d modelling can be very frustrating. 3d modelling software is unlike any other type of software that you will have used and the process of 3d modelling doesn't usually match your experience in the real world.

What you will learn

This workshop will make the process more intuitive by breaking it down into a series of relatable activities. We will be working with a ready-made 3d model/environment and experimenting with navigation, lighting, materials, rendering and very simple work with 3d models.

What you need to know

You do not need any prior knowledge of *Blender* or 3d modelling.

This workshop will cover:

- Understand how to navigate a 3d modelling environment
- Explore a 3d model
- Make simple adjustments to a 3d model
- Import and export 3d models
- Manipulate simple lighting and materials
- Output (rendering)

If you need to review these activities, LinkedIn Learning is a great place to get guidance. There is an activity with relevant videos in the IT Learning Portfolio: visit skills.it.ox.ac.uk/it-learning-portfolio and search for "Blender" or "3d modelling activity".

The resources you need

Sample documents that you can use to experiment with will be made available, but you may like to bring along your own.

The resources for most workshops, including any pre-course activity, are in the IT Learning Portfolio: visit skills.it.ox.ac.uk/it-learning-portfolio and search for "Blender" or "3d modelling".

Unless you have been told otherwise, in classroom workshops there will be a computer available for you to use with Blender installed.

You can use your own computer with your preferred app installed if you want to – just bear in mind that I am not an expert in every app (although I am sure that between us we will be able to sort out most problems!)

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Learning Objective 11 - Lighting
Learning Objective 12 - Materials
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Learning Objective 14 - Create and apply materials
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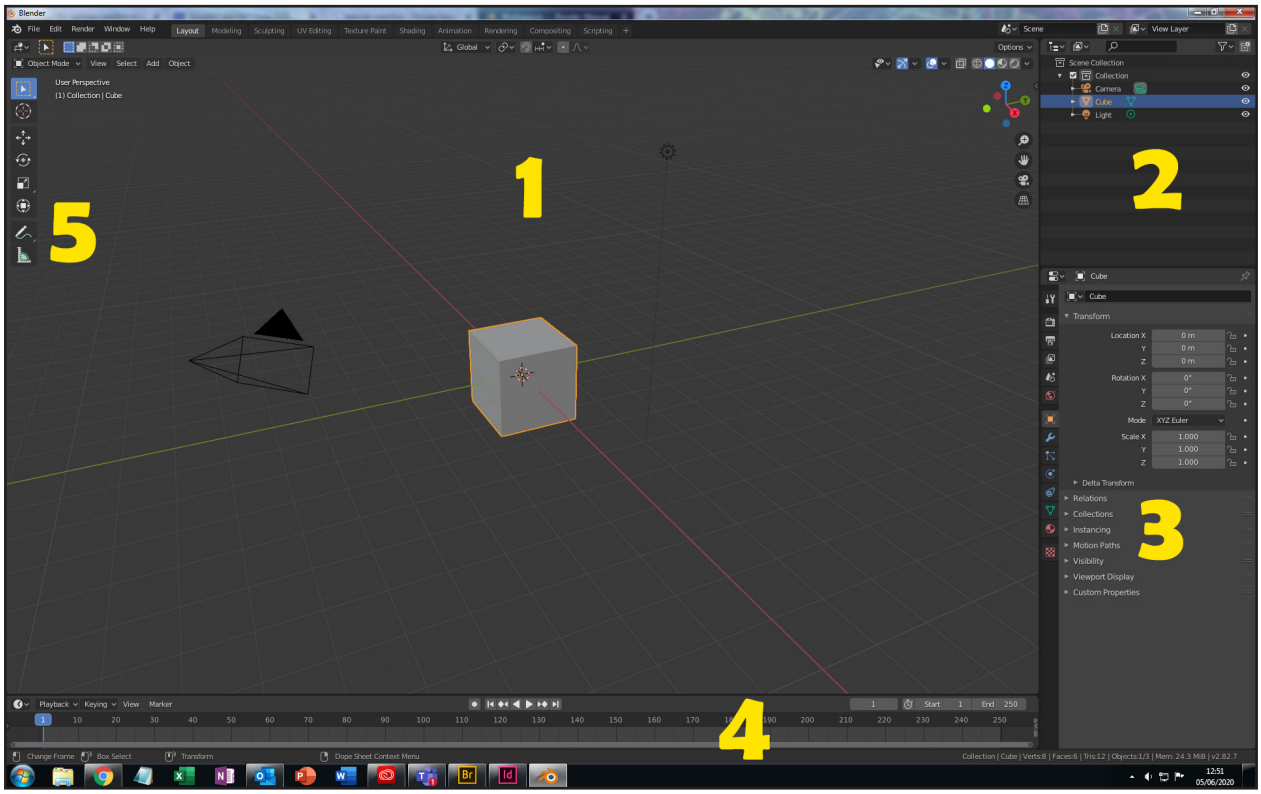
Learning Objective 01 - Introduction and the interface



What can Blender do? Blender is a computer graphics program that allows you to produce high-quality still images and animations using three-dimensional geometry.

1 = **3d Viewport** (*the 3d Viewport is used to interact with the 3d scene for a variety of purposes, such as modelling and animating*).
2 = **Outliner** (*the Outliner is a list that organizes scene data*).
3 = **Properties editor** (*The Properties editor shows and allows editing of many active data, including the active scene and object*).
4 = **Timeline** (*the Timeline gives the user a broad overview of a scene's animation, by showing the current frame, the keyframes of the active object and the start and end frames of your animation sequence*).
5 = **Toolbar** (*The Toolbar contains a set of interactive tools.*)

Learning Objective 02 - Setting Preferences

The Blender Preferences dialog contains settings to control how Blender behaves.

Task

• Choose **Edit>Preferences...**

Options are listed to the left of the Preferences dialog box.

• Choose the following preferences:

Viewport>3D Viewport Axis>Interactive Navigation

Navigation>Zoom to Mouse Position

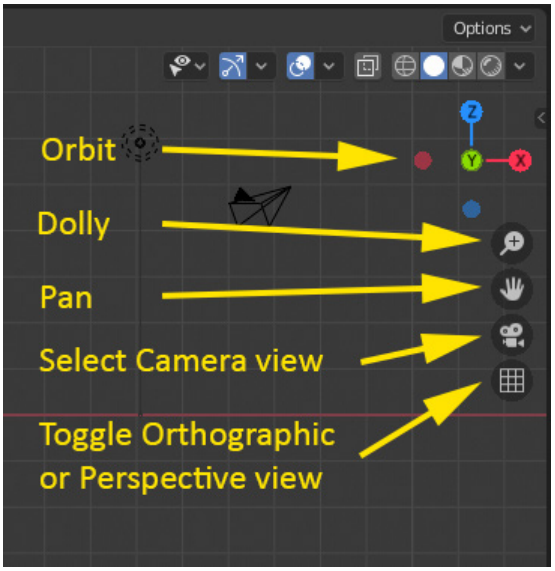
Keymap>Industry Compatible (from dropdown menu at the top)

System>Undo Steps

Save & Load>Auto Save>Timer (mins)

File Paths>

Learning Objective 03 - Navigation



Task

• Experiment with the following navigation tools (see image above):

Dolly (middle mouse wheel or ALT + right mouse button)

Pan (ALT + middle mouse wheel)

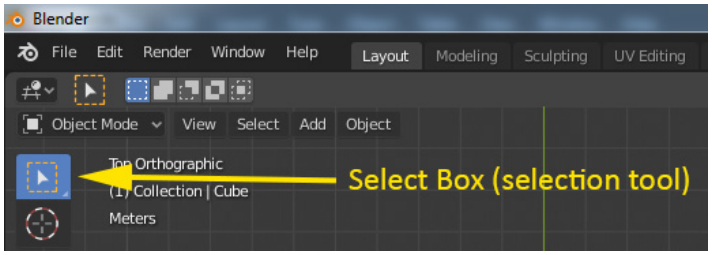
Orbit (ALT + left mouse button)

User Perspective/Ortho, **Camera**

Top, **Front** etc. (View>Viewpoint>Top etc.)

Toggle Quad View (View>Area>Toggle Quad View)

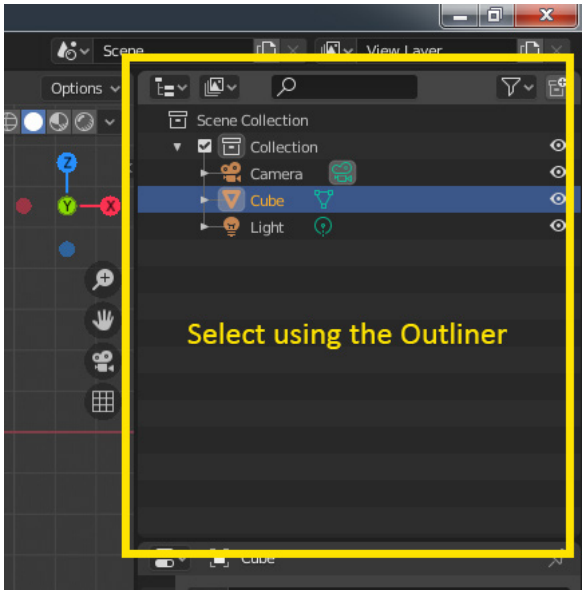
Learning Objective 04 - Selecting



Task

• Use the **Select Box** tool, from the toolbar (see image above), to select objects by clicking on them (*hold SHIFT down while selecting to select more than one object*) or clicking-and-dragging around them (i.e. creating a selection box).

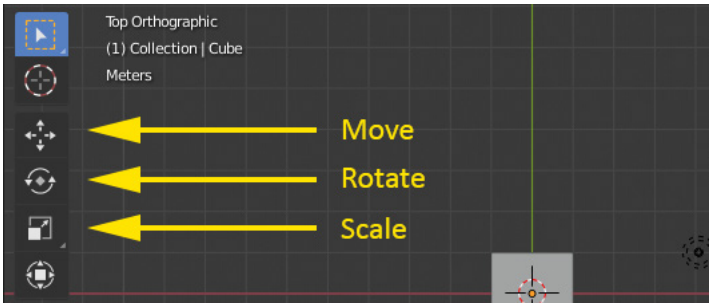
• **Deselect** by clicking in empty space away from an object.



Task

• Use **Outliner** to select items by clicking on their icon/name (see image above).

Learning Objective 05 - Transforming (freehand)



Task

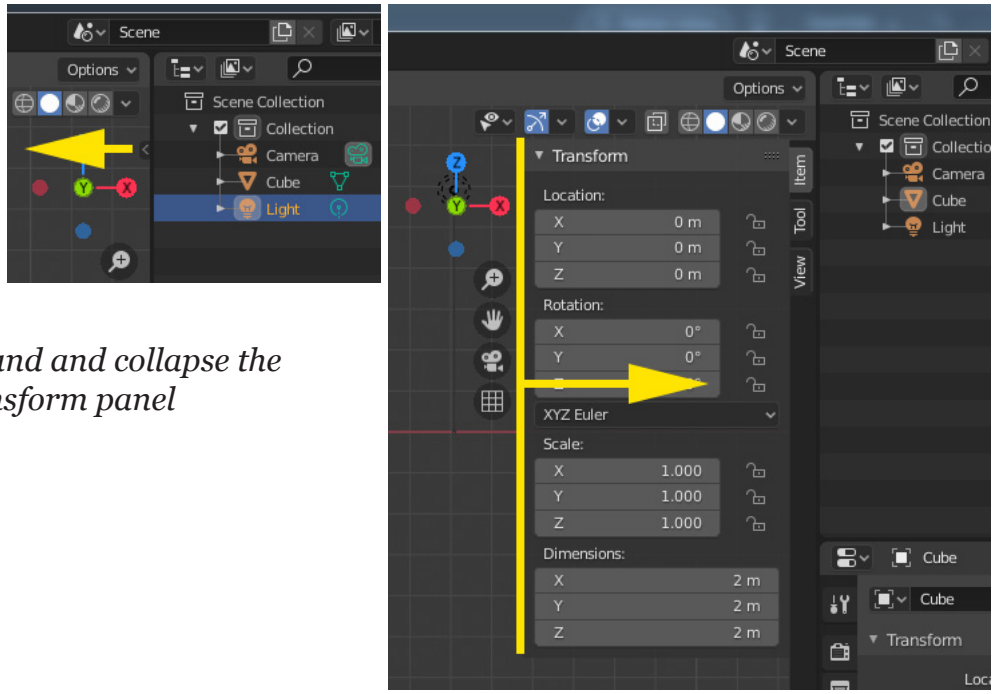
• **Select** an object and then use the following tools, from the toolbar, to transform the object (see image above):

Move

Rotate

Scale

Learning Objective 06 - Transforming (by numbers)



Expand and collapse the Transform panel

Task

- Use the **Transform** panel to transform objects by typing in values.

Learning Objective 07 - The Camera

In Blender we can view our scenes using the orthographic views (top, front, etc.) and our User Perspective/Orthographic views. However, we cannot generate still images or animations from these views. To generate a still image or an animation you need a camera.

Cameras are invisible in renders, so they do not have any material or texture settings. However, they do have Object and Editing setting panels available which are displayed when a camera is the active object.

You automatically have a camera as part of any new scene (as well as the cube and a light) and you can add additional cameras.

Task

• **Toggle Quad View** (so that you have the four window view).

• **Toggle the camera view** in the top-right window.

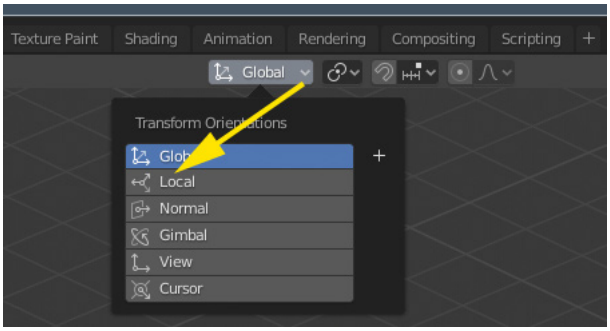
• **Select the camera**.

• Experiment with **moving** and **rotating** the camera

You may have noticed that when we move, scale or rotate our objects the transformation axis is aligned to the world or global axis. Sometimes it is more useful to use the object's own axis, it's local axis.

Task

• Change the **Transformation orientation** from Global to **Local** and then try moving it (see image below).



Load lick off 01.blend

Learning Objective 08 - Camera lenses

Blender's camera system is based on the 35mm format. For further information see:

https://en.wikipedia.org/wiki/35_mm_format

Just like a real-world 35mm camera system, you can select different lenses for your Blender cameras.

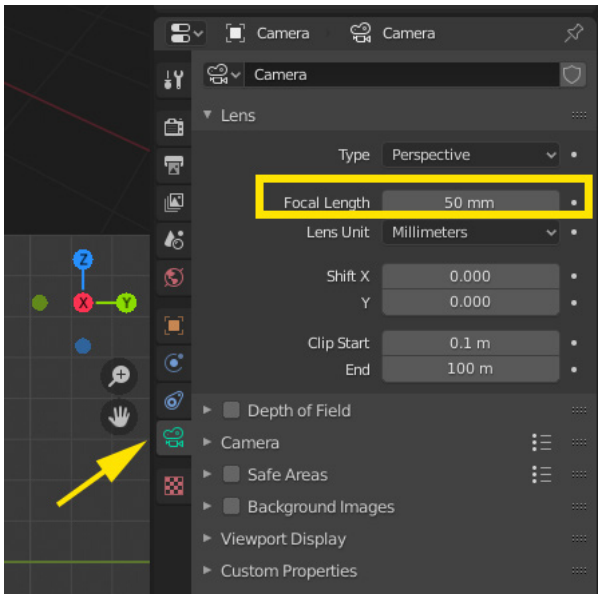
Task

• Ensure that you can see you camera view.

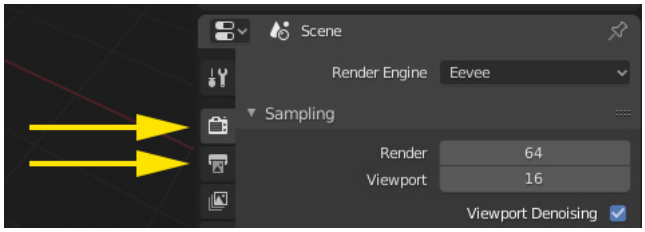
• **Select the camera**.

• From the **Properties** panel (see image below), select the tab for the camera properties.

• Change the camera's **Focal Length** (see image below) and move the camera to recompose.



Learning Objective 09 - Rendering and render settings



Rendering is the process of turning a 3d scene into a 2d image. Blender has three render engines listed here in order of quality, with the highest quality/longest render time at the top of the list:

Cycles is a physically based path tracer (slowest to render, highest quality).

Eevee is a physically based realtime renderer.

Workbench is designed for layout, modeling and previews (fastest to render, lowest quality).

The render engine is selected from the Render Properties tab in the Properties panel (see image above).

The **render size** is selected from the Output Properties tab in the Properties panel (see image above).

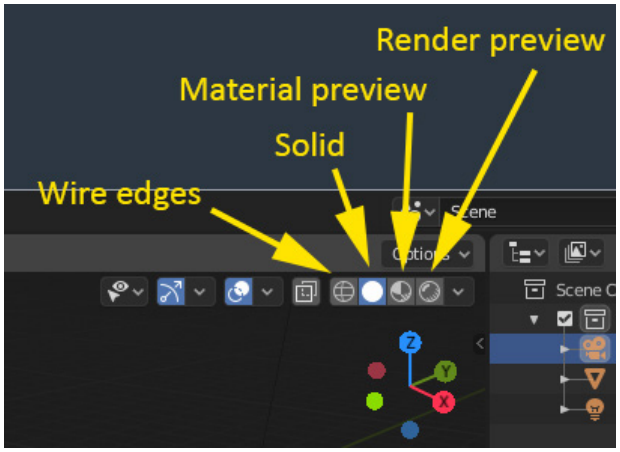
Task

• Render your scene using each of the 3 render engines.

• Change the size of your render.

• Save your render using the **Image>Save As...** menu option from the render window.

Learning Objective 10 - Viewport shading



Task

• Experiment with the following viewport shading modes (see image above):

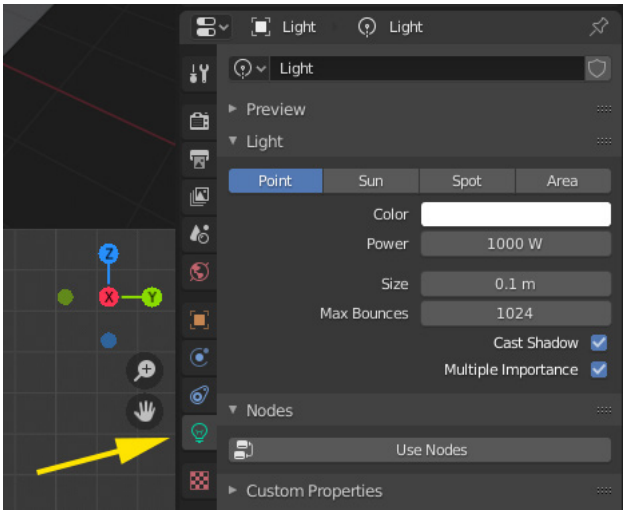
Wire edges

Solid

Material preview

Render preview

Learning Objective 11 - Lighting



Blender has 4 light options: Point, Spot, Area and Sun.

When you create a new scene you are automatically given a single Point light as part of that new scene (along with a camera and the cube object).

Lights can be moved and their properties can accessed and adjusted using the Properties panel (see image above).

Task

• **Select** the Point light in your scene.

• Begin by **moving** the light and rendering the scene to see the effect.

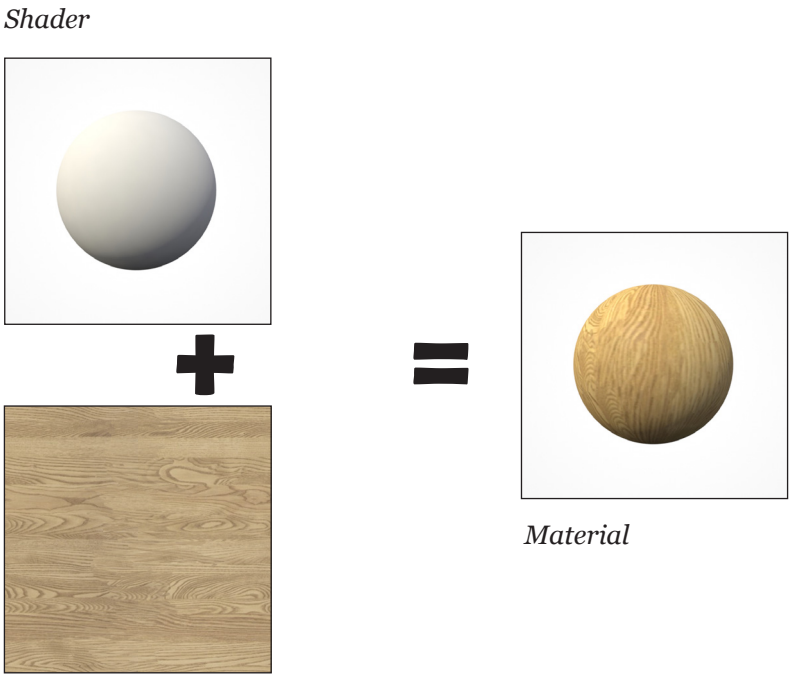
• Next, try **changing the light's parameters** such as Colour, Power, Size and try turning the Cast Shadow on and off. Re-render each time to see the effect of your changes.

• Finally, try **adding a new Spot light** to the scene. Move it, rotate it and adjust it's parameters and re-render to see the effect this has.

Learning Objective 12 - Materials

Materials control the appearance of your objects. They define the substance that the object is made of, its colour, texture and how light interacts with it.

A **material** is made up of a **shader** and a **texture**.

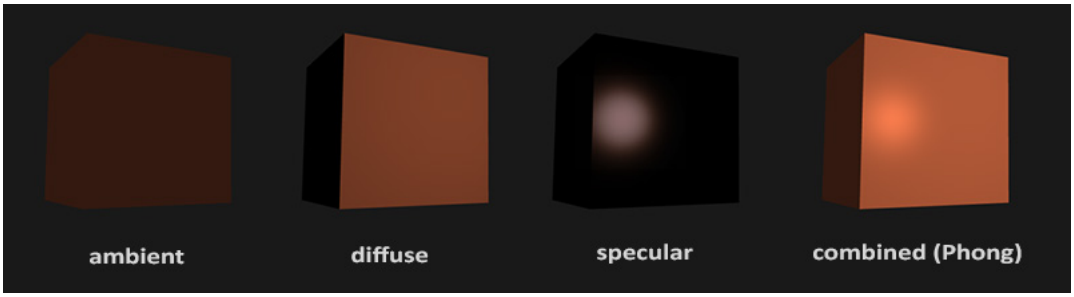


Shader

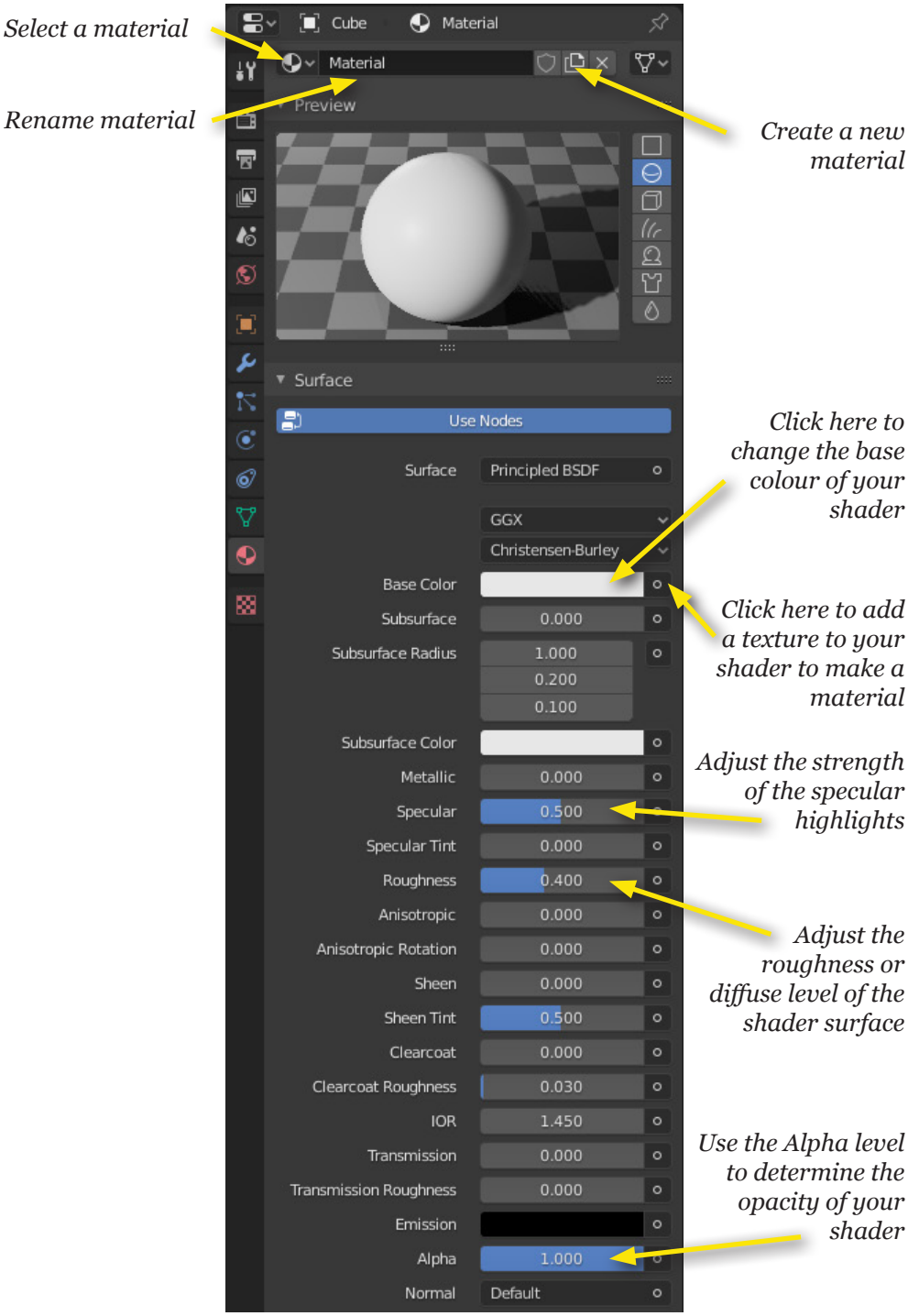
Texture

Material

The appearance of the **shader** and how light interacts with it can be controlled by adjusting it's diffuse and specular properties as well as it's opacity.



Learning Objective 13 - The Material Properties panel



Learning Objective 14 - Create and apply materials

Task

• Create a new material, **shader only to begin with**. Add it to one or more objects in your scene.

• Ensure your material has a name.

Task

• Create a new material and **add a texture**. Assign this material to one or more objects in your scene.

• Ensure your material has a name.

Further information

Getting extra help

Course Clinics

The IT Learning Centre offers bookable clinics where you can get pre- or post-course advice. Contact us using courses@it.ox.ac.uk.

Study Videos from LinkedIn Learning

On our website, you will find our collection of self-service courses and resources. This includes providing LinkedIn Learning video-based courses free to all members of the University. Visit skills.it.ox.ac.uk/linkedin-learning and sign in with your Single Sign-On (SSO) credentials.

Some courses recommend pre- and/or post-course activities to support your learning. You can watch the online videos anywhere, anytime, and even download them onto a tablet or smartphone for off line viewing.

About the IT Learning Portfolio online

Many of the resources used in the IT Learning Centre courses and workshops are made available as Open Educational Resources (OER) via our Portfolio website at skills.it.ox.ac.uk/it-learning-portfolio.

Find the pre-course activity for this course in the IT Learning Portfolio: visit skills.it.ox.ac.uk/it-learning-portfolio and search for “Blender” or “3d modelling activity”.

About the IT Learning Centre

The IT Learning Centre delivers over 100 IT-related teacher-led courses, which are provided in our teaching rooms and online, and we give you access to thousands of on-line self-service courses through LinkedIn Learning.

Our team of teachers have backgrounds in academia, research, business and education and are supported by other experts from around the University and beyond.

Our courses are open to all members of the University at a small charge. Where resources allow, we can deliver private courses to departments and colleges, which can be more cost-effective than signing up individually. We can also customize courses to suit your needs.

Our fully equipped suite of seven teaching and training rooms are usually available for hire for your own events and courses.

For more information, contact us at courses@it.ox.ac.uk.

About IT Customer Services
The IT Learning Centre is part of the Customer Services Group. The group provides the main user support services for the department, assisting all staff and students within the University as well as retired staff and other users of University IT services. It supports all the services offered by IT Services plus general IT support queries from any user, working in collaboration with local IT support units.

The Customer Services Group also offers a data back-up service; an online shop; and a computer maintenance scheme. Customer Services is further responsible for desktop computing services – for staff and in public/shared areas – throughout UAS and the Bodleian Libraries.

3d modelling: Kick-off

Carl Wenczek

IT Learning Programme

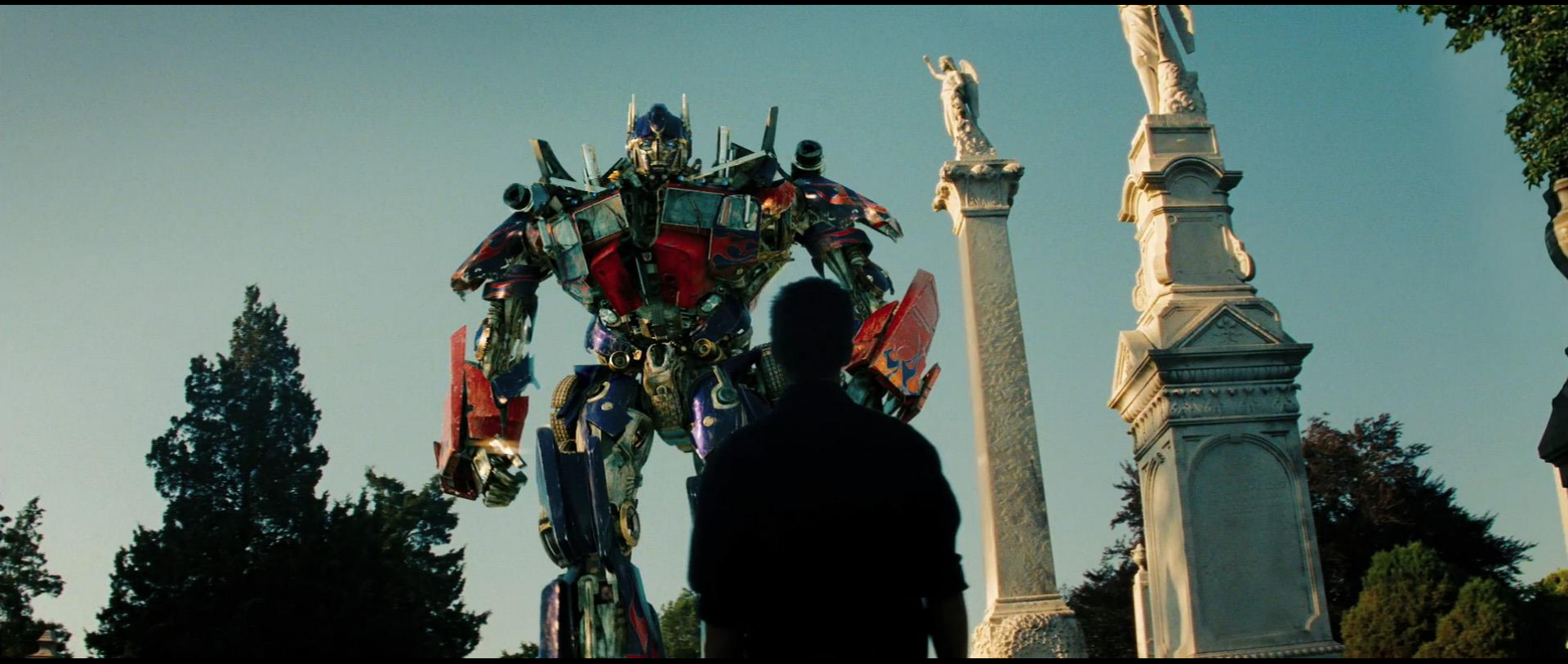
Comfort and safety

Programme

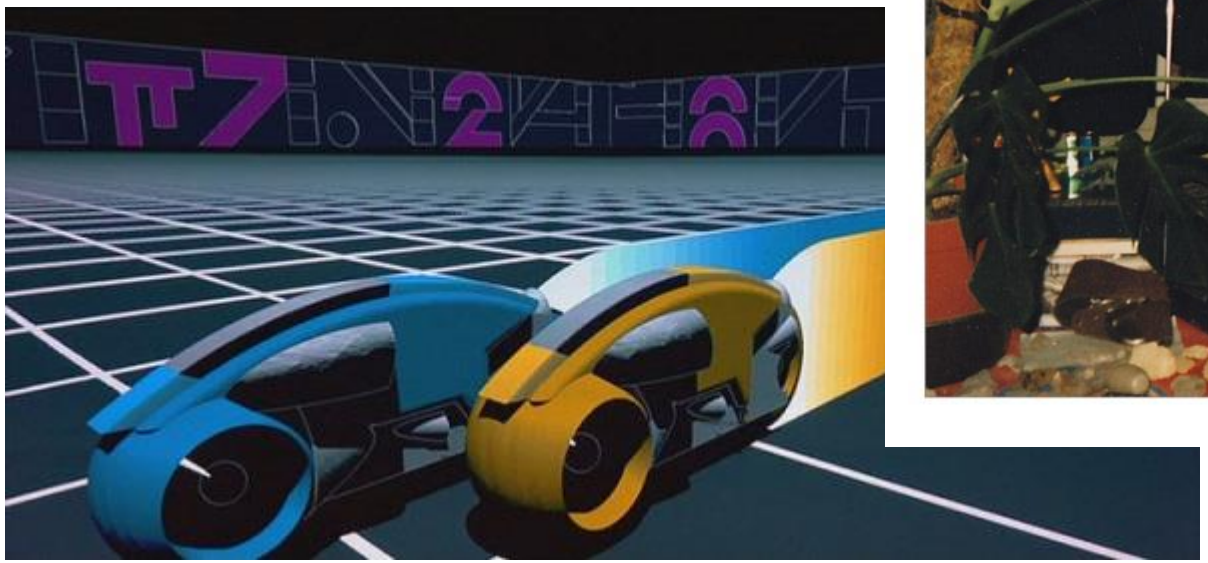
Programme

1. 3d modelling concepts
2. Using a 3d modelling package for the first time
3. Interface
4. Setting Preferences and Properties
5. Navigation
6. Display modes
7. Selecting and Transforming
8. Cameras
9. Lighting
10. Materials
11. Rendering and render settings
12. Basic 3d modelling

Welcome to the wonderful world of 3d graphics



sinclair
ZX Spectrum



Why use Blender?

Why Blender?

Open source

Use on any computer

Tutorials

Easy to use

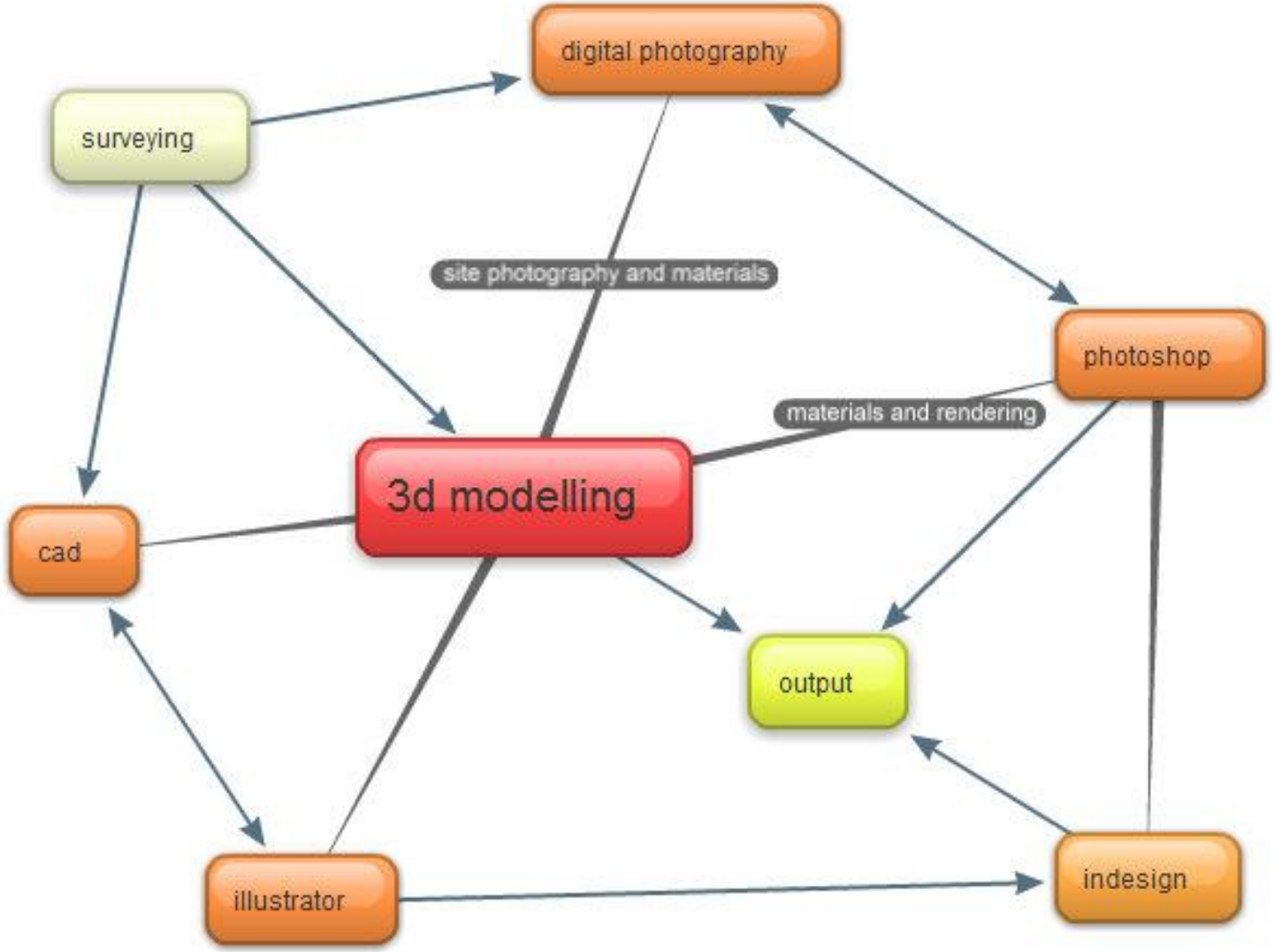
Free

Similar to other 3d modelling applications

Other 3d modelling applications

Working in 3d

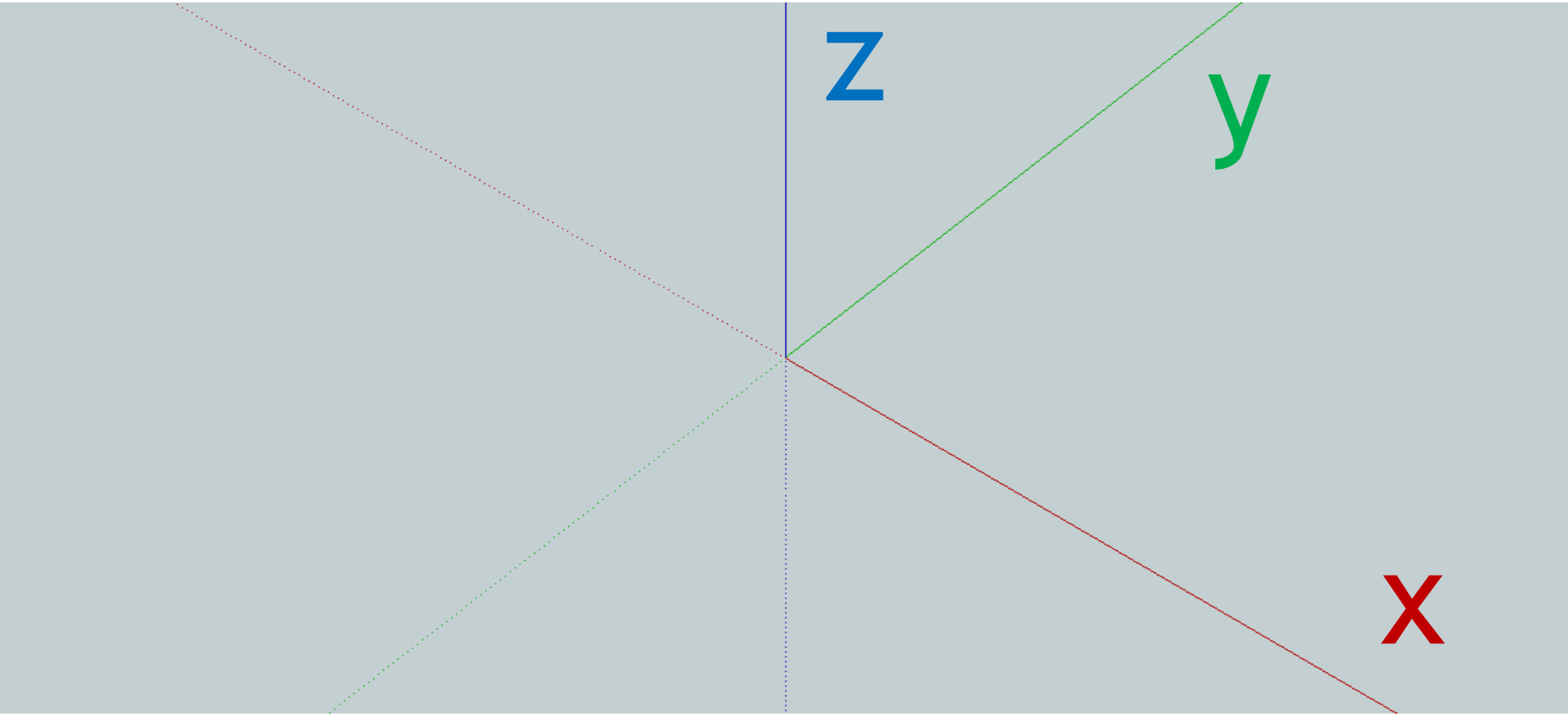
Workflow


digital photography
surveying
site photography and materials
photoshop
materials and rendering
3d modelling
cad
output
illustrator
indesign

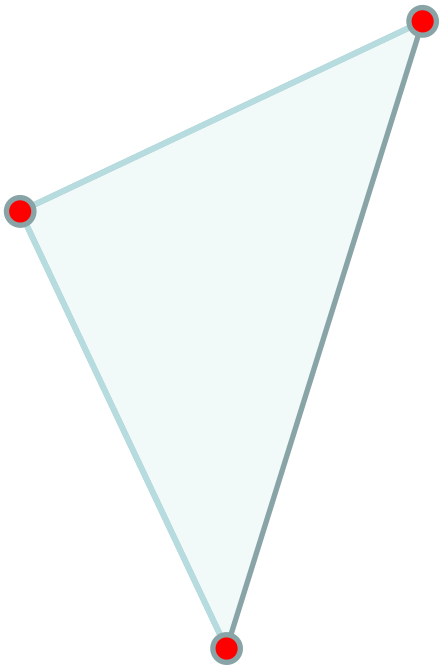
Working in 3d can be confusing

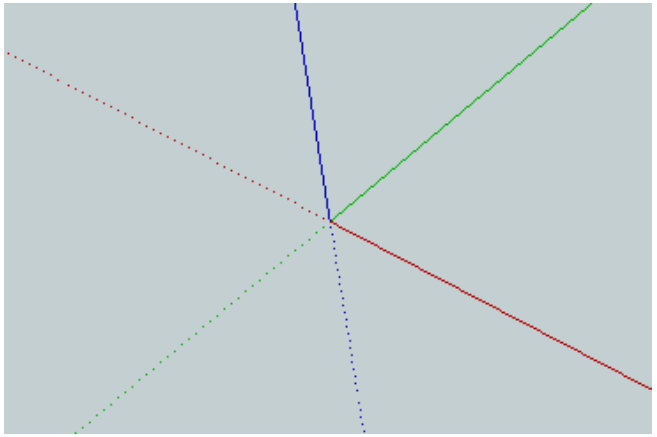
- http://www.michaelbach.de/ot/sze_Necker/index.html
- https://www.illusionsindex.org/ir/necker-cube

Working in 3d



Terminology





extrude

render

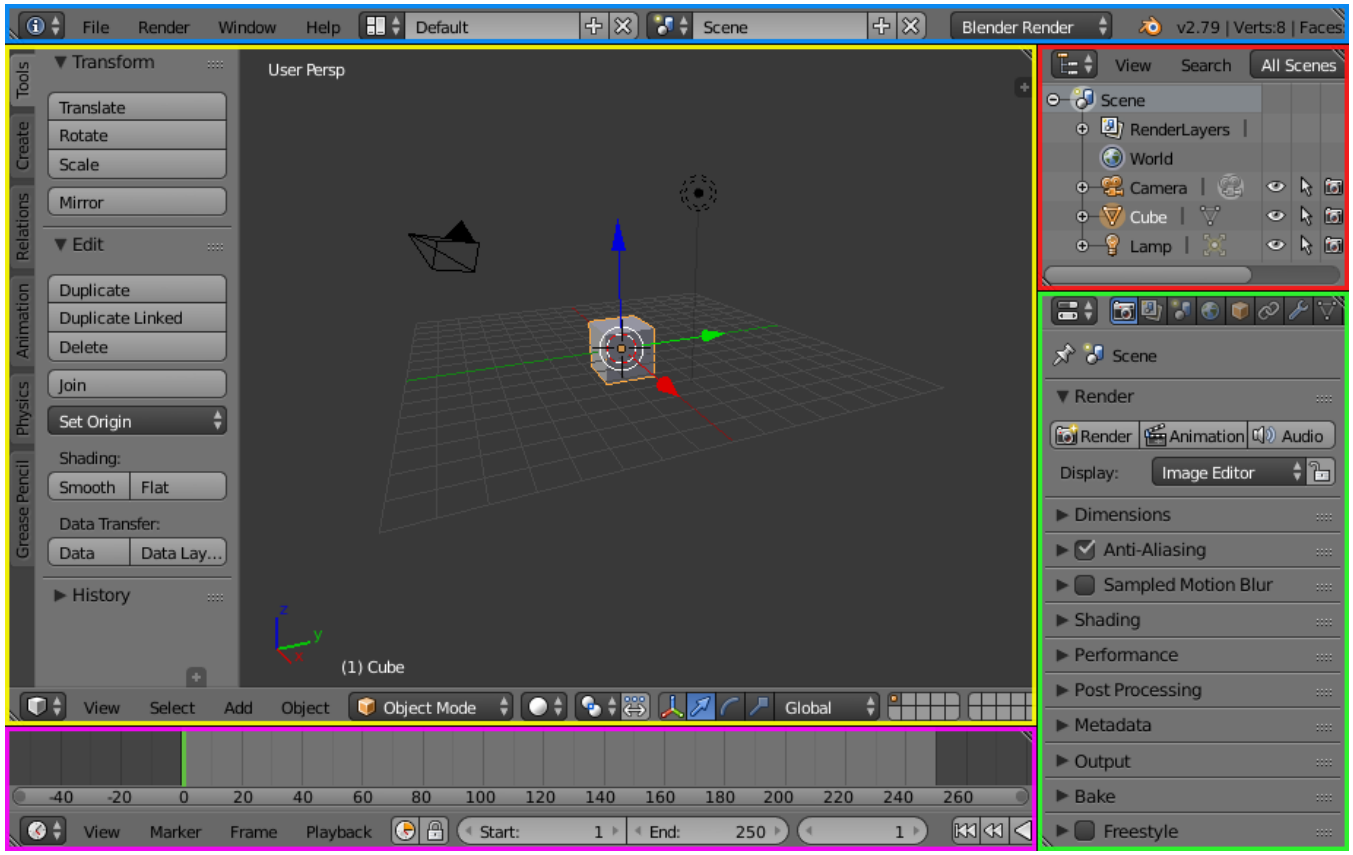
lathe

revolve

https://youtu.be/ouvf-4wciak

Blender

Interface

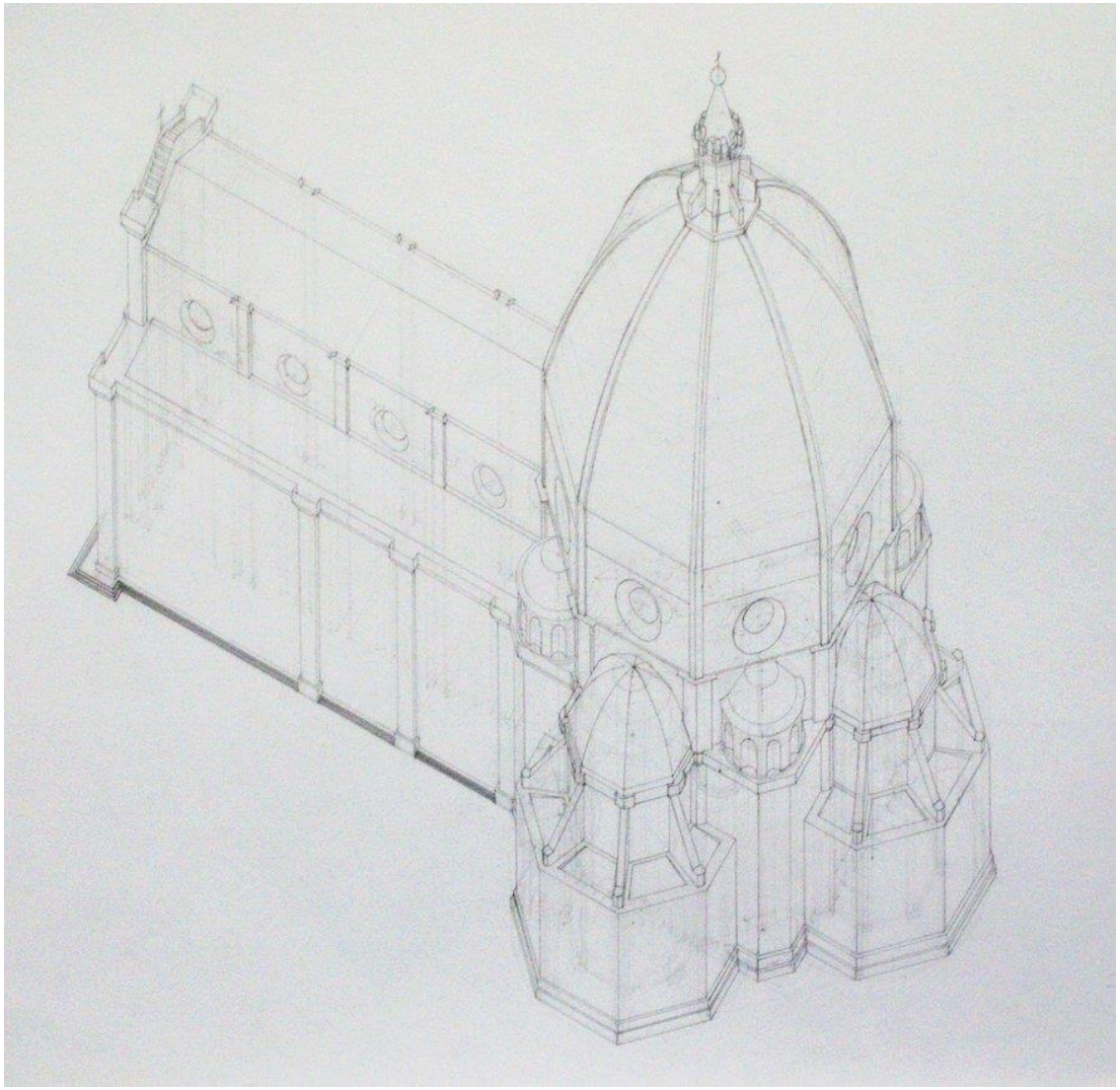


Info (blue), 3D View (yellow), Outliner (red), Properties (green) and Timeline (purple)

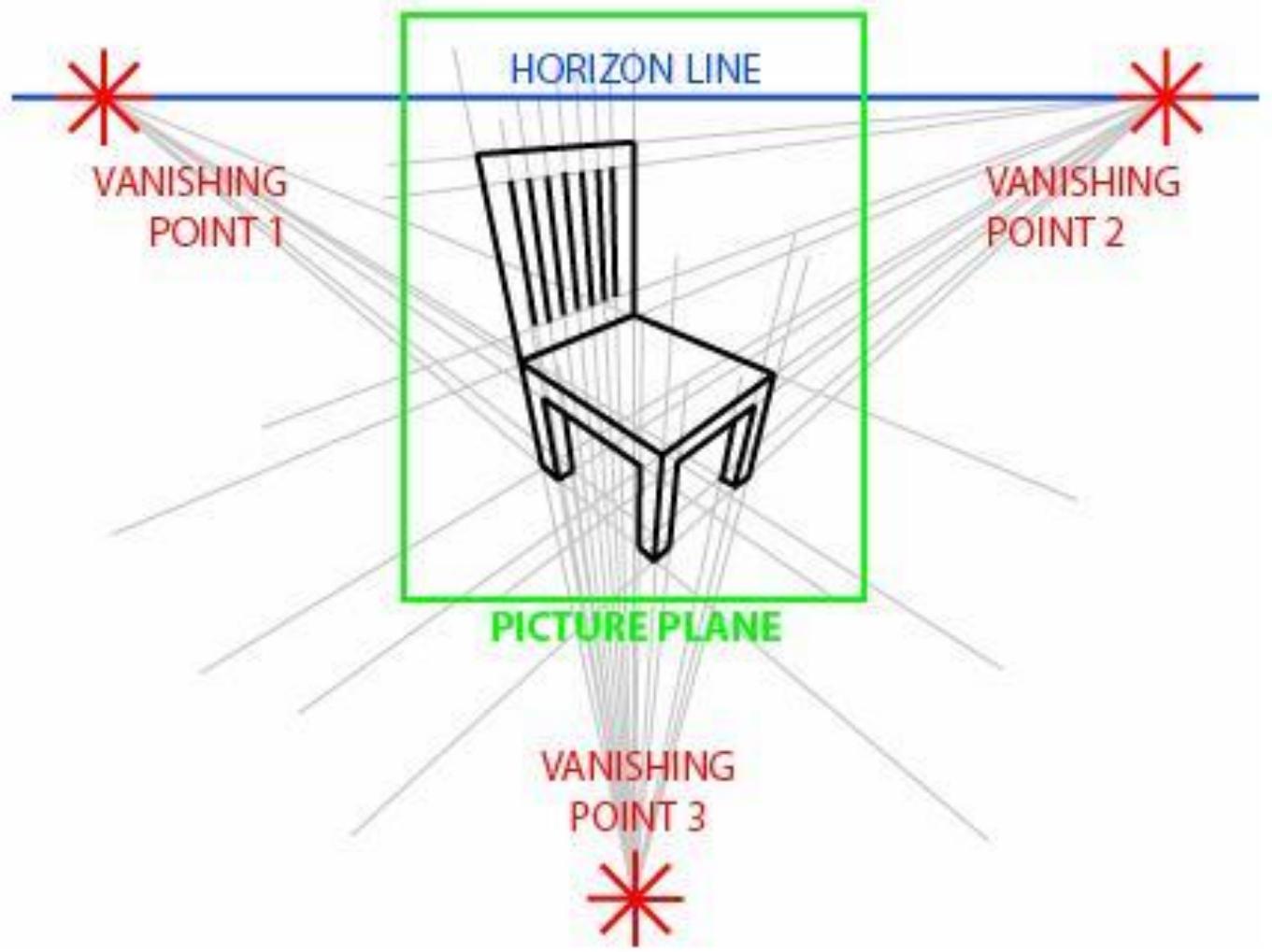
Navigation

Orthographic views 01

Orthographic views 02



Views - perspectives



perspective (three point)

Display modes

Transforming

Camera

Camera Lenses

Focal length and field of view

Telephoto

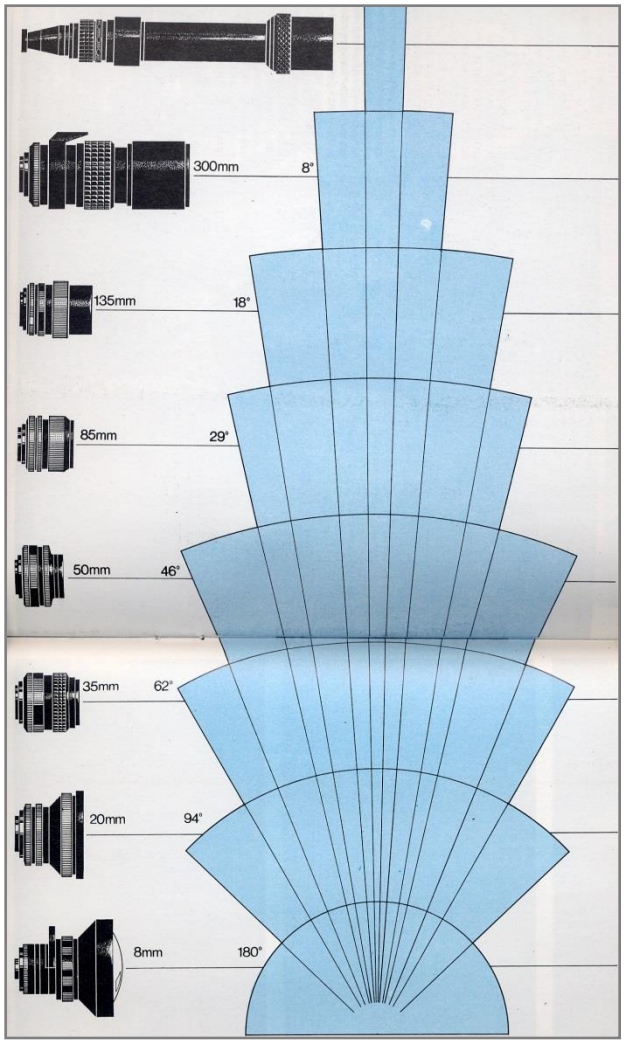
Lenses over 85mm

Normal

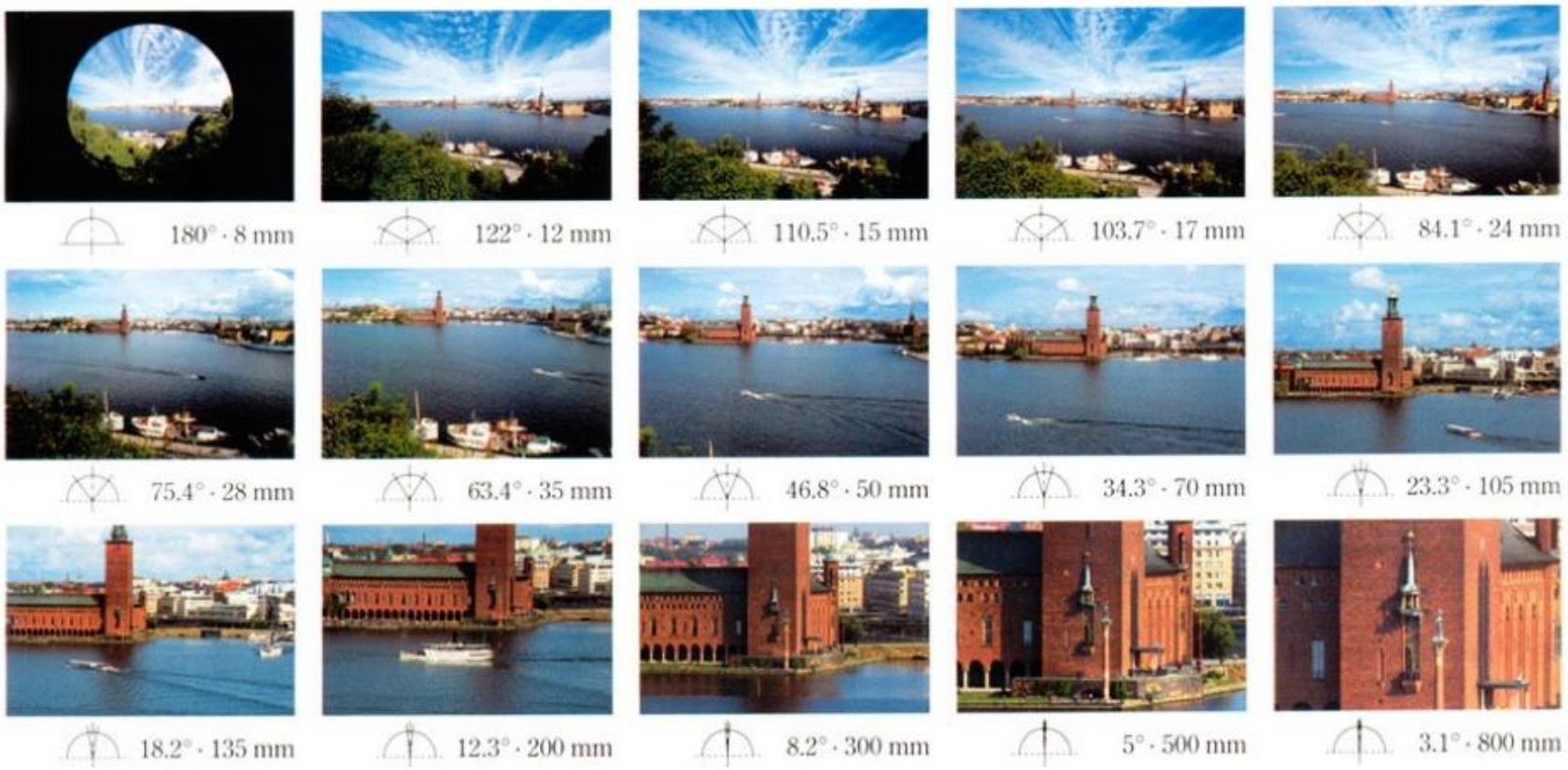
Lenses 40 – 50mm

Wide Angle

Lenses under 40mm



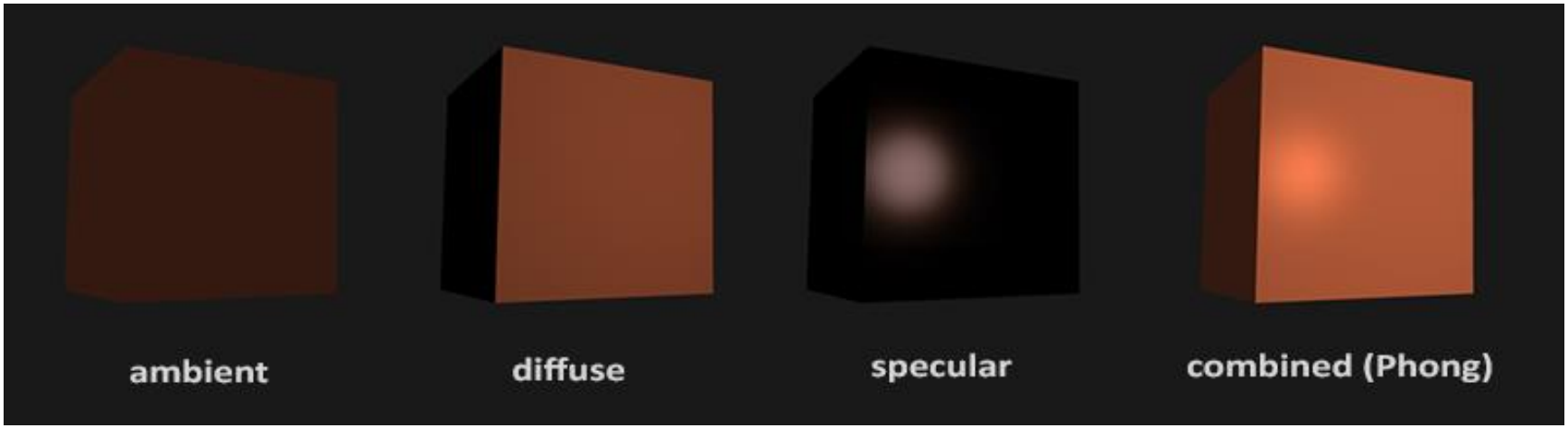
Focal length comparison



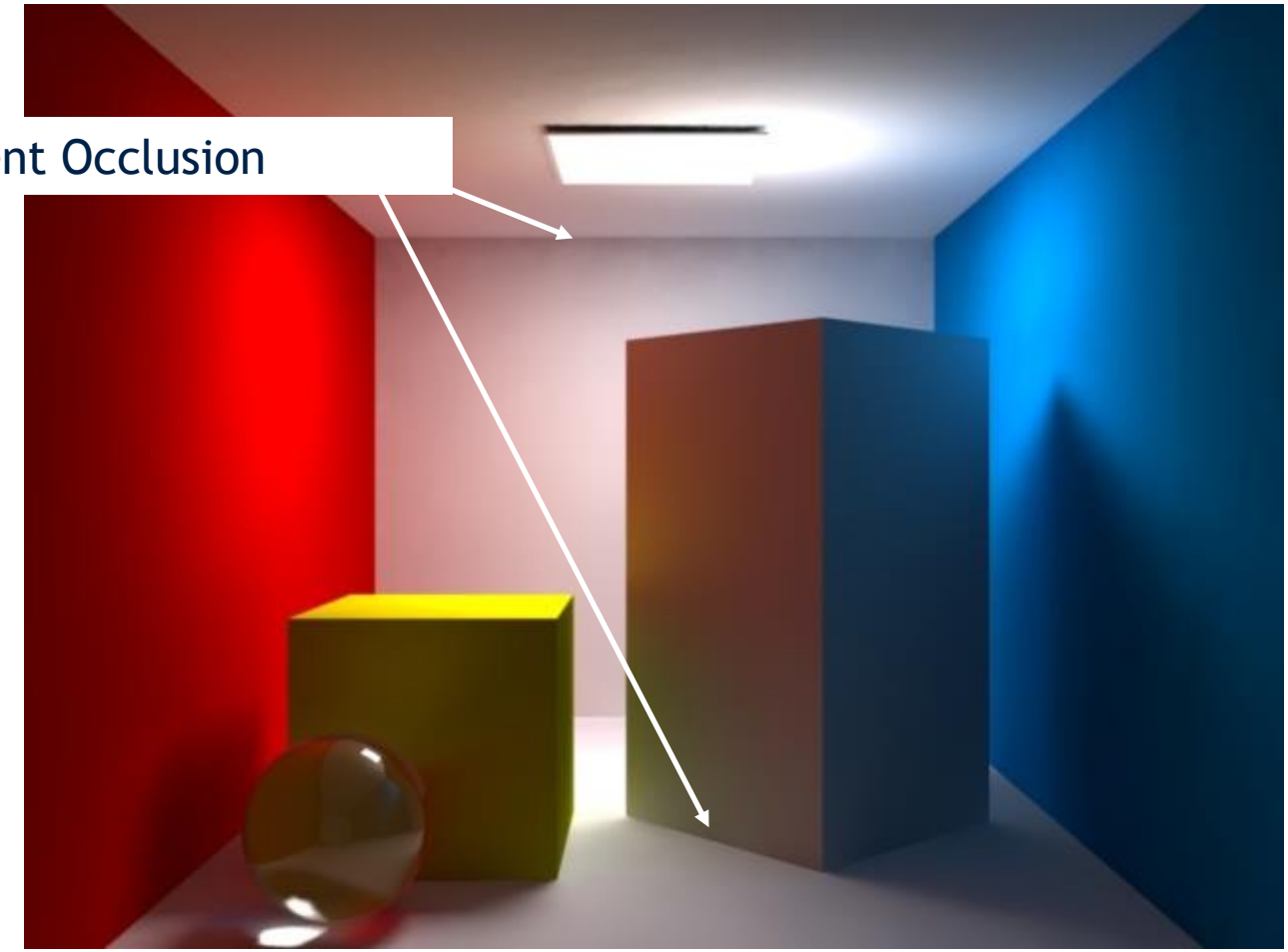
Focal length and perspective

Lighting

Lighting components 01

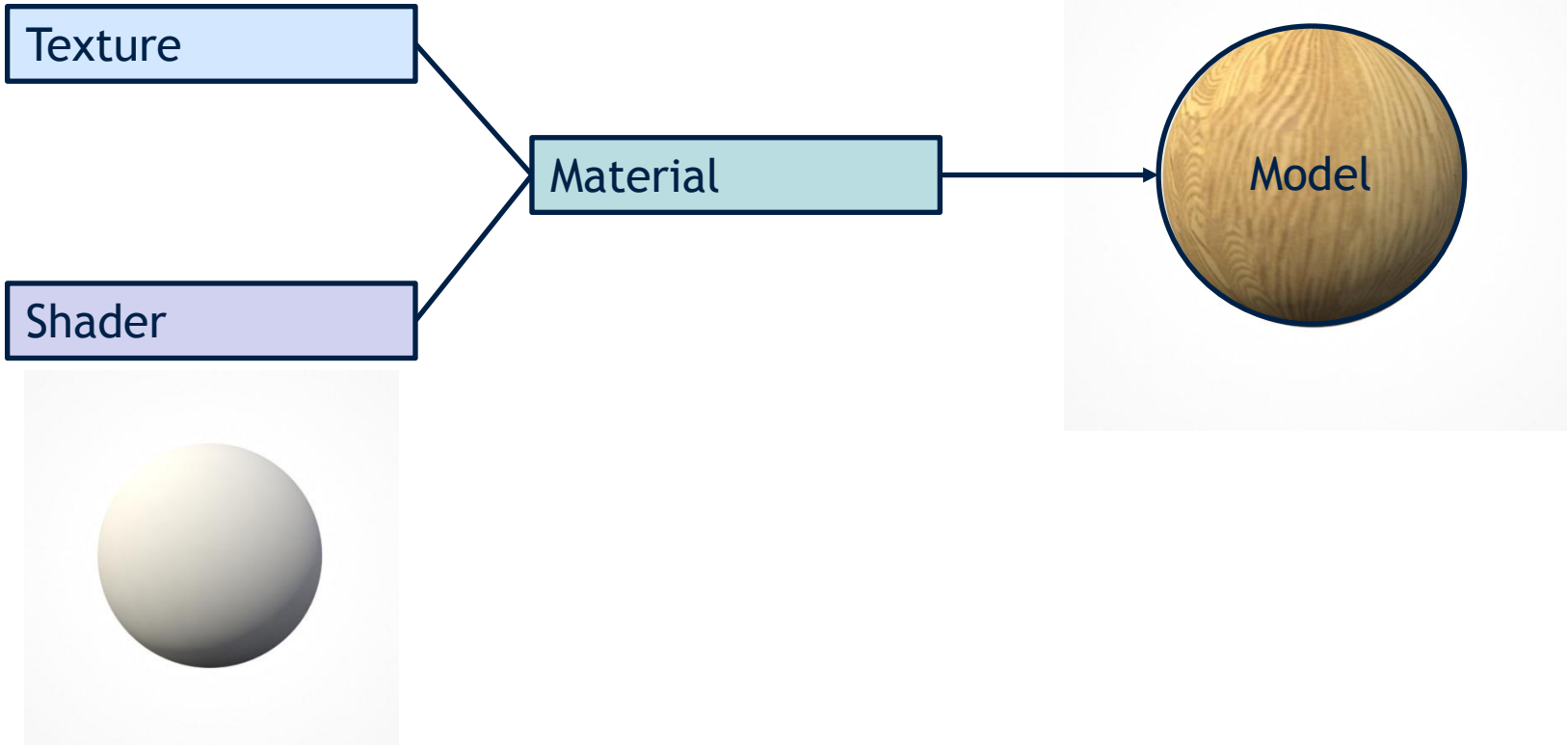


Lighting components 02



Materials

Materials

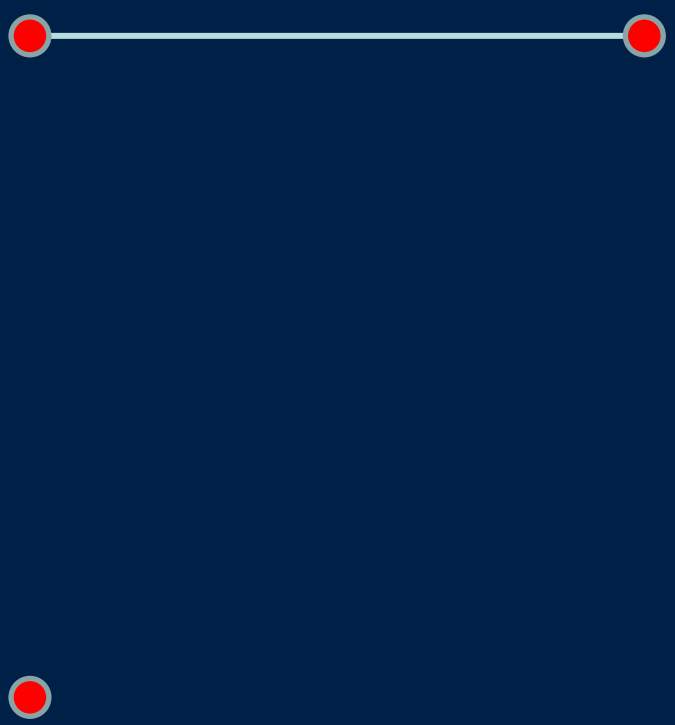


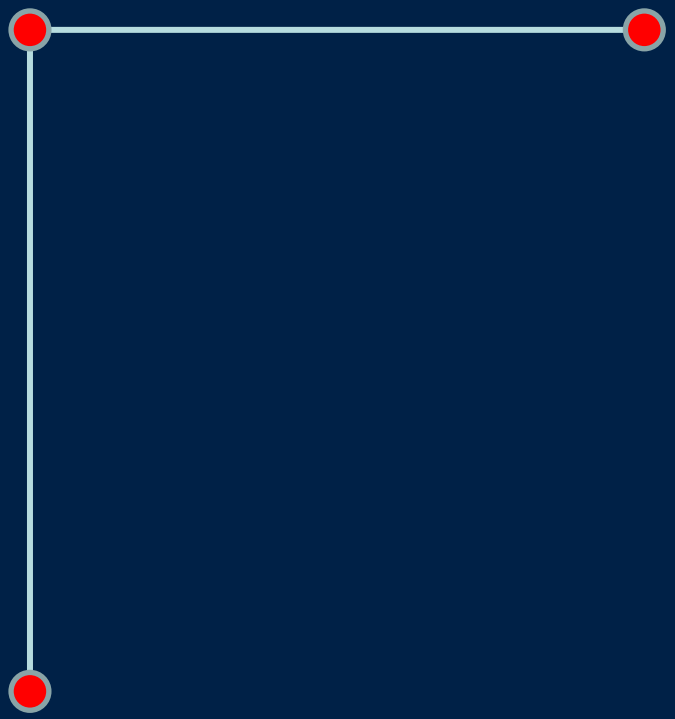
Rendering

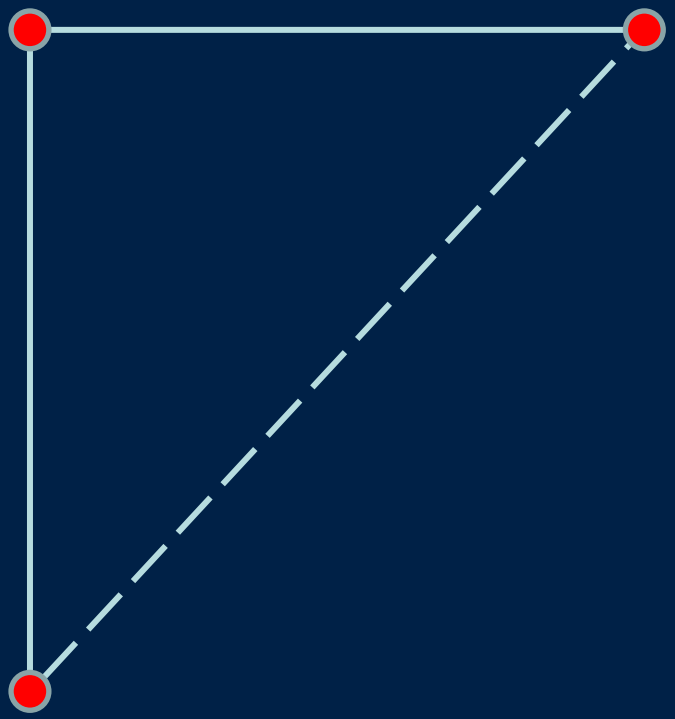
Modelling Concepts

vertex

edge







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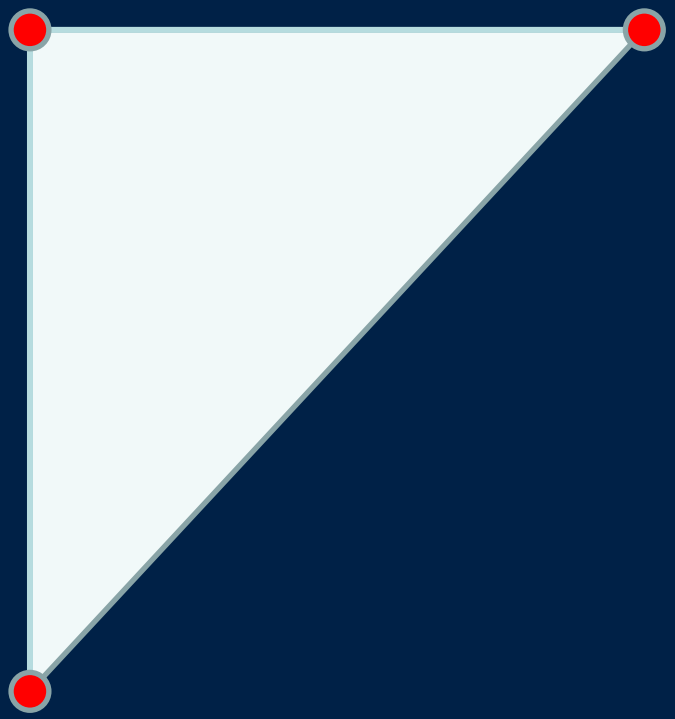
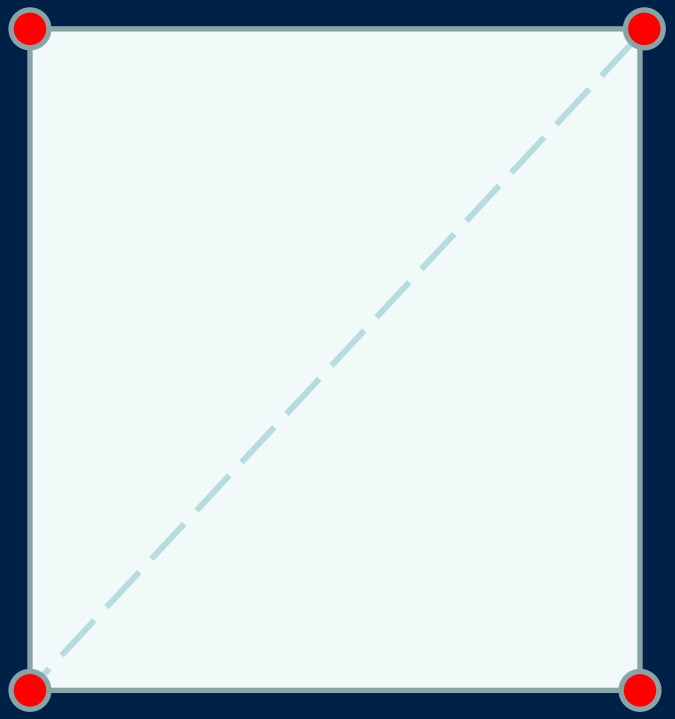
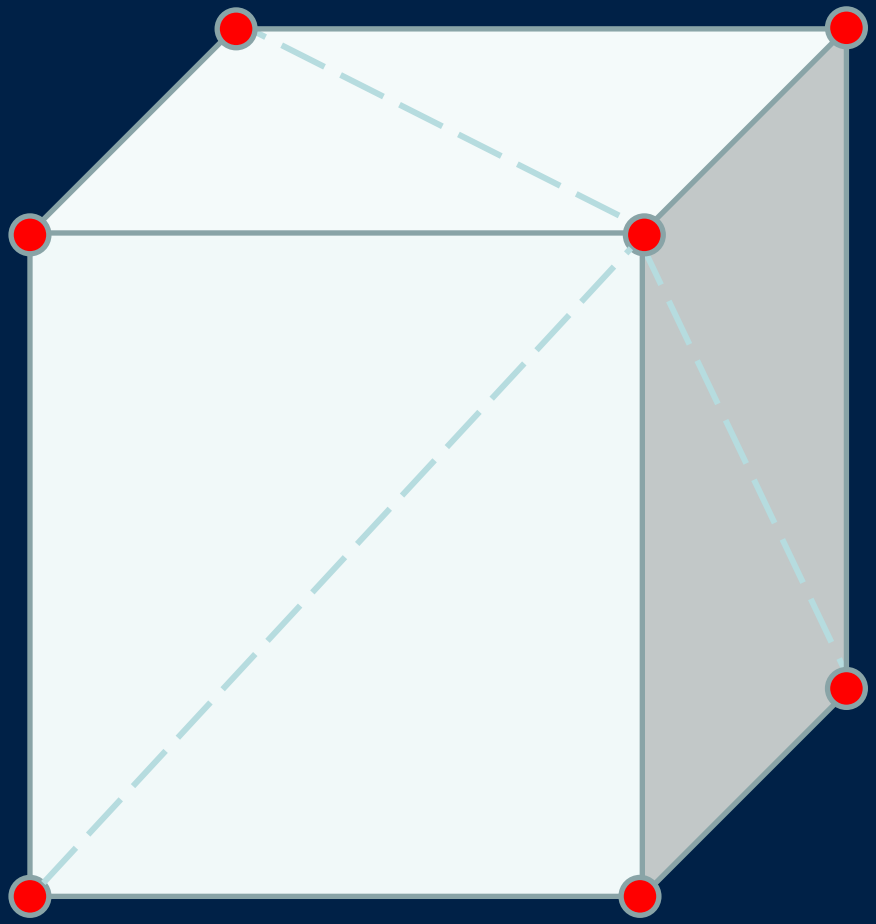


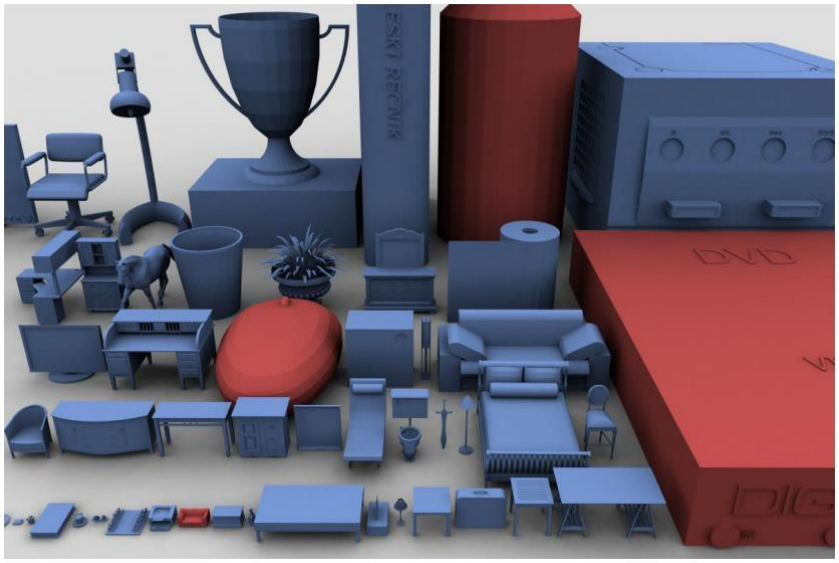
polygon



object



Relative size



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