Course 1 - Mesh and vertex editing I

Meshes, vertices and faces

A 3D-object, like a cube, sphere or cylinder is called a **mesh** (figure 1). This cube consists of eight points. One of these points is called a **vertex** (plural vertices). In a cube, four vertices together form a **face**. Each face has at least three vertices.

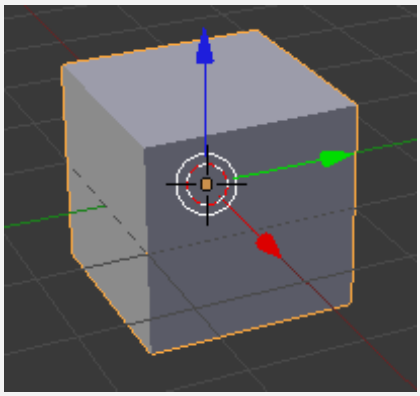

figure 1

Views and axis

In 3D space we are using three axis: X-, Y- and Z-axis. In the bottom left of the 3D view (figure 2) is shown in which direction these axis are pointing. Figure 3 is a screenshot of the cube which is shown when Blender starts. Here you can see how the axis match the object.

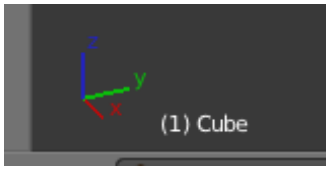

figure 2

Rendering

In Blender we are working with some kind of wireframe (figure 3). This wireframe is not the actual result of your design (figure 4). The wireframe needs to be "translated" into an image, this process is called rendering. During this process the CPU calculates things like light, shadow, reflections etc.

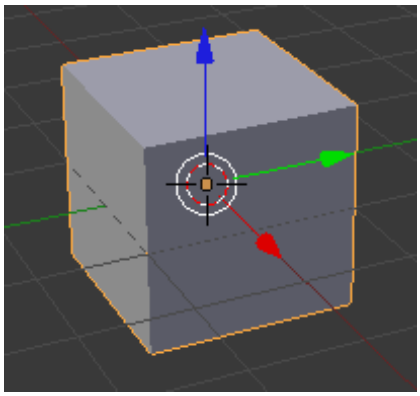

figure 3

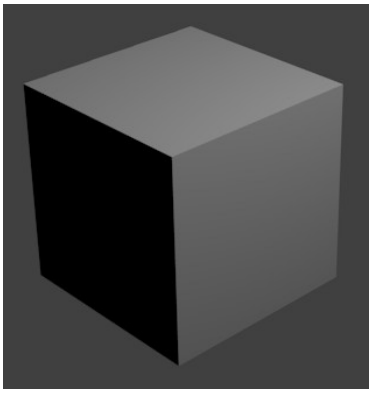

figure 4

Modelling a house

During this course we are going to build a simple house.

- ➔ Start Blender.
- ➔ Move with your mouse cursor to the centre of the cube and click with the right mousebutton to select the cube.

In the bottom left of the view you can see which object you have selected (marked in red in figure 5).

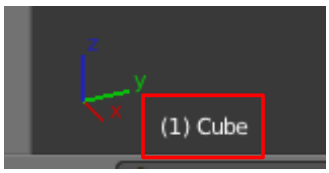

figure 5

The green and red lines mark the 0-level. The cube is located half below these 0-lines. The next steps show you how to move the cube upwards.

➔ Switch by using the numeric <1> (this is the right part of the keyboard) to the Front View. You now see "Front Persp" in the top left corner of the 3D view (figure 6).

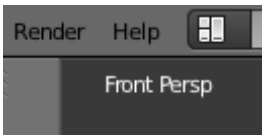

figure 6

There are more views available than just the Front View. The other numeric keys correspond to the following views:

<1>	Front Perspective View	<4>	Rotate View Left
<3>	Right Perspective View	<6>	Rotate View Right
<7>	Top Perspective View	<8>	Rotate View Top
<0>	Camera Perspective View	<2>	Rotate View Bottom
<.>	User Perspective View	<+>	Zoom View In
		<–>	Zoom View Out

<5> Switch between Perspective and Orthographic View

➔ Move with the mouse cursor to the centre in the Front View and press <G> (move), you are now able to move the cube around freely.

➔ Press <Esc> to cancel the movement; the cube is placed back to its original location.

➔ Press the numeric <5> in order to switch to Orthographic view.

➔ Move the cube around, just like we did before and notice the difference between Perspective and Orthographic View.

➔ Move the cube around and click the left mousebutton to release. Switch with the numeric keys between views to see the see the result.

You might notice that moving a cube around is not very easy. You can lock the movement on the axis of your view. In order to do this press <G> (move) and the letter of the axis which you like to lock (<X>, <Y> or <Z>).

If you hold down <Ctrl> during the movement you make sure the object moves along the grid.

➔ Move back with your cursor in the centre of the cube in the Front View and press <G> for move and <Z> to lock the Z-axis.

The 3D View shows which of the axis you have locked, in this case the light blue Z-axis (figure 7).

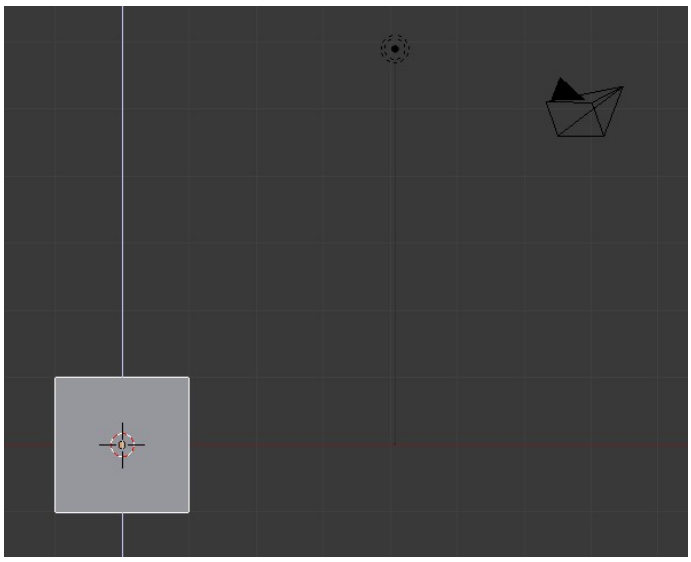

figure 7

➔ Now hold <Ctrl> down while moving the cube upwards till it is on the 0-line.

➔ Click with your left mousebutton or press <Enter> to confirm the movement.

If everything worked out well you screen should look like figure 8.

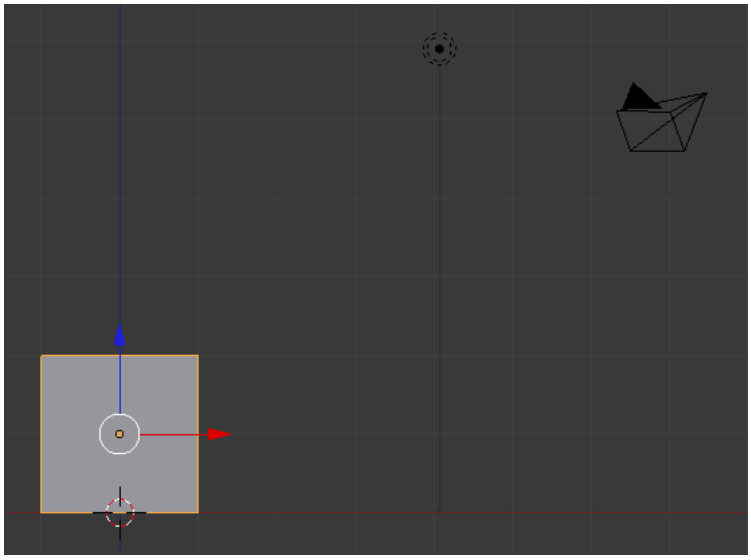

figure 8

This cube is the base of our house, we now need to create the roof. In order to build the roof we need another cube on top. To achieve this we are about to duplicate the old one.

- ➔ Select in the Front View the cube (move cursor to the centre of the cube and press the right mousebutton).

- ➔ Press <Shift> + <D> (duplicate object).

You can now move the duplicated cube freely around.

- ➔ Press <Z> to lock the Z-axis.

- ➔ Hold down <Ctrl> and move the cube till it is on top of the first one.

- ➔ Click with the left mousebutton or press <Enter> to confirm the movement.

If everything worked out well you now have two cubes as shown in figure 9.

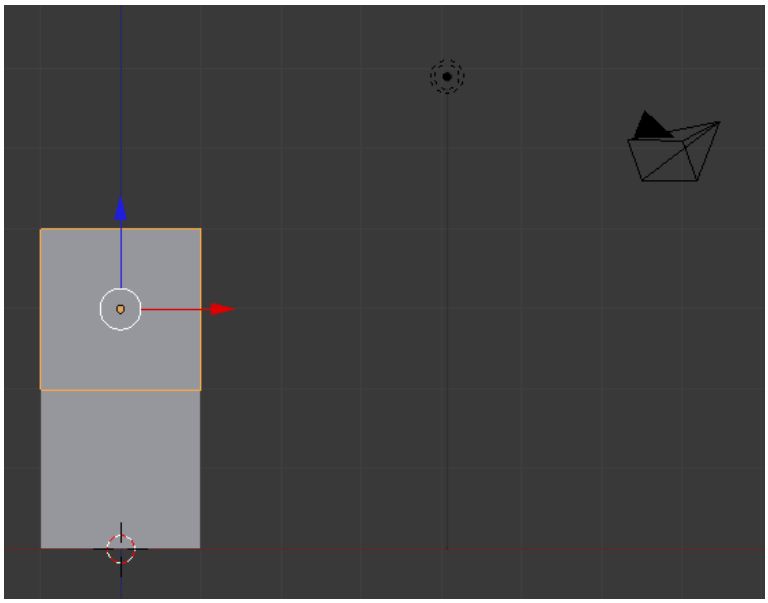

figure 9

With the scrollwheel (<Scrl>) you are able to zoom or out.

➔ Hold <Shift> while moving the scrollwheel up and downwards. You will notice you scroll the view vertically.

➔ Hold <Ctrl> while moving the scrollwheel up and downwards. You will notice you scroll the view horizontally.

Blender uses two different modes: **Object Mode** and **Edit Mode**. In Object Mode you are working with the object as a whole. In Edit Mode you can edit the object per vertex or multiple vertices.

You can switch between these modes by pressing <Tab>.

➔ Select the top cube.

➔ Press <Tab> for switching into Edit Mode.

You have now switched into Edit Mode. You will be able to know this by the visible vertices and the text “Edit Mode” in the view menu bar (red marked figure 10).

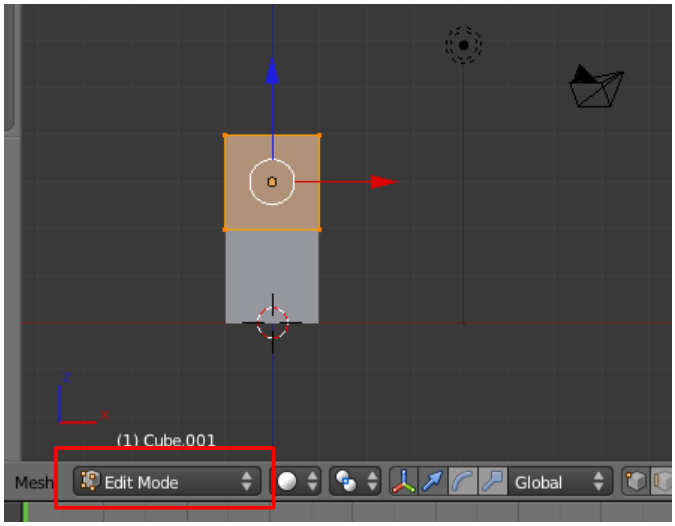

figure 10

In the next steps we are going to make the roof sharp.

- ➔ Switch, by using the numeric <7> key to the Top View
- ➔ Press <A> to deselect all vertices.
- ➔ Make sure "Limit selection to visible" is enabled (marked red in figure 11), otherwise you will select the vertices at the bottom of the cube as well.

figure 11

- ➔ Press <B> for block selection and drag a rectangle around four vertices (figure 12).

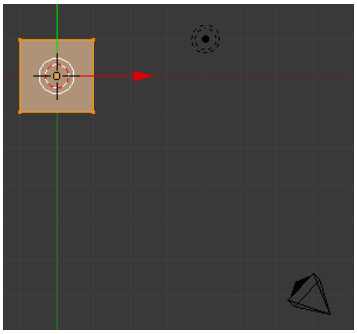

figure 12

You can scale objects by pressing <S>, to rotate you can press <R>. Also with these operations you can use <X>, <Y> and <Z> to lock the axes.

➔ Move your cursor in a corner of the view and press <S> followed by <X> to lock the X-axis. If we did not lock on the X-axis we would have a pyramid.

➔ Move your cursor to the centre of the view till the roof is getting sharp like figure 14.

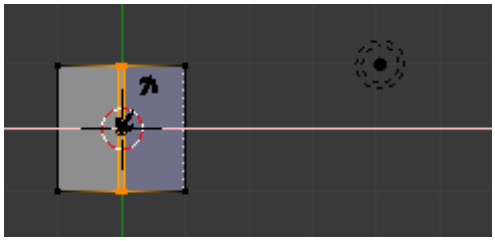

figure 13

➔ Confirm your operation by pressing the left mousebutton or press <Enter>.

If everything worked out well, you now have a house with a sharp roof just as (figure 15).

➔ Switch to the Camera View by pressing the numeric <0> key.

As you can see the house falls partly out of the camera view (figure 14). We are going to correct this.

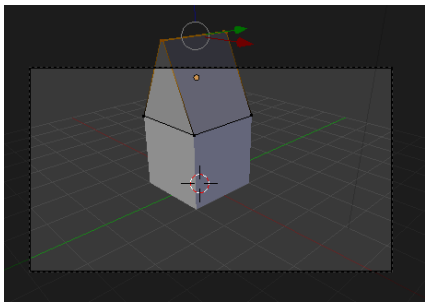

figure 14

➔ Switch to the Front View by pressing the numeric <1> key.

➔ Press <Tab> to switch back to Object Mode.

➔ Select (with the right mousebutton) the camera in the Front View (marked red in figure 15). Its colour changes to orange.

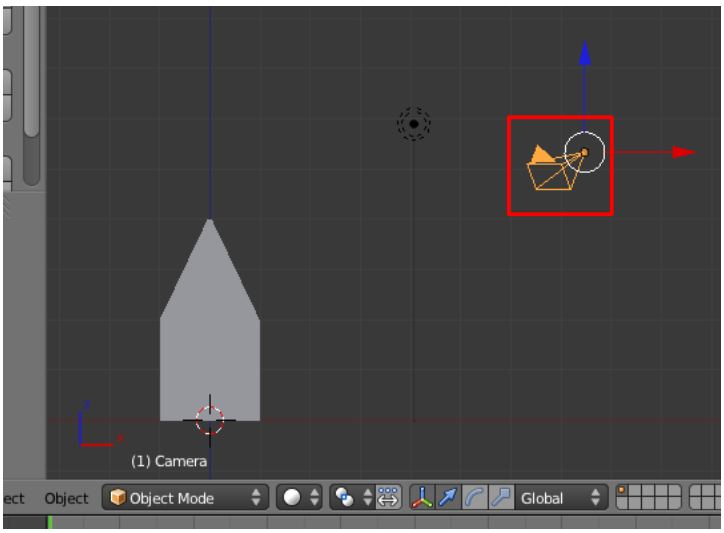

figure 15

➔ Press <G> followed by <Z> and move the camera upwards till the whole house shows up in the Camera View (switch with the numerical <1> and <0> in order to see if the camera is at the correct position).

➔ Confirm your movement by pressing the left mousebutton or press <Enter>.

Your Camera View should now look like figure 16.

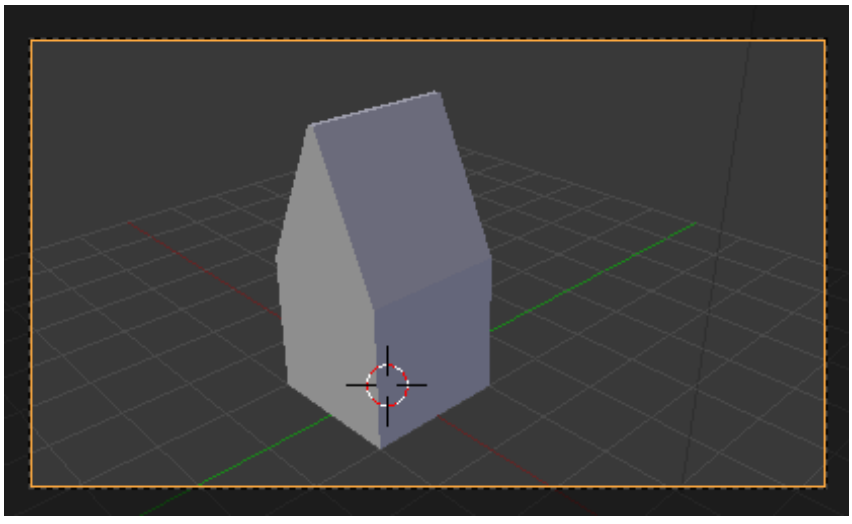

figure 16

It is time to save our work.

> In Blender you can save by pressing <Ctrl> + <S> or choose File → Save. The first time Blender prompts you for a filename, every next time your file is overwritten automatically.

➔ Press <Ctrl> + <S>.

The 3D View changes into a save dialog (figure 17).

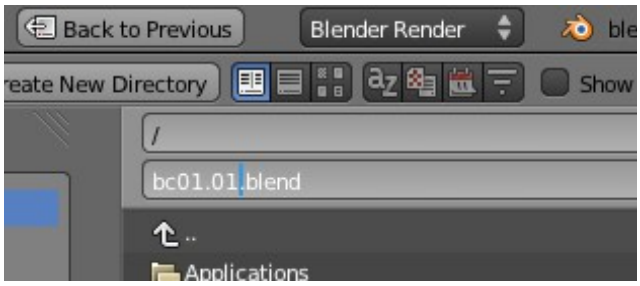

figure 17

➔ Change untitled.blend into bc01.01.blend and press <Enter>.

➔ Browse to the correct folder and click [Save As Blender File].

Your file is saved; you can see this in the window title of Blender (figure 18). This is the filename in which your file is saved.

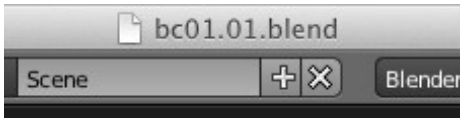

figure 18

Finally we are about to "render" our house. As described earlier, this operation transforms our wireframe into the final image.

➔ Choose Render → Render Image (figure 19) or press <F12> in order to start the render process. Another option is to press [Image] on the render tab in the properties pane (marked red in figure 20).

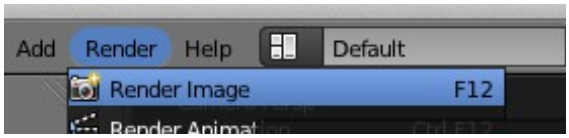

figure 19

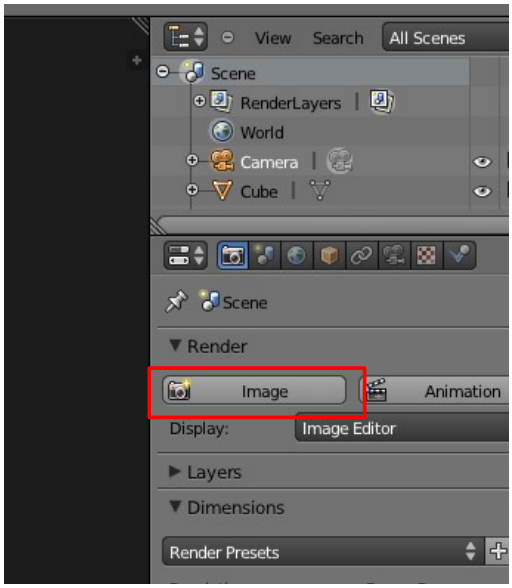

figure 20

The 3D window changes into the render view, which shows the rendering process (figure 21).

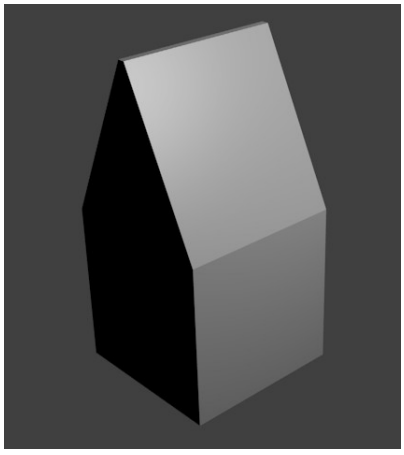

figure 21

➔ Press <ESC> to close the render window.

➔ Press <Shift> + <Ctrl> + <S> which is Save as

➔ Change bc01.01.blend into bc01.02.blend and press <Enter>.

Sometimes it is hard to see how the different objects within a scene are shaped since there are solid objects in front of it. Pressing the <Z> key switches between solid and wireframe viewport shading. You can also pick other viewport shading methods from the selection menu at the bottom of your 3D View as shown in figure 22.

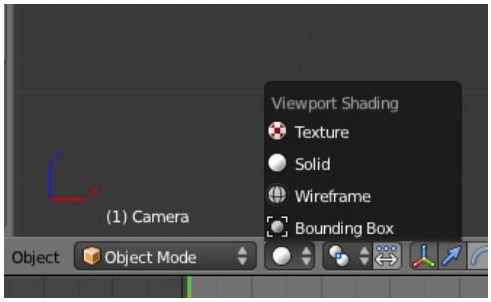

figure 22

➔ Press <Z> and notice how the shading looks in wireframe mode (figure 23).

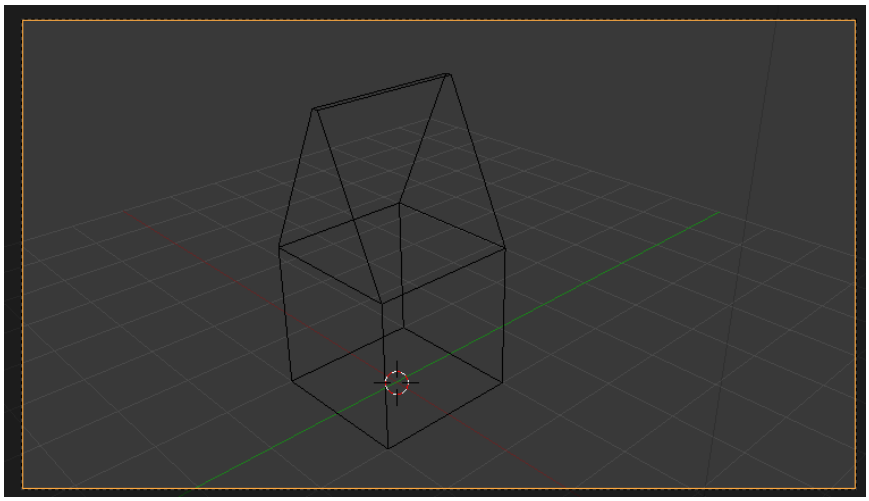

figure 23

➔ Press <Z> again to switch back to solid viewport shading.

The challenge

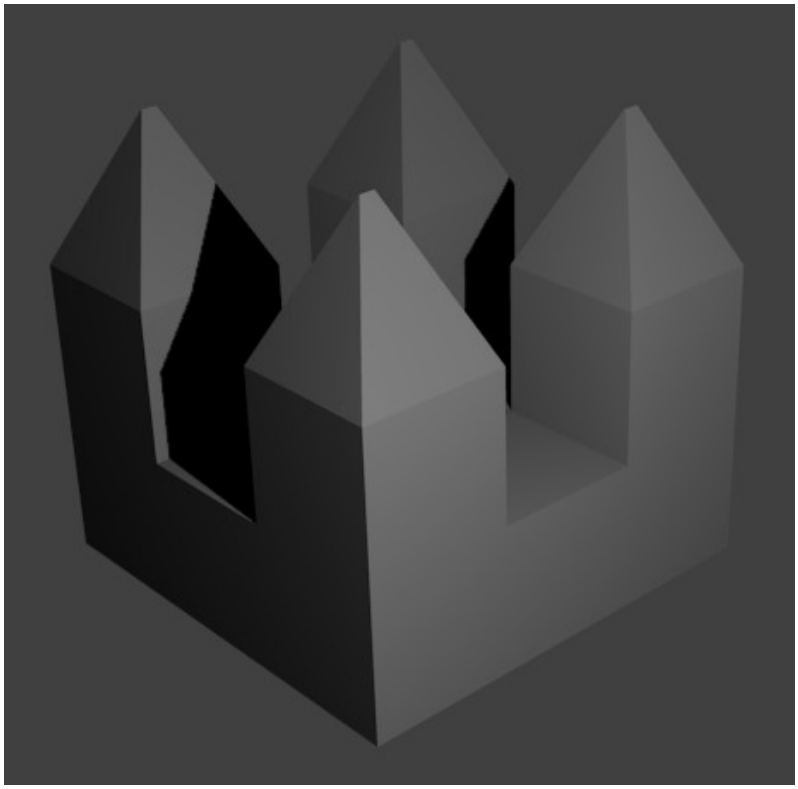

figure 24 – castle – bc01.03.blend

Skills from this course

- Moving, rotating and scaling objects
- Locking axis
- Editing vertices of an object
- Duplicating objects
- Saving files
- Rendering scenes