CAMERA BASICS

Making a target camera
A target camera is one that looks at an object, and that object can be moved and animated independently of the camera position. It’s much easier to use a camera with a target than try to rotate the camera to keep something in the center of view all the time. Most 3D modeling and animation programs have target cameras built in; Blender doesn’t. But they’re easy to make.

Let’s say your camera is well named (in CMPM25 terms) and called z-cam.000. Create an Empty object from the Shift-A list, and name that z-cam-target.000. The top choice of plain axes is fine. It will appear in the Outliner list just under the camera. Select the camera first (the child) and then the target (the parent) then hit Control-T and choose Track to Constraint. When you deselect all, then select the target and move it, the camera will follow. In Camera view (Numpad-0) it will stay locked in the center of the viewport no matter where you move it. When you select the camera and move that, it will always look at the target. Again, in Camera view, the target will remain in the center of the viewport.

You should create one or two target cameras and save them as part of your default scene. This makes them available immediately you open Blender. Do this with Control-U.

Camera types
There are three Blender camera types: Perspective, Orthographic, and Panoramic. Perspective is the closest to a real camera, Orthographic is more like a scanner. We will not look at Panoramic cameras in this guide.

There are several elements to a physical camera and these are the same whether it is a traditional or contemporary digital version. These include the lens, whose main characteristic is focal length. Many contemporary lenses have a range of focal lengths; those that have only one fixed length are called prime lenses and, because of the lack of zoom mechanism, can open wider and so produce a shallower depth of field. There is an iris, whose setting defines the aperture and the depth of field. There is the coating on the lens, which defines lens flare (the effect you get when sunlight shines directly into a camera). And there are the dimensions and sensitivity of the light responsive medium, whether that is the chemical coated film in a traditional camera or the sensor in an electronic one.

Blender’s virtual (computer generated) camera can simulate any real camera and there are a couple of dozen presets in the Camera panel in Properties. This is so you can seamlessly match a Blender scene to a real photograph or video taken with one of those cameras. You can also define your own characteristics.
You can preview what will be rendered by the active camera by hitting 0 on the keypad. The section to be rendered will appear in the 3D window.

By default this is surrounded by a shaded area called Passepartout. The name comes from the opaque black tape used by film photographers to mark off unwanted edges of a negative that was to be printed. You can remove the Passepartout by unchecking the box, or change the Alpha to zero – effectively the same thing – or 1.000, which is completely black.

You can add one or more classic composition guides to the camera view as well. One is shown above.

**Focal length**

The focal length of a lens is directly related to how much it magnifies what it is pointing at and how wide an angle of view it covers. Anything under a 35mm focal length is regarded as wide angle, and though you see a lot with such lenses the image is visibly distorted. You can see the model’s nose appears large in the 24mm and 35mm shots left.

The human eye has a focal length of around 55mm, so anything above an 80mm focal length starts to become telephoto. Telephoto lenses make distant objects appear close, but have a narrow field of view and tend to flatten objects just as wide angle lenses distort them. Again, you can see the model’s face looks wide and flattened in the photos taken with over 100mm focal length. This is because more of the side of her head is seen by
the camera lens that you would see with your eye.

For most purposes keep your camera lens between 50 and 65 mm. Camera focal lengths, like most things in Blender, can be animated to change over time.

![Camera Lens Settings](image)

Note that the preview window in Blender also has a perspective view. You can find this in the right fly-in on the View panel. This is the focal length which is used in the preview image. You may want to change it to around 55mm. The parameters of the preview and rendering cameras are not related but should be 50-70mm unless you have a particular reason for choosing another value.

**Clipping**

The clipping values determine when the camera begins and ends rendering. Very often when a distant object in your scene shows in preview but does not appear in renders it is beyond the default clipping end point of 100 units. Adjusting that value solves the problem.

**Moving a camera**

Adding a target to a camera and moving them along a path is covered in guide 073. Setting the camera to look at what you want without a target is less easy. One relatively simple way is to go into Camera view mode by hitting 0 on the keypad (or View - Camera from the pop-up menu at the foot of the 3D Window) and then bring in the right hand fly-in with N. Check the Lock Camera to View box and then by holding down the middle mouse button you can move the camera view around the scene. Remember to uncheck the Lock Camera to View button when you’ve got a good view, though, or the camera angle will continue to change as you work in the scene.

![Camera View Mode](image)

**Orthographic cameras**

Ortho cameras have an infinite focal length. What this means is that no matter how far away they are from the subject they show the same image, and that image is undistorted by perspective. You can think of an ortho camera as being like a flatbed scanner. Architects and engineers like orthographic views because - in some views - lengths, angles, and areas are undistorted. Animators and videographers like ortho cameras for making title sequences and captions. I have a ten minute YouTube video about orthographic cameras at [https://youtu.be/qIxLQN-V3II](https://youtu.be/qIxLQN-V3II).

Note that an orthographic camera doesn’t have to be in an orthogonal view! Orthographic refers to the graphic, the way the rendering is produced. Orthogonal is related to polygonal, and refers to the
angle of view - right, left, top, bottom, front, or back. A straight-on view, in other words. So you can use an orthographic camera in an oblique view, or a perspective camera in an orthogonal view.