

**Game Components**

**3D Web Gallery For Game**

Blender 2.80 interface showing various 3D models and materials.

Left Panel: Principled BSDF material settings.

Center Viewport: 3D rendering of a character in a mountain landscape.

Right Panel: Render properties and settings.

Bottom Panel: Timeline and status bar.

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## Chapter 8 CAMERA SETTING

### Learning Outcome

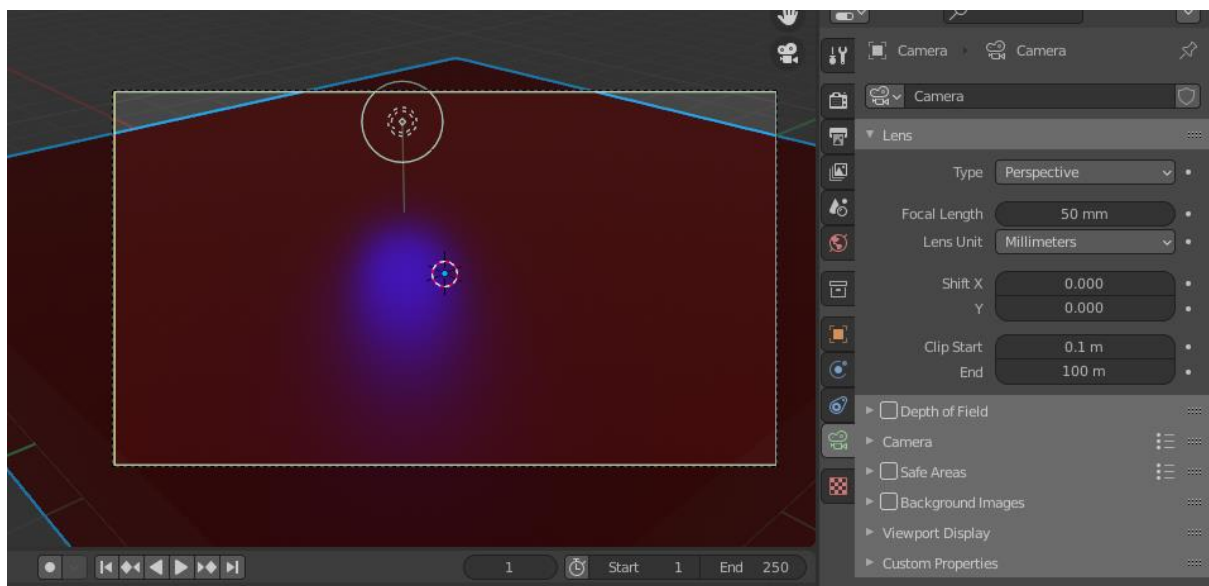
#### Objectives of this chapter are: -

- Camera
- Camera properties

### CAMERAS

A camera is an object that provides a means of rendering images. It defines which portion of a scene is visible in the rendered image.

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.

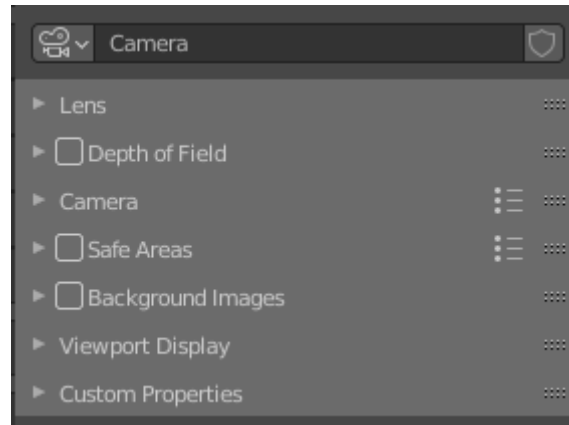


*Figure 1 Rectangle shows the render part of image viewed by camera*

## Properties

Camera's properties are: -

- Lens
- Depth of field
- Camera
- Safe area
- Background Image
- Viewport Display
- Custom properties

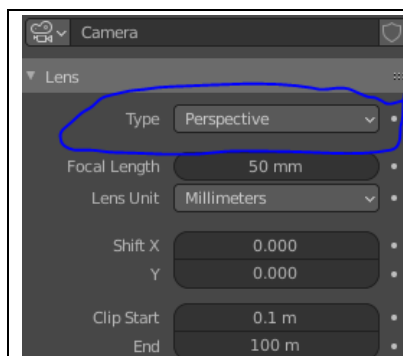


*Figure 2 Camera Property panel in Blender*

## Lens

Lens have 3 types: -

- Perspective
- Orthographic
- Panoramic



*Figure 3 Perspective View*



*Figure 4 Orthographic View*



*Figure 5 Panoramic View*

## Type

The camera lens options control the way 3D objects are represented in a 2D image.

## Perspective

This matches how you view things in the real world. Objects in the distance will appear smaller than objects in the foreground, and parallel lines (such as the rails on a railroad) will appear to converge as they get farther away.

### **Focal Length/Field of View**

The Focal Length controls the amount of zoom, i.e., the amount of the scene which is visible all at once. Longer focal lengths result in a smaller FOV (more zoom), while short focal lengths allow you to see more of the scene at once (larger FOV, less zoom).



*Perspective camera with 35 mm focal length.*



*Perspective camera with 210 mm focal length instead of 35 mm.*

### **Lens Unit**

The focal length can be set either in terms of millimetres or the actual Field of View as an angle.

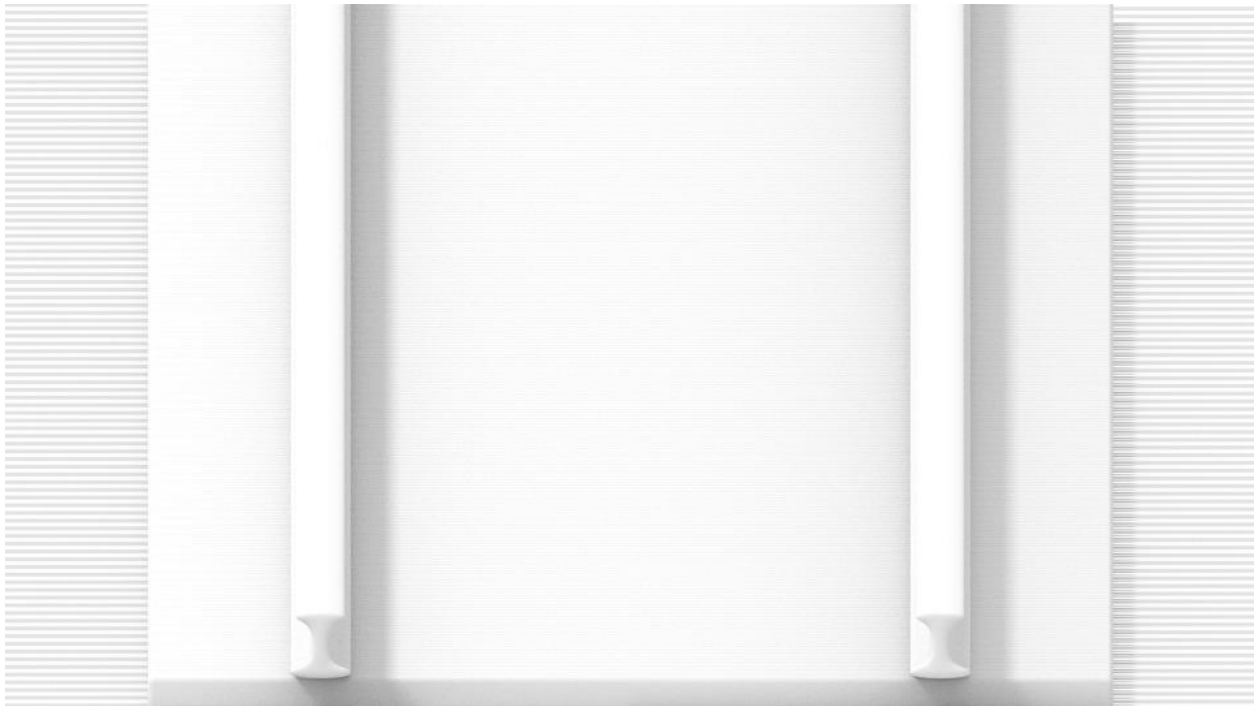
#### **Hint**

While the camera is moving towards an object the Focal Length property can be decreased to produce a Dolly Zoom camera effect, or vice versa.

This video demonstrates the Dolly Zoom camera effect.

### **Orthographic**

With Orthographic perspective objects always appear at their actual size, regardless of distance. This means that parallel lines appear parallel, and do not converge like they do with Perspective.



Render from the same camera angle as the previous examples, but with orthographic perspective.

### **Orthographic Scale**

This controls the apparent size of objects projected on the image.

Note that this is effectively the only setting which applies to orthographic perspective. Since parallel lines do not converge in orthographic mode (no vanishing points), the lens shift settings are equivalent to translating the camera in the 3D Viewport.

### **Panoramic**

A panorama is any wide-angle view or representation of a physical space, whether in painting, drawing, photography, film, seismic images or a three-dimensional model.

Panoramic cameras only work in Cycles. Cycles supports three types of panoramic cameras; Equirectangular, Fisheye, and Mirror Ball. Note that these cannot be displayed in non-rendered modes in the viewport, i.e., Solid mode; they will only work for the final render.

### **Equirectangular**

Render a panoramic view of the scenes from the camera location and use an equirectangular projection, always rendering the full 360° over the X axis and 180° over the Y axis.

This projection is compatible with the environment texture as used for world shaders, so it can be used to render an environment map. To match the default mapping, set the camera object rotation to (90, 0, -90) or pointing along the positive X axis. This corresponds to looking at the center of the image using the default environment texture mapping.

## Minimum/Maximum Latitude/Longitude

Limits of the vertical and horizontal field of view angles.

## Fisheye

Fisheye lenses are typically wide-angle lenses with strong distortion, useful for creating panoramic images for e.g., dome projection, or as an artistic effect.

The Fisheye Equisolid lens will best match real cameras. It provides a lens focal length and field of view angle, and will also take the sensor dimensions into account.

The Fisheye Equidistant lens does not correspond to any real lens model; it will give a circular fisheye that does not take any sensor information into account but rather uses the whole sensor. This is a good lens for full-dome projections.

## Lens

Lens focal length in millimetres.

## Field of View

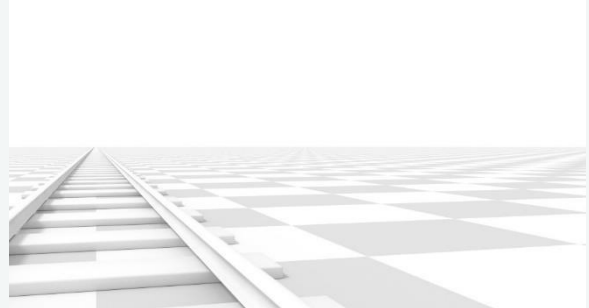
Field of view angle, going to 360 and more to capture the whole environment.

## Mirror Ball

Render is if taking a photo of a reflective mirror ball. This can be useful in rare cases to compare with a similar photo taken to capture an environment.



Horizontal lens shifts of 0.330.



Rotation of the camera object instead of a lens shift.

## Shift

Allows for the adjustment of vanishing points. Vanishing points refer to the positions to which parallel lines converge. In these render examples, the most obvious vanishing point is at the end of the railroad.

Notice how the horizontal lines remain perfectly horizontal when using the lens shift, but do get skewed when rotating the camera object.

## Note

Using lens shift is equivalent to rendering an image with a larger FOV and cropping it off-centre.



## Clip Start and End

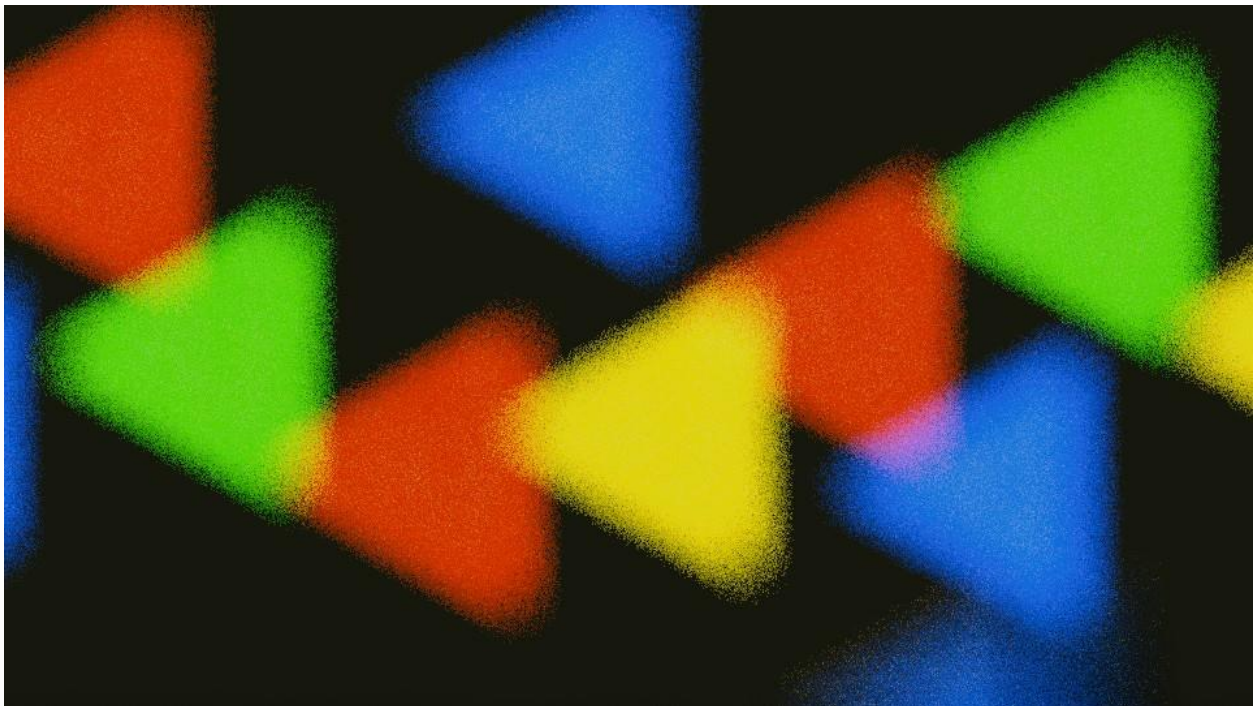
The interval in which objects are directly visible. Any objects outside this range still influence the image indirectly, as further light bounces are not clipped.

### Note

For viewport rendering, setting clipping distances to limited values is important to ensure sufficient rasterization precision. Ray tracing renders do not suffer from this issue so much, and as such more extreme values can safely be set.

## Depth of Field

Real-world cameras transmit light through a lens that bends and focuses it onto the sensor. Because of this, objects that are a certain distance away are in focus, but objects in front and behind that are blurred.



Example of DOF bokeh effect.

The area in focus is called the focal point and can be set using either an exact value, or by using the distance between the camera and a chosen object:

### Focus Object

Choose an object which will determine the focal point. Linking an object will deactivate the distance parameter.

### Focal Distance

Sets the distance to the focal point when no Focus Object is specified. If Limits are enabled, a yellow cross is shown on the camera line of sight at this distance.

### Aperture

### F-Stop

F-Stop ratio that defines the amount of blurring. Lower values give a strong depth of field effect.

### **Blades**

Total number of polygonal blades used to alter the shape of the blurred objects in the render, and render preview. As with the viewport, the minimum amount of blades to enable the bokeh effect is 3, resulting in a triangular-shaped blur.

### **Rotation**

Rotate the polygonal blades along the facing axis, and will rotate in a clockwise, and counter-clockwise fashion.

### **Ratio**

Change the amount of distortion to simulate the anamorphic bokeh effect. A setting of 1.0 shows no distortion, where a number below 1.0 will cause a horizontal distortion, and a higher number will cause a vertical distortion.

## **Camera**

### **Camera Presets**

Presets to match real cameras.

### **Sensor Size**

This setting is an alternative way to control the field of view, as opposed to modifying the focal length. It is useful to match a camera in Blender to a physical camera and lens combination, e.g. for motion tracking.

### **Sensor Fit**

Option to control which dimension (vertical or horizontal) along which field of view angle fits.

## **Safe Areas**

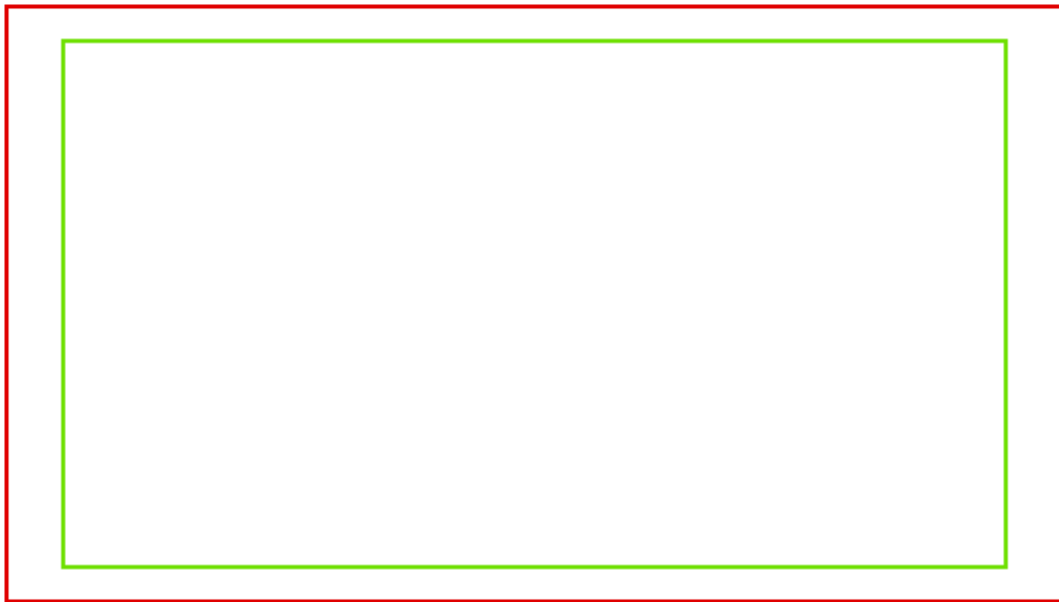
Safe areas are guides used to position elements to ensure that the most important parts of the content can be seen across all screens.

Different screens have varying amounts of Over scan (especially older TV sets). That means that not all content will be visible to all viewers, since parts of the image surrounding the edges are not shown. To work around this problem TV producers defined two areas where content is guaranteed to be shown: action safe and title safe.

Modern LCD/plasma screens with purely digital signals have no Overscan, yet safe areas are still considered best practice and may be legally required for broadcast.

In Blender, safe areas can be set from the Camera and Sequencer views.





Red line: Action safe. Green line: Title safe.

The Safe Areas can be customized by their outer margin, which is a percentage scale of the area between the centre and the render size. Values are shared between the Video Sequence editor and camera view.

### **Title Safe Margins X/Y**

Also known as Graphics Safe. Place all important information (graphics or text) inside this area to ensure it can be seen by the majority of viewers.

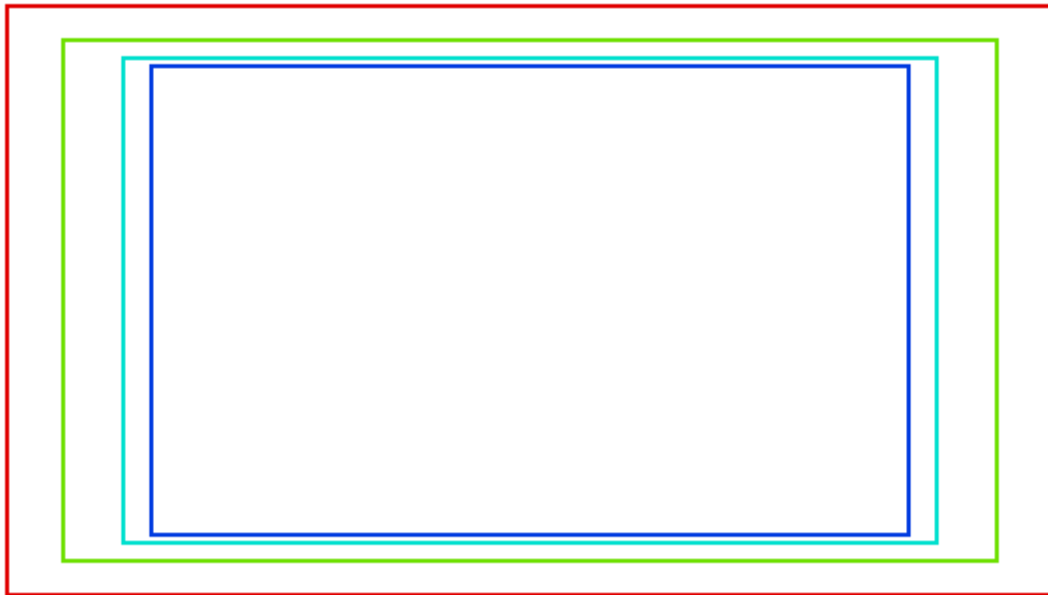
### **Action Safe Margins X/Y**

Make sure any significant action or characters in the shot are inside this area. This zone also doubles as a sort of "margin" for the screen which can be used to keep elements from piling up against the edges.

### **Center-Cut Safe Areas**

Center-cuts are a second set of safe areas to ensure content is seen correctly on screens with a different aspect ratio. Old TV sets receiving 16:9 or 21:9 video will cut off the sides. Position content inside the center-cut areas to make sure the most important elements of your composition can still be visible in these screens.

Blender defaults show a 4:3 (square) ratio inside 16:9 (widescreen).



Cyan line: action center safe. Blue line: title center safe.

### **Background Images**

A background picture in your camera can be very helpful in many situations: modelling is obviously one, but it is also useful when painting (e.g., you can have reference pictures of faces when painting textures directly on your model...), or animation (when using a video as background), etc.

#### **Background Source**

The source of the background image.

#### **Image**

Use an external image, image sequence, video file or generated texture.

#### **Movie Clip**

Use one of the Movie Clip data-blocks.

#### **Active Clip**

Follow the scene's active clip.

#### **Color Space**

The color space the image or video file uses within Blender.

#### **Render Undistorted**

Draw the background image using undistorted proxies when available.

#### **Proxy Render Size**

Select between full (non-proxy) display or a proxy size to draw the background image.

**Opacity**

Controls the transparency of the background image.

**Depth**

Choose whether the image is shown behind all objects, or in front of everything.

**Frame Method**

Controls how the image is placed in the camera view.

**Stretch**

Forces the image dimensions to match the camera bounds (may alter the aspect ratio).

**Fit**

Scales the image down to fit inside the camera view without altering the aspect ratio.

**Crop**

Scales the image up so that it fills the entire camera view, but without altering the aspect ratio (some of the image will be cropped).

**Offset X/Y**

Positions the background image using these offsets.

In orthographic views, this is measured in the normal scene units. In the camera view, this is measured relative to the camera bounds (0.1 will offset it by 10% of the view width/height).

**Rotation**

Rotates the image around its center.

**Scale**

Scales the image up or down from its center.

**Flip**

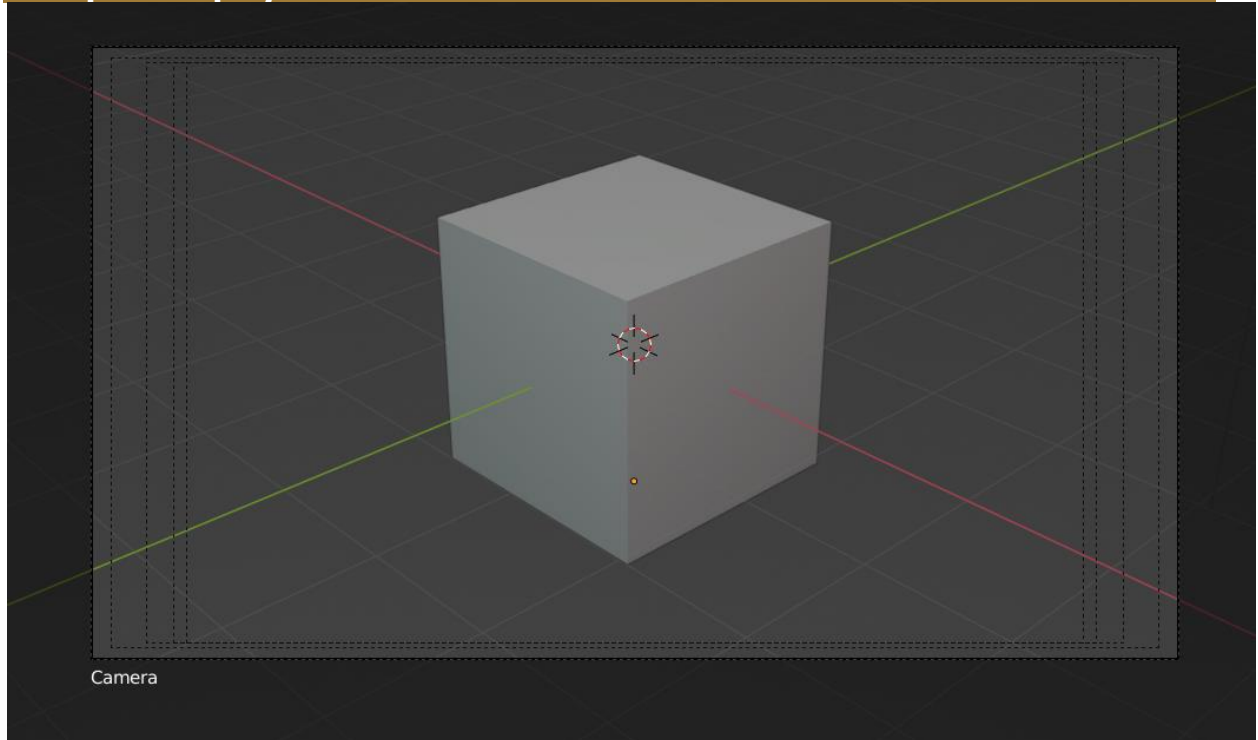
X

Swaps the image around, such that the left side is now on the right, and the right now on the left.

Y

Swaps the image around, such that the top side is now on the bottom, and the bottom now on the top.

## Viewport Display



Camera view displaying safe areas, sensor and name.

### Size

Size of the camera visualization in the 3D Viewport. This setting has no effect on the render output of a camera. The camera visualization can also be scaled using the standard Scale S transform key.

### Show

### Limits

Shows a line which indicates Start and End Clipping values.

### Mist

Toggles viewing of the mist limits on and off. The limits are shown as two connected white dots on the camera line of sight. The mist limits and other options are set in the World panel, in the Mist section.

### Sensor

Displays a dotted frame in camera view.

### Name

Toggle name display on and off in camera view.

### Composition Guides

Composition Guides enable overlays onto the camera display that can help when framing a shot.

### Thirds

Adds lines dividing the frame in thirds vertically and horizontally.

### **Center**

Adds lines dividing the frame in half vertically and horizontally.

### **Diagonal**

Adds lines connecting opposite corners.

### **Golden**

#### **Ratio**

Divides the width and height into Golden proportions (about 0.618 of the size from all sides of the frame).

### **Triangle A**

Displays a diagonal line from the lower left to upper right corners, then adds perpendicular lines that pass through the top left and bottom right corners.

### **Triangle B**

Same as A, but with the opposite corners.

### **Harmony**

#### **Triangle A**

Displays a diagonal line from the lower left to upper right corners, then lines from the top left and bottom right corners to 0.618 the lengths of the opposite side.

#### **Triangle B**

Same as A, but with the opposite corners.

### **Passepartout**

This option darkens the area outside of the camera's field of view. The opacity of the passepartout can be adjusted using the value slider.