

Getting Started With Blender

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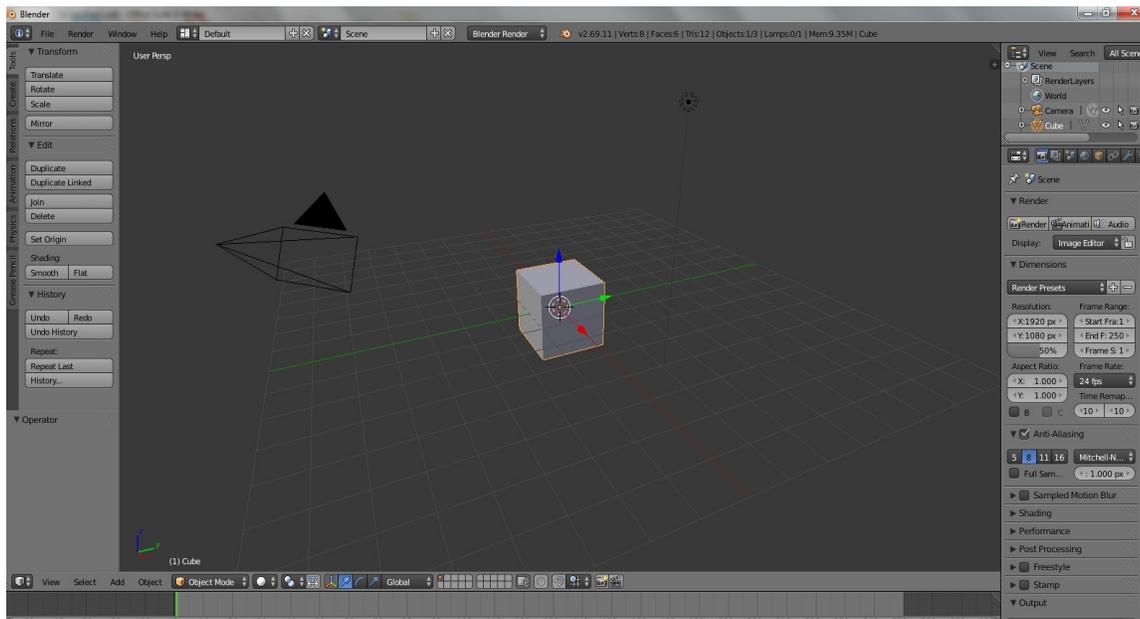
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The First Rule of Blender

Keep your left hand on the keyboard and your right hand on the mouse.

What You See

When you first open Blender your screen will look like this.



Windows

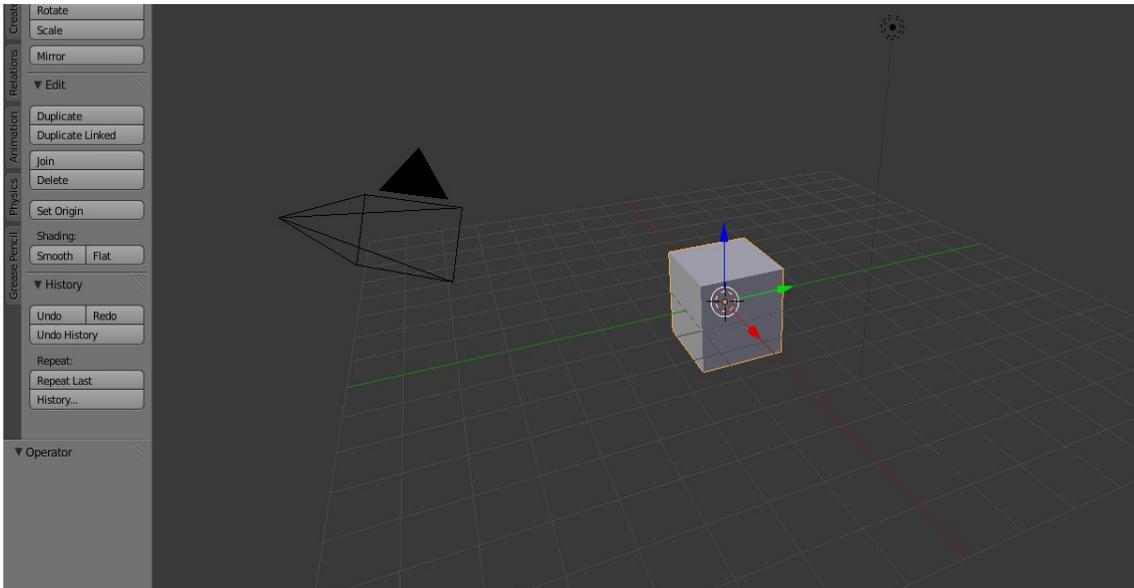
There are many different types of windows that you will work with in Blender. Each has its own purpose and appearance. Each window also has its own icon in its header or footer bar. The identifying icon appears at the left side of the header/footer. This will be referred to as a header from now on. The window type icon is also a button for opening the menu to change the type of window. To see all the types of windows available, simply click on the little cube icon in the lower left corner of the 3D View Port window (the largest of the default blender settings windows.)

Most windows in Blender are non-overlapping. This means that a window does not cover up part of another window. If one window is re-sized by dragging its border, the neighboring windows that share that border are also re-sized.

A window is active when the mouse pointer is in the window. You do not need to click anything to make a window active, unlike some other graphics programs.

3D View Port

The largest window in our default start up screen is truly the most like a window in the traditional sense. It allows us to peer into our 3D world from different directions. The 3D View window can show your scene and all the objects in your scene.



On the left side of the 3D View Port is a Tool Shelf. This pane can be toggled visible and invisible by pressing the T key while the mouse is in the 3D View Port Window. New in Blender as of 2.70 are the Tabs along the left edge of the Tool Shelf. These tabs have been added to organize and to make better use of options. A Properties pane is also part of the new 3D View Port, but you have to toggle it on by pressing the N key. By default the scene contains only 3 objects...one mesh object, a gray cube (seen in the center of the window.) It also contains a camera, (seen as black pyramid lying on its side,) and a lamp, (seen as a black dot with a black dashed circle and a black dashed line indicating which direction it shines.) We will talk more about these different types of objects a little more before we move on.

Cube

“Out of the Box,” so to speak, Blender opens with one mesh object in the opening scene, a cube. This can be changed as with almost everything in Blender. We will cover more about this later.

Camera

The camera is a unique object that will show how your scene will be rendered, so that others can see it. As with a real camera it can be moved, rotated and set for different focal lengths. To see what the camera sees from its current position press the 0 key on the Numeric Pad, while the mouse pointer is in the 3D View Port window. You can also make the camera move to the position to show things as they appear in a window by placing your mouse pointer in the 3D view port (window) and pressing Ctrl+Alt+NumPad 0. We will talk much more on this later.

Lamp

As with real cameras, if there is no light there will be no image. The default Blender scene only has one lamp, but you can add as many as you want. Lamps can be duplicated as well as textured to project a pattern or image or even a movie onto the

other objects it shines on. Blender has a wonderful set of different types of lamps that can be also adjusted to color, intensity, position, and even to cast shadows or not cast shadows. If an object has a transparent colored, material, the light can even cast a colored shadow. This will be beyond the scope of this class, however.

Other important things that you will see in this window are...

The 3-D Curser



The 3-D Curser is a symbol that shows a location in 3-D space. It determines among other things where a new object will be placed when it is added to your scene.

It can be moved to a new location by left clicking on the screen where you would like it to be or reset to the original location (0,0,0) by pressing Shift, C Key. Remember the mouse must be in the 3-D View Port in which you are want this to happen.

Axis

The axis symbol represents the three directions in 3-D Space. They are represented by the last three letters of the alphabet, X, Y, and Z. In the bottom of the 3-D View window you will see a set of little arrows pointing in the positive directions of these axis. In the Top view you will only see two, the X, and the Y. That is because the Z is pointing directly at you. If you place your mouse pointer in the middle of the 3-D window and hold down the middle mouse button while you move the mouse a bit, your will shift the view and be able to see all three arrow. Notice that their tails meet at 90 degrees to each other. The colors associated with the 3 directions are as follows:

X Red, Left or Right
Y Green, To and From
Z Blue, Up and Down

Note also that the central axis of the grid is also colored green for the Y axis and red for the X axis.

By default only the X and Y grid and grid axis are shown when in other than the Top, Bottom, Side, Front, or Back views.

Navigation

To navigate in your 3-D space, you have many options.

Choosing a view: By pressing the keys on your Numeric Pad you can change the view to Top (Numeric Pad 7) to Front (Numeric Pad 1) to Right side (Numeric Pad 3) or to Camera View (Numeric Pad 0). This is the view that will render your scene. To see how this renders with only one lamp, press F12. Close the render window with the ESC key. You can also go to Bottom with Ctrl Numeric Pad 7, Back with Ctrl Numeric Pad 1 and Left side with Ctrl Numeric Pad 3. *Remember the number keys on the Numeric Pad are different from the number keys above the alphabetical letters unless you set up the preferences to Emulate Num Pad.* To do this go into the Preferences Window ,

click on the “Input” button, and in the first column, click “Emulate NumPad.”

Rendering Your Scene

Press F12 to render an image as scene by the camera in your scene. The time it takes to render will depend on many factors including the complexity of your scene, which render engine you are using and the power of your computer.

Saving Your Render

To save a single image render you must press F3 to open the file save dialogue window. Choose a name for your image and a location for saving your image.

Rotating the scene: To rotate the scene press Numeric Pad Keys 2,4,6,8 or with the middle mouse button Click and Drag, drag the mouse.

Zoom in or out: To zoom, press the Numeric Pad + or – keys, or turn the middle mouse wheel, while the mouse pointer is in the 3D view window. You can also zoom by holding down the Ctrl and Middle Mouse Button, clicking and dragging the mouse.

Panning: To pan a view, hold down Shift and Middle Mouse Button click and drag.

Adding an Additional Lamp

Blender only comes with one lamp by default and this gives a very strong shadow area to everywhere the default lamp does not shine. To see how this renders with only one lamp, press F12. Close the render window with the ESC key.

Let’s set up our default scene with at least one more lamp. You can always add more, later, or you can delete them. First select the lamp that is in the scene already by Right Clicking on it. To select any object in Blender you simply Right Click on it. To select more than one object, select the first in the usual manner and then hold down the Shift key while Right Clicking on additional objects.

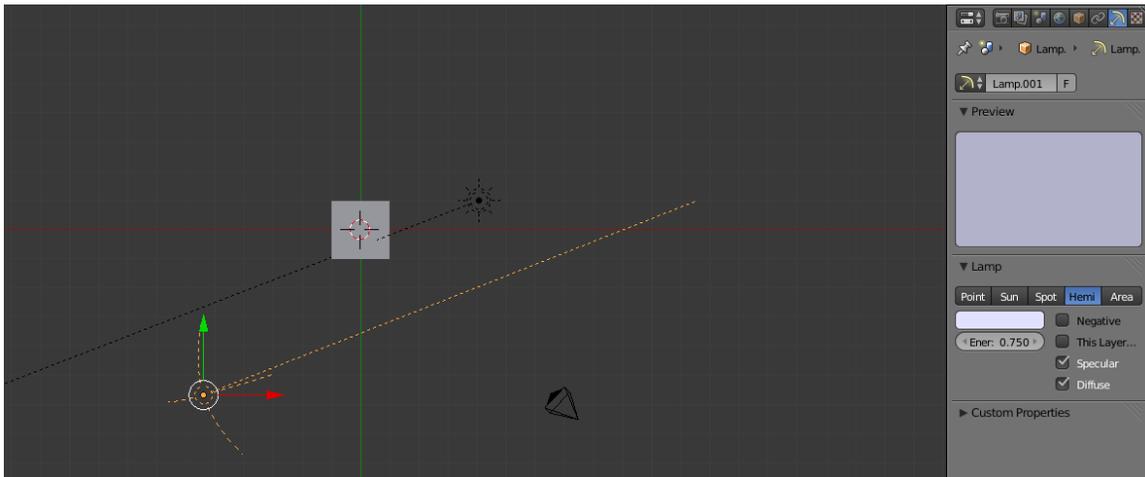
In the Properties Window to the right of the 3-D View Port Window, locate the buttons at the top of this window. Click on the seventh button from the left that is labeled “Object Data” when the mouse is over it. (It is the one between the 2 chain links and the checker board.) In the panel named “Lamp,” click the button that says “Sun” instead of “Point.” As you can see when you open this menu, Blender has many different types of lamps to choose from.

When you see a field with arrows on both sides, it indicated that it is a slider button. You can click and drag inside this button to change its value. You can also click the arrows to increase or decrease the value. If you click on the number



in the field, you will select it and make it editable by typing in a new value followed by pressing the Enter key.

The rectangular solid color button between the Lamp Type buttons and the Energy field is an indicator of the color of the lamp. Click it and a color picker will appear that allows you to change the color of the lamp. Make the light a little more yellowish by moving the blue slider down to about .750. We will cover more about the color picker when we start building materials.



With the mouse in the 3D View Port, press the numeric key “7” to move to Top View. Right click on the “Sun” lamp to select it, if it is not still selected. Duplicate the Lamp by pressing Shift D key. Move it to the approximate location shown in the picture above. Select Hemi, for the type of Lamp in the Properties window.

Change the color to be more like sky light blue by decreasing the Red and the Green to 0.750 and the Blue at 1.000. This gives an overall light that illuminates the shadow areas like the blue light from the sky. Set the Energy down to about 0.750. Press the R key to rotate the lamp so that it shines in the direction of the cube. Press F12 to render the image again to see the difference. Leave the rendered image by pressing the ESC key to return to the 3D View Port.

If you are doing a scene inside you might want to change the color of this light to the color of the light reflecting off the walls, or at sunset, you may want this light to be more orange. Since the sun does not shine inside, usually, you can change the sun to a spot light.

To save these changes as the default settings, press the Ctrl U key combination. Now whenever you open Blender, you will have this as your opening screen. You can return to the factory settings by clicking “File,” and “Load Factory Settings.” Unless you press Ctrl U Key again, these factory settings will only be for the file you are working on, not the new Default Settings.

As you learn more about your own pattern of working you will want to develop your own set of preferences and save them by pressing the Ctrl U key combination.

Anatomy of a Mesh Object

In Blender we can add many different types of objects including Text, Curves, Lamps, and Cameras to name a few. In this section we will be working with Mesh Objects.

To study how this works, left click somewhere on your 3-D View Port window, away from the cube to set the 3-D cursor to a new location. This is simply so that the 3-D cursor will not obscure your view of the Cube object's center.

All objects including Mesh Objects have a center. An object's center shows up in the 3-D View Port as an orange dot when the object is selected. The center is drawn at the location that defines the objects location in 3D space.

This center is used to determine the location or address of the object and its rotational and scaling axis by default. We will be changing the placement of this center from time to time on purpose and probably sometimes by accident.

The center is visible in the 3D View Port, but does not show up in the final render of your scene.

Edit Mode

Mesh objects also have vertices. To see the vertices of an object you must be in Edit Mode. Go into Edit Mode by pressing the Tab Key and back to Object Mode by pressing the Tab Key again. A vertex (singular for vertices,) is simply a point in 3-D space. Just like the center of an object each vertex has an address along the 3 axis of the 3-D space known as its global coordinates. It also has an address, as well, in relationship to its own center known as its local coordinates. In other words, for its global coordinates, it is a certain distance left or right from a central location called the origin, in the 3-D scene as well as a certain distance above or below the origin, and a certain distance in front of or in back of the origin. Like wise it has Local Coordinates in relationship to the object to which it belongs, center. Even though you can see the vertex on the screen in the 3D view window, it will not render, because it has no size, only a location.

If there are two vertices in different locations, they can be connected with a line segment. This line segment is known as an Edge in Blender terminology and also does not render as it has no thickness. It does have some things that the vertex does not have however. It has length and rotation in our 3D Space.

When 3 or more vertices are connected with edges, they can be filled in with a Face. Faces are the first thing that will actually render, or show up in the final product. Until recently in Blender all Faces were made from 3 connected vertices, known as triangles, or 4 connected vertices, known as quads. Now a face can have more than 4 faces.

Meshes can be made of any number of vertices, edges and faces. A cube will have only 6 faces while a highly detailed human figure will have thousands of faces. There are ways to create objects with fewer faces than you might expect and then have the computer make it look like there are more faces than you actually have created. In general you want to have the fewest vertices that are necessary to create the look you want. This makes your files quicker to render and edit.

Selection of Objects

Most programs use a click of the left mouse button to make selections. Blender does not! As we have seen Blender uses the Right Click. Get used to it. This is one of the hardest concepts for new Blender

users to learn, if they are used to other graphic programs. Go ahead and try it. Right click on different objects in your scene and watch how they change to an orange outlined object. This is how you know they are selected objects.

Notes for one button Mac mouse users:

- 1. If you have a 1 Button Mac Mouse, you can emulate the Right Click with the Apple ~ Key and the mouse button at the same time.*
- 2. The Middle Mouse Button can be Emulated with Alt (Option) and the mouse button.*
- 3. The Middle Mouse wheel zoom can be emulated with the combination Ctrl+Alt+ Click and Drag.*

There are many other ways to make selections in Blender, both in Object Mode and Edit Mode.

The A key toggles between nothing selected and everything selected. Try it.

To select more than one object, (but not everything,) select the first object by right clicking, then while holding down the Shift key right click on additional objects. Try it.

Active Object: The Active Object is the last object that is selected. If more than one Object is selected it will appear as the lighter orange selection. Only the active object will be able to be placed into edit mode, which we will talk more about soon.

To deselect only one object right click a second time while holding down the Shift key. Try it.

To use the border select mode, press the B key once to enter Border Select Mode. Then left click and drag a box around the object or objects you want to select. Try it.

To use the border deselect mode, press the B key once to enter Border Select Mode. Then Middle Mouse Button click and drag a box around the object or objects you want to deselect. Try it.

To use the Circle select mode, press the C key once to enter Circle Select Mode. A circular area will appear in the 3-D View Port window. The diameter can be increased or decreased by turning the middle mouse wheel, or by pressing the + or – keys on the Numeric key pad. Then left click and drag to “paint” the object or objects you want to select. You must click the Right mouse button, or press the ESC or Enter key to exit Circle Select mode. Try it.

To use the Circle deselect mode, press the C Key once to enter Circle Select Mode. A circular area will appear in the 3 D View Port window. The diameter can be increased or decreased by turning the middle mouse wheel, or by pressing the + or – keys on the Numeric key pad. Then middle mouse click and drag to “paint” the object or objects you want to deselect. You must click the Right mouse button, or press the ESC or Enter key to exit Circle Deselect mode. Try it.

While in Circle Select mode, you can both select and deselect without exiting by switching between dragging with the left and middle mouse buttons.

Adding an Object

Again there are several ways to add an object in Blender. The easiest is to press Shift A key, then in the drop down menu choose *Mesh*, then the *Object type* that you want to add. The ready made mesh objects you can add are called Primitives. Most have some additional options you can choose. The choices are:

Plane, which is just a Quad Face, (4 connected vertices, 4 Edges, and 1 face.) If you check the Align to View box in the Object Tools panel, the Plane and its Local Z axis will face the screen surface.

Cube, which is made of 6 Quad faces, 8 vertices, and 12 edges. If you check the Align to View box in the Object Tools panel, the Cube's local Z axis will face the screen surface.

Circle, which is a set of vertices equidistant from the center. You set the number of vertices in the tool box panel to the left of the main part of the 3D View Port window. The more vertices the smoother the circle, the fewer the more memory you save. By default the radius is set to 1 Blender Unit (BU,) but you can change this to what ever you like. Edges connect the vertices, but by default, there are no faces, so this object alone will not render. If you left click in the "Fill Type," button to open the menu, you can change Nothing to Triangle Fan or N-Gon fill types. This makes the circle into a disk with faces that do render. If you check the Align to View box in the Object Tools panel, the Circle's surface and local Z axis will face the screen surface.

You can also use the Circle Mesh to create polygons by setting the Vertices number to the number of Sides you want your Polygon to have. For example you can create a Hexagon by adding a circle and setting the vertex number to 6 or a Pentagon by setting the number of vertices to 5. The least number of vertices you can set is 3, which makes an equilateral triangle.

UV Sphere which is a sphere or ball with a north and a South Pole, and sections like an orange or lines of Longitude and Rings like Rings of Latitude. You can decide the number of segments and rings. The smallest number you can input for each of these options is 3. The number of rings and faces refer to the number of faces from pole to pole and around the equator for one full turn.

Smooth Shading

Up until now the cube and the plane looked alright as they are. They are made of flat sides. The sphere however looks terrible as a set of flat sides. Under the Edit panel in the Tool Shelf, locate the "Shading" buttons and click "Smooth" to make the faces appear to be reflecting light as if they were curved. To cancel it, click the "Flat" button underneath the "Smooth" button.

Icosphere which is a sphere or ball made up of 20 equilateral triangles. It is really an icosahedron at this point. You can set the subdivision of these triangles to create a rounder ball. They will of course no longer be equilateral triangles. Smooth Shading can also be used with Icospheres.

Cylinder, which is a tube if you choose not to have end caps. The other options are the number of vertices in the end circles. Like the Circle, you can change the number of vertices to create what ever number of Sides you want your object to have.

Cone, which is like a cylinder with one end replaced by a single vertex. Without the end cap, it is like an ice cream cone. By setting 4 as the number of vertices you have a pyramid.

Grid, which is a plane that has been subdivided. Note that the settings are for the number of vertices

not the number of faces. For example if you want a grid that is 3 by 4 Blender Units, you must set the numeric fields to 4 and 5. There may be a change in future versions of Blender to eliminate the grid primitive.

Monkey, which is a much more complex mesh that looks like a cartoon monkey head. It is very useful for trying out different tests to see how things like textures look on more complex objects. In Blender culture, the monkey head is known as “Suzanne.”

Torus: The torus is a donut shape. It has several options including the radii of its major and minor axis as well as the number of major and minor sections.

Deleting an Object

Getting rid of an object is simple. Right Click on the object you want to delete to select it, if it is not already selected. Press the X key and confirm “Delete” in the drop down menu that appears on screen. (It only has one option in Object Mode. Many more options will appear if you are in Edit Mode, but we will get to that soon.)

To add a new object, begin in Object Mode. Press the Tab button to toggle back to Object Mode if you are in edit mode. Remember that the new object will be added where the 3D Cursor is located. If it is in the same location as your default cube, be sure to left click somewhere else on your 3D view window, to move the 3D cursor before you add your new mesh object. Its local Z axis will be pointing in the Global Z axis direction unless you check the “Align to View” button in the object tools panel. If the “Align to View” button is checked the local Z axis will point in your direction. If you try to add a new object in edit mode, you will only add vertices of the new object to the already selected object in edit mode. There will only be the one object and one center.

Go ahead and try it. Start by pressing the Numeric Pad 7 key while your mouse pointer is in the 3D View Port window, to be sure you are in Top view. Left Click where you want the new object to be placed on the X and Y axis. Then press the Numeric Pad 1 or 3 key while your mouse pointer is in the 3D View Port window, to go to the Front or Side view. Left Click again where you want the new object to be placed on the Z axis. Then by pressing Shift A key, to open the Add Menu and choose *Mesh*, then *Cube*. The act of pressing Shift A key is known as a Hot Key or Shortcut Key combination. It is useful to learn these, especially this one.

Notice in the picture to the right, in the Properties Window, the button in the Header that has a picture of an orange cube is selected. If yours is not selected, click it to select it. This shows that you are in the “Object” context of the Properties window. Now look in the light gray field with the word “Cube” in it. The name of the selected object is given in this field. In the above picture it is “Cube.” This name can be selected and changed to something more useful. It is a good habit to name your objects as soon as you add them to something that makes sense to you. Left Click the name in the field to select it. It will be highlighted in a darker gray and the text will change from black to white. Type in a new name such as “Box,” and press Enter or Right Click.



You can also open the Add Menu by clicking on Add in the Footer of the 3D View Port or by clicking the Create Tab in the Tool Shelf on the left of the 3D View Port. If the Tool Shelf is not visible, it can be toggled on and off by pressing the T key while in the 3D View Port.

Object Mode and Edit Mode

In Blender there are several different modes that you will use to do different things. While Modeling or creating various Mesh Objects you will be working with the two modes **Object** and **Edit**. When a new object is created it is automatically in Object Mode. To toggle between Object and Edit Modes, press the Tab Key. Object mode allows you to make changes in a whole object, including its center, while Edit Mode allows you to make changes to parts of an object, but not its center.

Transformations

Moving, Scaling, and Rotating are the most common operations you will use in Blender for all sorts of objects. These operations are called Transformations. To see how these work, try the following.

In Object Mode select an object. For now select the cube by right clicking on it. It will turn Orange when it is selected. By pressing the G Key you will enter into Translation Mode to move the object. Also notice that the highlight turns from Orange to White. This is how Blender notifies you that an object is waiting to have a Transformational operation performed. You can now move the object around the scene with the mouse. Left click to lock the change or Right click to reset it to its original location. It will return to an orange highlight.

Translation (Moving, also known as Grab)

G Key, to move the selected object with no constraints

G Key, then X, or Y, or Z Key to move along the specified global axis

G Key, then XX, or YY, or ZZ Key to move along the specified local axis of the selected object

G Key, then Shift X, or Y, or Z Key to restrict movement along the global axis

G Key, then Shift XX, or YY, or ZZ to restrict movement along the local axis of the selected object

You can also move an object an exact number of Blender units or BUs by pressing G and X,Y or Z to set an axis and then type a number, positive or negative to move along that axis. The number can be a decimal or whole number.

Left click to lock the change or Right click to reset to its previous location.

Scaling (Size Change)

S Key, to scale the selected object with no constraints

S Key, then X, or Y, or Z Key to scale along the global axis

S Key, then XX, or YY, or ZZ Key to scale along the local axis of the selected object

S Key, then Shift X, or Y, or Z Key to restrict scaling along the global axis

S Key, then Shift XX, or YY, or ZZ Key to restrict scaling along the local axis of the selected object

You can also scale an object an exact multiple by pressing S alone or with X,Y or Z to set an axis and then type a number, positive or negative to move along that axis. The number can be a decimal or whole number. Numbers larger than 1 numbers make the selected object larger and decimals greater than 0 and less than one make the object smaller. Negative 1 can be used to flip an asymmetric object along the selected axis, to create a mirror image of the original object.

Left click to lock the change or Right click to reset to its previous size.

Rotate (Turning)

R Key, to rotate the selected object with no constraints

R Key, then X, or Y, or Z Key to rotate along the global axis

R Key, then XX, or YY, or ZZ Key to rotate along the local axis of the selected object

R Key, then Shift X, or Y, or Z Key to restrict rotation along the global axis

R Key, then Shift XX, or YY, or ZZ Key to restrict rotation along the local axis of the selected object

You can also rotate an object an exact number of degrees by pressing G and X,Y or Z to set an axis and then type a number, positive or negative to rotate along that axis. The number can be a decimal or whole number.

Left click to lock the change or Right click to reset to its previous rotation.

You may want to think of the G for grabbing. Many people do use the term Grab for Translation and this makes it easier to remember until you get used to it. You can also use the Ctrl key to snap to the nearest Grid mark when Translating, Scaling or to the nearest 15 degrees when Rotating, or the Shift Key to make your mouse movements smaller for fine tuning your movements. Once in Translation, Scale or Rotation modes you can use the arrow Keys in place of the mouse for more accuracy. The default 15 degrees for rotational constraints can be changed in the “User Preferences” window, “Interface” tab, and “Rotation Angle” field.

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