

About Blender

How can Blender be free?

People usually associate freeware software with the terms “bad”, “with limited features” or just a “demo”. Blender is fully functional. It works as an open-sourced, community development program where people from around the world contribute to its success. Blender is a rendering\animation\game development open-sourced freeware program maintained by the Blender Foundation and can be downloaded, free of charge, from www.blender.org. The goal of the foundation can be summarized as follows:

“The Blender Foundation is an independent organization (a Dutch “stichting”), acting as a non-profit public benefit corporation, with the following goals:

- To organize a fund raising campaign in order to finance the €100,000 one time license fee
- To give the worldwide Internet community access to 3D technology in general, with Blender as a core
- To establish services for active users and developers of Blender
- To maintain and improve the current Blender product via a public accessible source code system under the GNU GPL license
- To establish funding or revenue mechanisms that serve the foundation’s goals and cover the foundation’s expenses”

Blender website (blender.org)

Blender can be a difficult program to learn with limitless possibilities. What do you teach in the time you have to teach? That’s a tough question because you can’t teach it all. This tutorial book is designed to get you up and running in the basics of creating objects and scenes and animating. The best advice I can give you about learning this program is *Don’t Give Up!* Any rendering and animation program has a tough learning curve and Blender is no exception. After a few weeks, things get easier. This tutorial has been developed to be used in conjunction with daily lesson planning and demonstrations. Because of this, some areas of Blender have not been described as fully as they could be. If you are using this guide as a stand-alone teaching or “self-help” tool, you may need to seek additional help from reputable places like www.blender.org and www.blenderartists.org to make sense of things. These sites give you access to help forums and tutorials. *There are literally thousands of Blender users worldwide that browse the forums to give and get advice.* Make use of that vast knowledge base!

Version Information:

The current release at the time of this printing is **version 2.49**. Since Blender is developed by a worldwide pool of individuals giving freely of their time, releases can happen in as little as 4 months and as much as 1 year. Because of such a large number individuals contributing to Blender, major changes can occur between releases showing substantial improvements.

Rendering and Animation

Rendering and Animation Basics

RENDERING:

A rendering is a pictorial output of a 3D scene or object. Features like materials, lighting, oversampling and shadows control the effects and quality of the rendering. The more of these features you add, the more realistic your scene become, but also lengthens rendering times.

Materials and Textures:

You can control the way an object appears by applying color and textures. Materials provide realism with added effects. You can control glossiness (specularity), self-emitting lighting characteristics, transparency and pattern repetition. Raytracing can provide reflection (mirror) and refraction (transparency) effects. Textures can be made from any scanned photograph or drawn object in an image-editing or painting-type program. Images in almost any format (jpeg, bitmap, png) can be used. Blender also has many built-in texture generators that can simulate a variety of surface characteristics such as wood, marble, clouds, waves and surface roughness.

Lighting:

Lighting provides the realism to your scene through reflections and shadows. You can control the type of light, intensity and color. Some lights can give a “fog” or “dusty” look with a halo or volume lighting effect. Illumination distances can also be set.

Cameras:

Your camera is your point-of-view for the scene. Just like a real camera, you can control lens length to achieve close-ups or wide angles. Clipping distance can also be set to control how far and near the camera sees. Depth-of-field can now be controlled using nodes.

ANIMATION:

An animation is a series of rendered images that form a movie. The quality of your movie is controlled by all of the above mentioned features including frames per second (fps), output size, file type and compression. The most common method of animation is called *keyframing*. Key frames are created at various points in the animation while the computer generates all of the transition frames between the two keys. Basic animation options include changing size, rotation and location of objects.

Time Factors:

In order to animate, you must first set the length of your animation in frames and your frames per second (fps). The length in time can be calculated from these.

Frame Rate Options:

NTSC- U.S. and Japan video standard of 30 fps

Film- Movie standard of 24 fps

PAL- European video standard of 25 fps

Custom- set your own fps

*We typically use a frame rate of 25-30 fps depending on computer speed or if we plan to save the file to DVD. Hit the “PAL” or “NTSC” setting buttons for these.

Creating Keys:

A key is placed at the beginning and end of a desired move, size change or rotation of an object. Think in terms of how long you want a change to occur and relate it to your fps. For example, if you want an object to move from point A to point B in 2 seconds and you have 30 fps, place 2 keys 60 frames apart.

Following Paths and Objects:

In most animation programs, a camera can follow a path or object (or both) as it moves. This feature saves a lot of animation time and reduces the number of keys needed.

Output Options:

We typically save our movies in MPEG format for Windows. This type of file plays easily on most media players and at a high quality. Depending on how you plan to use your movie (i.e. on the web, saved to DVD, played in a presentation), you may wish to use different formats. Examples include Apple Quicktime and Windows AVI formats. Different formats also allow you to adjust the quality settings. For example, AVI formats can be compressed using a variety of compressors called CODECs.

Real-Time Animation (Blender only):

Real-time animation allows you to add physical properties to your objects and use the keyboard and other features to control them. You can create actors, change masses, control dampening (friction), set force and torque in x, y, and z planes and create relationships with other objects within the scene. With time and practice, interesting 3D games and real-time architectural walk-throughs can be created.

Blender allow you to use the physics engine to create animation tracks. You can now use the physics to create realistic falling, rolling, etc. animations and use them in movies.

Basic Key Commands

Basic Blender Commands

This is just a partial list of Blender commands. Please visit the Blender.org website for more details.

TAB key-	Toggles between edit mode (vertex editing) and object select mode . If you're in edit mode when you create a new object, it will be joined to the selected object.
Ctrl "Z"	The global UNDO command . With each press, one step will be undone (up to 32 steps possible by default). If in <i>edit</i> mode, it will only undo editing steps on the selected object.
Alt "U"	Brings up a list of Global UNDO steps to choose from (default- last 32 steps you've done).
"Z" key-	Toggles view from wireframe to solid .
Alt "Z"-	Toggles a texture/shaded view .
"R" key-	Rotates an object or selected vertices.
"S" key-	Scales a selected object or vertices.
"G" key-	Grabs or moves the object or selected vertices.
"A" key-	While in edit mode it's good for selecting all vertices for commands like remove doubles and subdivide. "A" twice will clear selected and reselect.
Alt "A"	Plays animation in selected window. Your cursor must be in that window for it to play.
Ctrl "A"-	After an object has been resized and/or rotated, this can reset the object's data to 1 and 0.
"W" key-	Brings up a " Specials " menu while in edit mode of specific edit mode options .
Shift-"D"-	Duplicates or copies selected objects or selected vertices.
"E" key-	While in edit mode, selected vertices can be extruded by pressing E.
"O" key-	The "O" key (not zero) will put you into proportional vertex editing while in edit mode.
"B" key-	Gives you a box (window drag) to select multiple objects . In edit mode, works the same to select multiple vertices, but hitting "B" twice gives you a circle select that can be sized by scrolling the mouse wheel. Press LMB to select, press wheel to deselect.
Space Bar-	Brings up the tools menu where you can add meshes, cameras, lights, etc.
Number Pad-	Controls your views . "7" top, "1" front, "3" side, "0" camera, "5" perspective, "." Zooms on selected object, "+" and "-" zoom in and out. The + - buttons also control affected vertices size in proportional vertex editing.
Mouse-	Left to manipulate (LMB), right to select (RMB), center wheel to zoom and rotate view. If you hold down "shift" and center wheel you can pan around on the screen.
Shift Key-	Hold down the shift key to make multiple selections with the right mouse button. Holding down the Shift key while clicking in a text box allows for easier keyboard entry of numbers .
Arrow Keys-	Used to advance frames in animation . Left/right goes 1 frame at a time, up/down goes 10 frames at a time.
"P" key-	While in <i>edit</i> mode, pressing P will seperate selected verticies . In <i>object</i> mode, pressing P will cause you to enter into the game (real-time) mode . Press <i>Esc</i> to exit game mode.
ATL/CTRL "P"-	Creates or breaks child/parent relationships . To create C/P relationships, hold down shift key and select <i>child</i> first, then <i>parent</i> . Hit Ctrl P. To clear a relationship, do the same except hit Alt P.
"U" key-	In Object Mode, brings up the Single-User menu to unlink materials, animations (IPOs) , etc. for linked or copied objects.
"M" key-	Moves selected objects to other layers . Mirror in edit mode , "M" will give you a mirror command (all verticies selected, then press x,y,z for axis of mirror).
"N" key-	Brings up the numeric info. on a selected object (location, rotation and size). Info. can then be changed in the window.
Ctrl "J"-	Joins selected objects together.
"F" key-	Makes a face in edit mode of the selected vertices. You can only select 3-4 vertices at a time to make a face. By selecting 2 verticies and pressing F will close shape.
Shift-"F"-	Makes all faces on a selection of closed verticies (as opposed to only one face with F).
Ctrl "F"-	Brings up a " Face Specials " menu with other face options.
"X" or Delete-	Delete selected objects, vertices or faces.
"K" Key	In <i>edit</i> mode, K will bring up the Knife tool menu with specific options for slicing faces.
Shift- "S"	In both <i>edit</i> and <i>object</i> modes, this will give you options to locate objects or the cursor to assist in precise placement.

Basic Key Commands

- Function Keys-** F1-Load File; F2-Save File; F3-Save Image; F4-Lamp Buttons; F5-Material Buttons; F6-Texture Buttons; F7-Animation Buttons; F8-Real Time Buttons; F9-Edit Buttons; F10-Display Buttons; F11-Last Render; F12-Render
- “I” Key-** The “I” key is used to **insert animation keys** for various things. Objects can be animated with basic Rotation, Location and Size keys and combinations there of. If your cursor is down in the buttons portion of the screen, animation keys can be added to lights, materials and world settings.
- Ctrl “T”-** Used to create a **Track To Constraint** to make one object follow another (like a camera with a target).
- Ctrl “S”-** Used to **Save** your Blender file
- Alt “C”-** Used to **convert meshes, text and curves**. For example, text can be converted into a mesh for other transform options.
- “Shift” “Space”** Toggles between **multiple screens to full screen** of active viewport.
- Ctrl “O”-** If using multiple cameras, this will **switch to the selected camera**. (Number pad “0”)
- Armatures-** Meshes can be controlled by “bones” or armatures. Create a mesh with vertices at the joint locations, then create an armature string within it. Child/Parent the mesh to the armature using the armature option. You can then animate the armature in Pose Mode.
- Ctrl-Tab-** Puts you into **Pose mode** for manipulating armatures.
- Import/Export-** Blender accepts .DXF and VRML(.wrl) files. Just use the OPEN option from the file menu to insert these types of files into an already existing scene. When inserting other Blender files or objects into another scene, use the APPEND option from the file menu and select the appropriate options. Multiple objects can be selected with Shift-Right mouse button.
- Springs/Screw-** Blender can create these objects in the edit buttons. You need a profile of the object, the cursor at the center of revolution, and 2 vertices to show the length of the revolution. The profile and the length vertices need to be in the same object. All vertices need to be selected when performing the operation. You will also need to be in the front view. There are several tutorials to help with this operation. Results are great!
- Multiple Viewports-** To create multiple viewports, move your cursor over the edge of the viewport (to start, you only have the drawing window and the button window-move your cursor to the break between them). Right click on the break and select split area.

Basic Button Panels

