You will learn how to:

- Download the free 3D application Blender
- Navigate in 3D space
- Build a simple 3D house with a raised roof and chimney

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Abbreviations to know:

*LMB = Left mouse button*
RMB = Right mouse button
MMB = Middle mouse button (click down on your mouse scroll wheel)
If working on a Mac, substitute the Option key for the Alt key.

Download the free 3D application Blender

Blender is completely free and has similar features to top 3D programs such as 3D Studio Max, Maya, and Cinema 4D, which can be very expensive.

1. Go to http://www.blender.org.
2. Click on the blue and white download icon (will say something like "Blender 2.69").
3. Choose your operating system and click the appropriate type (64bit/32bit), or on a mirror below the type.
4. Open up the downloaded file and follow the simple installation instructions.
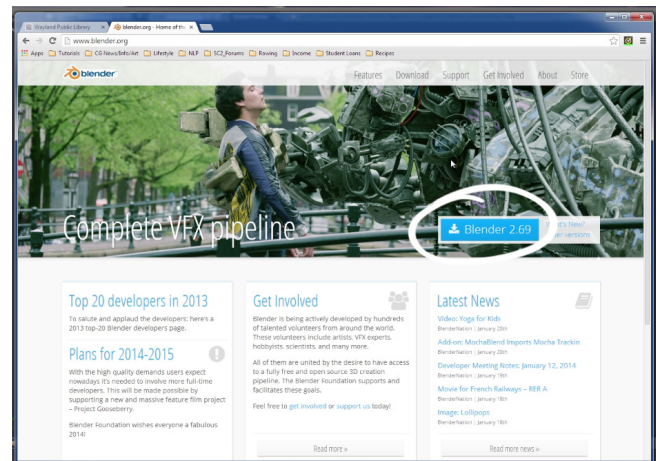
Navigate in 3D space

Navigation in a 3D scene generally consists of rotating, panning, and zooming. The ideal setup for working in 3D is to have both a three-button mouse (a mouse with a clickable scroll wheel) and keyboard with a numeric keypad. If you don't have these (i.e. if you're working on a laptop), please refer to the instructions at the end of this section.

Tip: Blender is a complex program with a lot of different functions and commands. Don't feel like you have to learn everything at once - just start with the basics and build from there.

1. To rotate, click and hold MMB (the middle mouse button) and drag the mouse around. This changes the angle of your view.

2. To zoom, use the middle mouse scroll wheel to zoom in and out, much like how you would scroll on a website.
3. To pan, hold down Shift+MMB and move the mouse around. This changes your left/right and up/down position in the scene.

Tip: If this is your first time using a 3D program, moving around will take some time getting used to. The more you work in 3D, the more comfortable you'll become.

If you don't have a three-button mouse (a mouse with a clickable scroll wheel) or keyboard with a numeric keypad, you can emulate them by following these steps:
1. Go to File > User Preferences.
2. Click the Input tab.
3. If you're using a two-button mouse, click the box for "Emulate 3 Button Mouse." Now, in place of MMB (middle mouse button), use the following commands:
   • Alt+LMB (left mouse button) is rotate.
   • Alt+Shift+LMB is pan
   • Alt+Ctrl+LMB is zoom
4. If your keyboard doesn't have a numeric keypad, click the box for "Emulate Numpad." Now, in place of a numeric keypad, you can use the normal number keys on the top row of your keyboard.
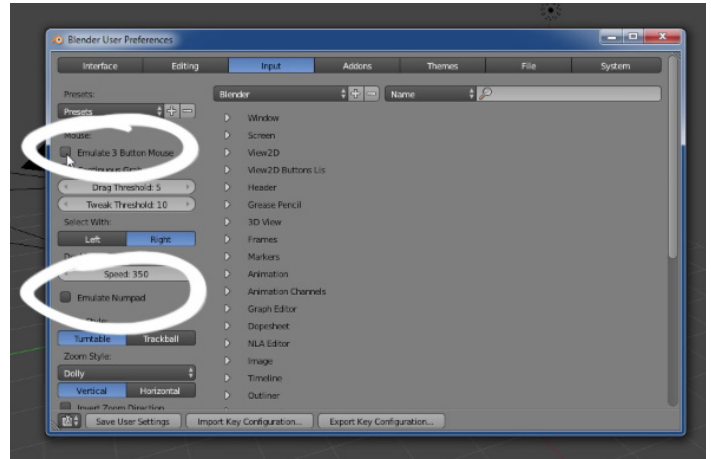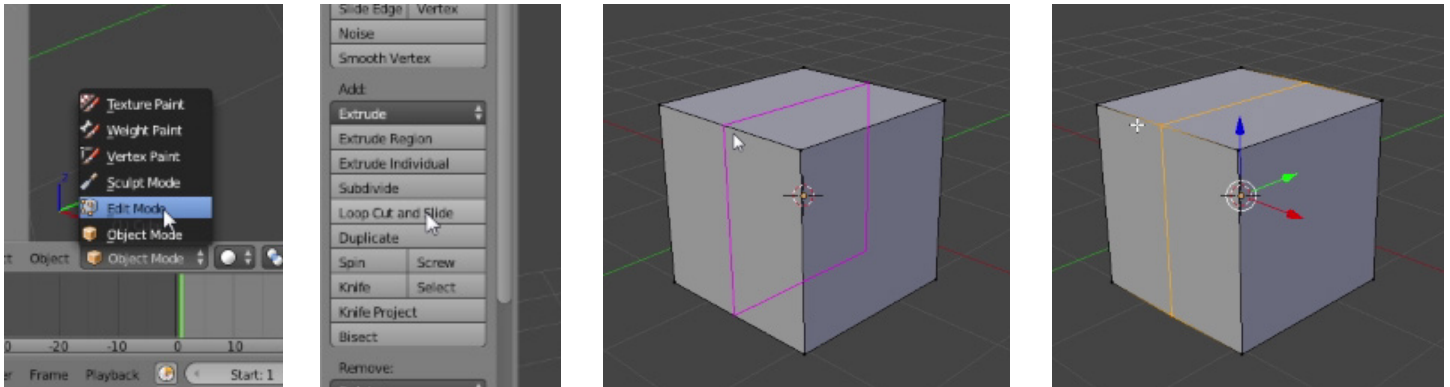
## Build a simple 3D house with a raised roof and chimney
A simple 3D house can be built from a cube with just a few basic 3D tools.
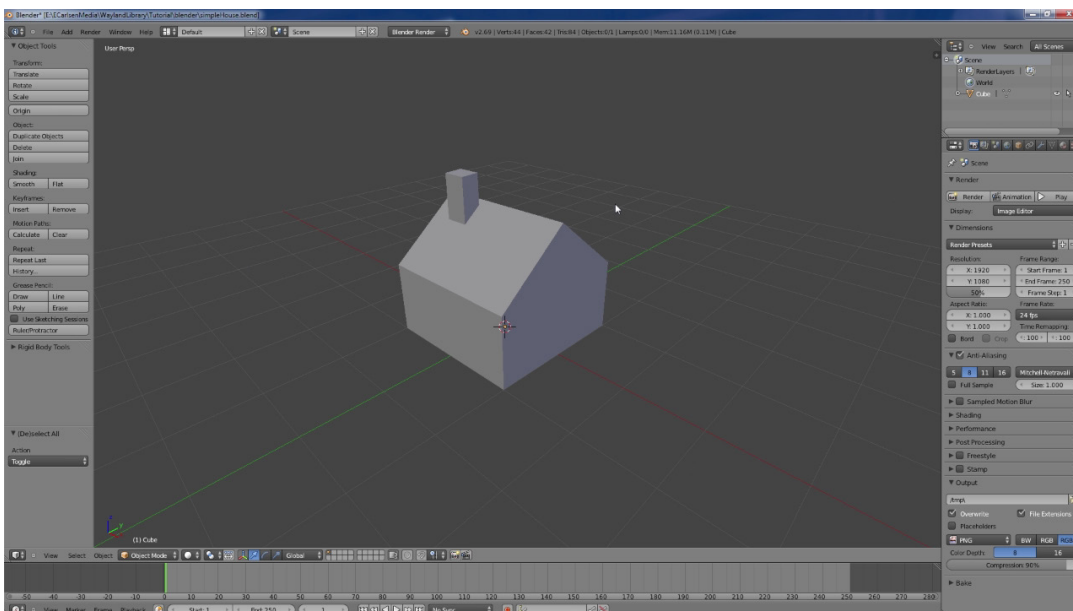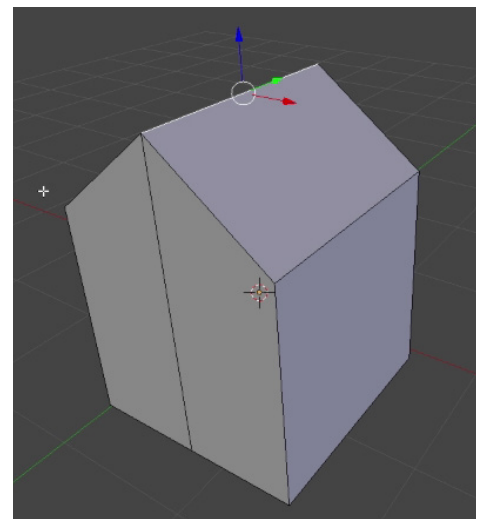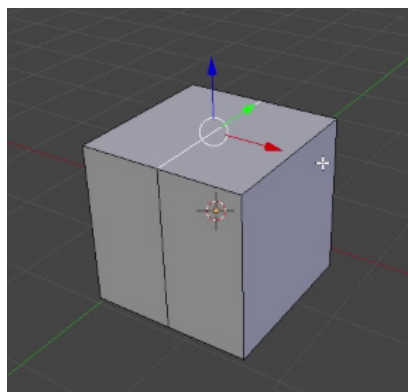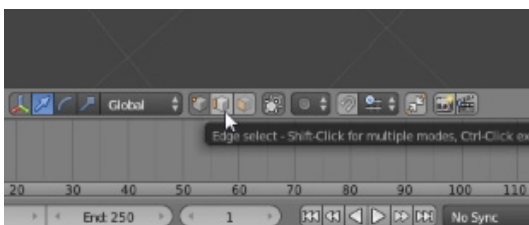
Create the roof

1. Find the menu at the bottom-left of the screen that says Object Mode, and change it to Edit Mode.
2. On the left Mesh Tools menu, under Add, click "Loop Cut and Slide."
3. Hover over an edge and left-click once, then right-click to place a loop cut in the exact middle of the object.
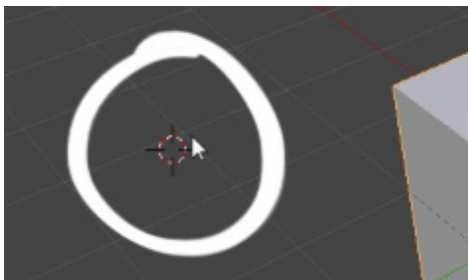

Tip: Blender often uses RMB (the right mouse button) to select objects, which can be counterintuitive since we often use LMB (the left mouse button). If you left-click and it moves the "3D cursor" (a small cross-hair used for some Blender functions), or if you otherwise lose your bearings in the scene, use Shift+C to recenter the cursor and reset your view.

4. Left-click on the Edge Select button, which is in the middle of a cluster of three buttons at the bottom of the screen, to the right of a menu that says "Global" (hovering over the button will reveal what it is).
5. Right-click on the top edge on the cube.
6. Using LMB, drag the vertical blue arrow upward to pull the roof up.

Create the chimney
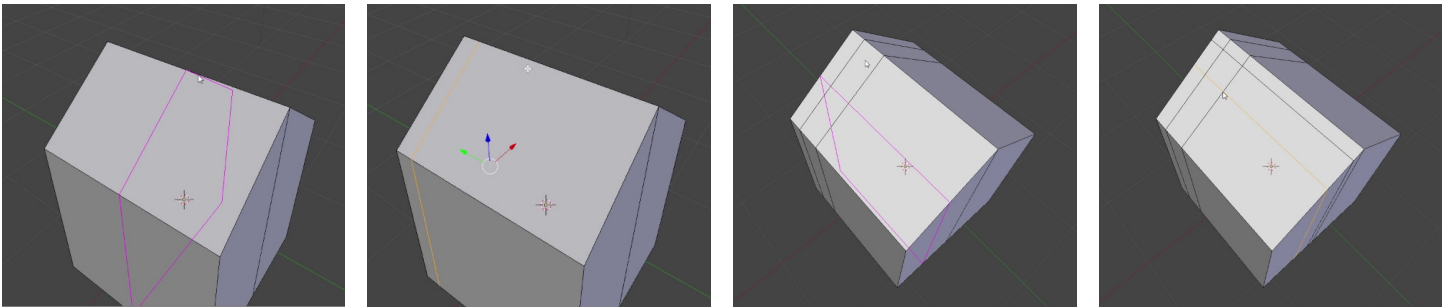
1. Click "Loop Cut and Slide" again.
2. This time, hover over the new middle roof ridge so that you're making a cut perpendicular to the ridge.
3. Left-click once to initiate the cut, then this time left-click again toward the back of the house to place it there (right-clicking at this point could place it right in the middle).
4. Repeat the same steps to make another loop cut. This will form the other edge of the chimney perpendicular to the roof ridge.
5. Make two new cuts, this time hovering over one of the newer top edges so that you can make the final edges of the chimney, parallel to the top ridge. You should end up with a rectangular box contained within the four cuts.
6. Click the Face Select button from the bottom of the screen (next to the Edge Select button).
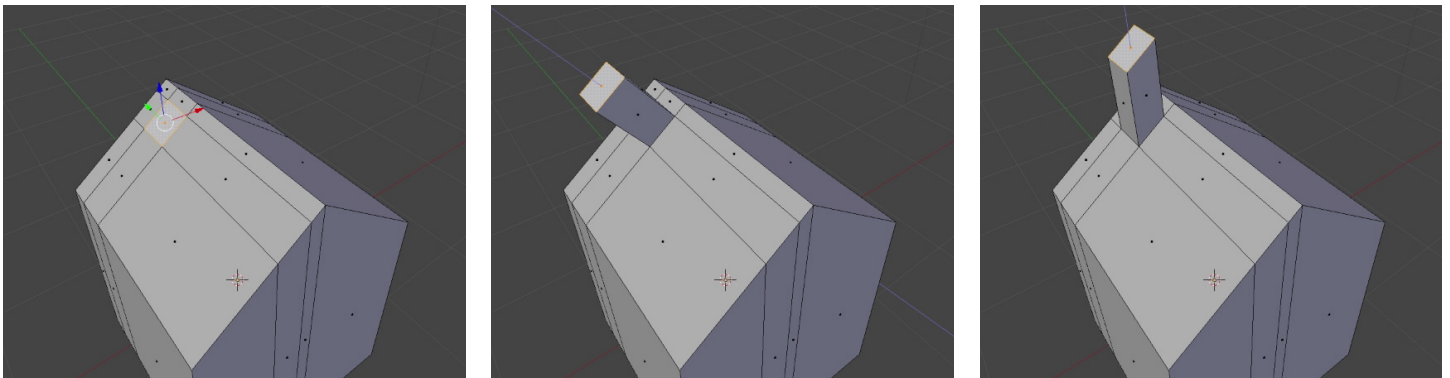
7. Right-click the box within the four edges we created to select it.
8. Just above Loop Cut and Slide, click on Extrude Individual.
9. Before clicking again, tap "z" **twice** to snap our extrude tool to the vertical (Z) axis.
10. Move the mouse up and down to raise the chimney to the height you'd like, then left-click to set it in place.
11. To even out the top of the chimney, choose Edge Select and select the lower or higher edge, then drag it up/down with the blue arrow like we did for raising the roof.
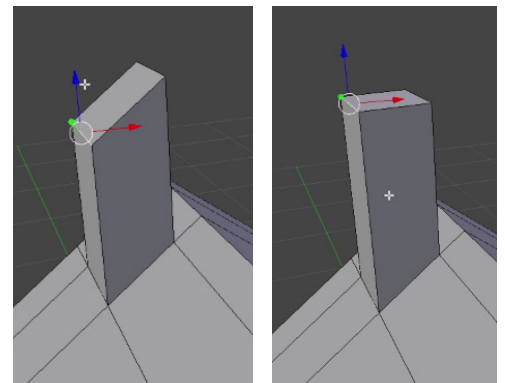
Make the house shorter
1. Click Face Select.
2. Change your view so you can see the underside of the house.
3. Holding down Shift as you go, right-click all the faces on the bottom of the house so they all become selected.
4. Click and drag upward, using the vertical blue arrow again, until the house has reached the desired height.