

Modeling a Simple Park Ride



This tutorial requires access & installation of AutoDesk 3DsMax.



Alice 2.2

This tutorial also requires access to Alice 2.2 for Mac or Windows.



Although not required, a graphics editor like Adobe Photoshop can enhance the realism of your model.

Linking with 3DsMax



Modeling a simple amusement park ride

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This tutorial was written by Travis East for the SPIRIT program at Purdue University. This lesson is intended for students and teachers who are comfortable with concepts like basic geometry, 3D modeling, rotations, parent-child relationships (hierarchy structure), linking and dilations (scaling). While it is not required to complete the tutorial, a basic knowledge of the AutoDesk 3DsMax interface is helpful. If you are an instructor, it is highly advised that you work through the tutorial first before presenting it to your students.

This tutorial can be used in conjunction with the Amusement Park ride activity available on the web at <http://www.theeastfamily.net/project.html>.

If you have questions or issues, you can contact Travis East at teast@nhj.k12.in.us.

Good Luck,

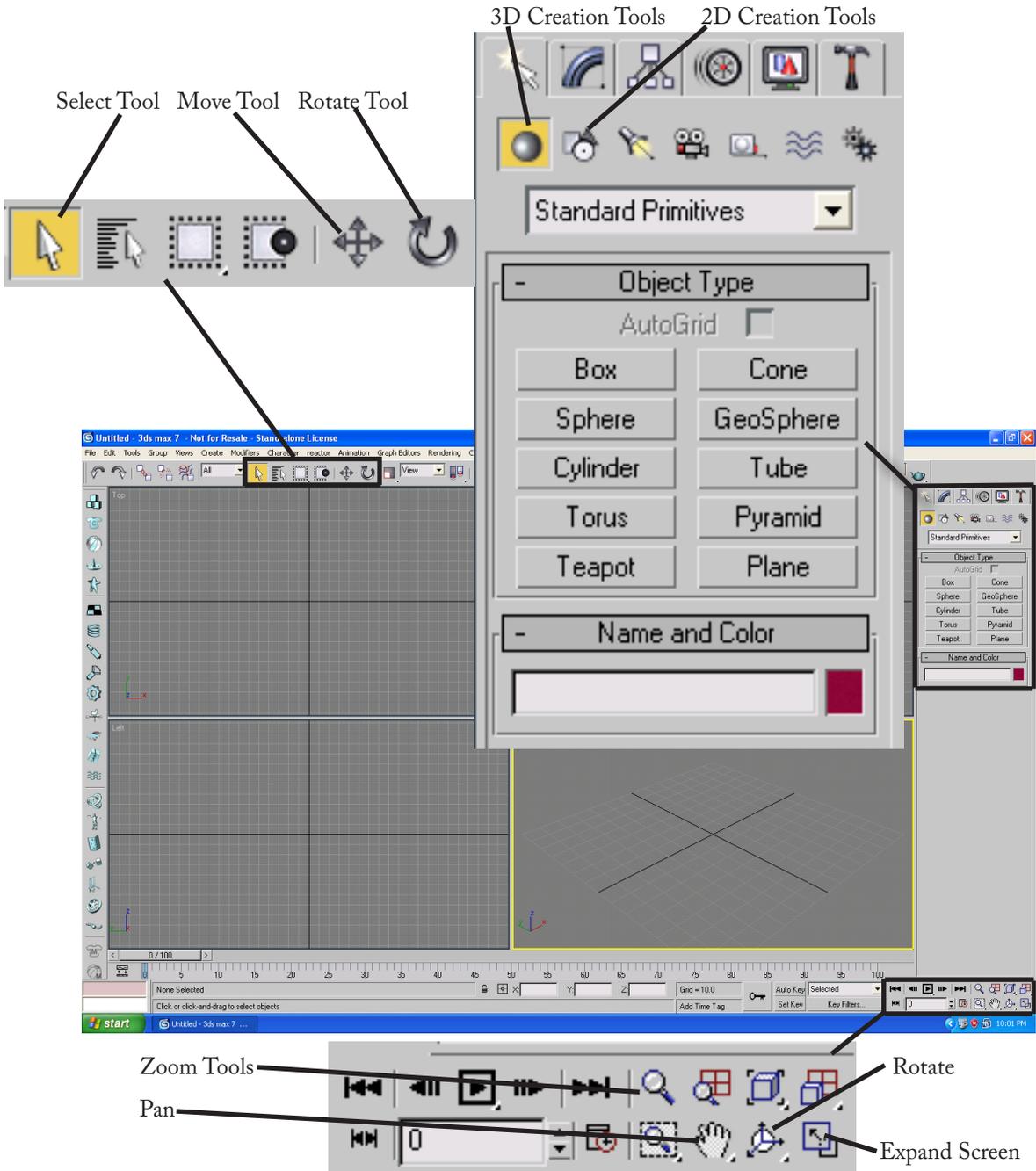
Travis East

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3DsMax Interface Overview



1 Building a simple amusement park ride in AutoDesk 3DsMax

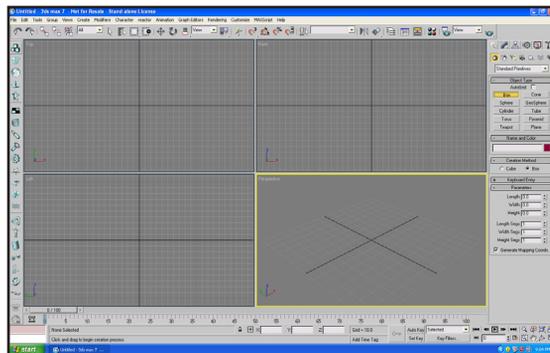
Before you begin this tutorial, you will need to make sure you have AutoDesk 3DsMax installed on your computer. This tutorial was create with screenshots of 3DsMax version 7, but the general interface and functionality has remained consistent enough that you should have not problems using a new version than I have. If you or your school can't afford 3DsMax or don't have it available, you can download a 13 month license of 3DsMax at <http://students.autodesk.com>. In order to get to the download page, you will have to register with AutoDesk.

In this tutorial, we will be creating a simple amusement park ride that will then be able to import into Alice 2.2. Although the ride we will be creating goes by a variety of names, it is commonly referred to as the Gravitron. When modeling amusement park rides, it is helpful to find a photograph of the ride to get a sense of what elements are important in modeling. This tutorial is not intended to make a perfect replica, but simply to show you how to create a basic functional 3D model.

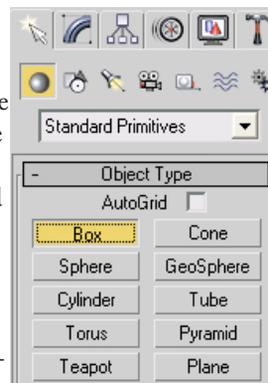


Let's Get Started

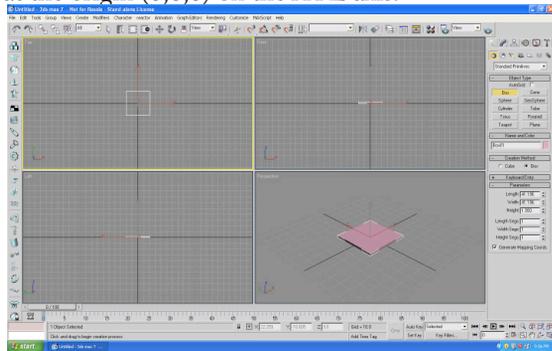
Open AutoDesk 3DsMax by either choosing the icon on the desktop or selecting the Start Menu: Program Files: AutoDesk: 3DsMax. (If you have an earlier version of the program, the folder will most likely say Discreet instead of AutoDesk.) To begin modeling, you need to have a window that looks like the one below.



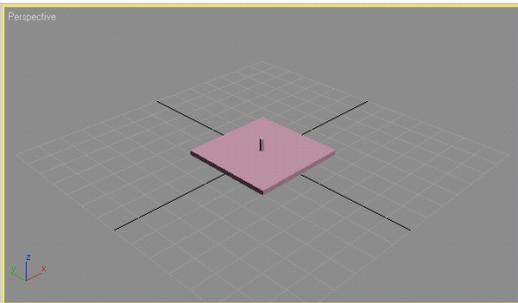
On the right hand side of your screen, you should see series of Standard Primitive buttons available to you. We will first create a platform for the ride. Select the Box button and click & drag somewhere in the Perspective window. After you see a 2D rectangle appear, drag up to create a small rectangular prism.



When you have finished creating the platform, it should look like the one below. You don't have to worry too much about scaling right now because you can always scale the model down in Alice once you have imported it. However, it is very helpful if you create the platform in such a way that it is centered at the origin (0,0,0) on the XYZ axis.

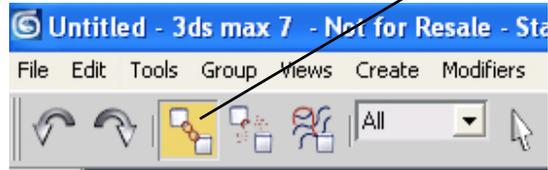


The next step is to create the shaft that will link the main body of the amusement park ride to the platform. To do this, simply select Cylinder to right under Standard Primitives. Click & drag to form a circle at the center of the rectangular platform, which is the origin if you were careful where you created it. Once you see a circle, click & drag up with the mouse to form the cylinder. At this point, your model should look like the one below.



The next step is to link the shaft to the platform. This will cause the cylinder to become a child to the platform. This will create a hierarchy structure that will transfer over to Alice when we import the model.

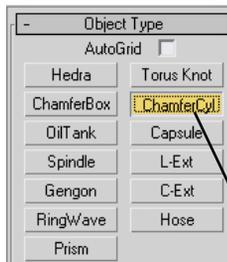
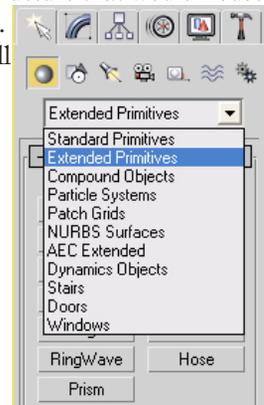
To link the cylinder, we must first highlight it using the arrow tool in the toolbox. In the screenshot below, it is the white arrow on the right side. Once the cylinder is highlighted, we click on the Link button.



With this tool selected, click & drag from the cylinder to the platform. Once you have done this, it may not be immediately apparent how the model changed. However, if you were to move the platform, you will find that the cylinder moves also. At any time, you can unlink objects by using the tool directly to the right of the Link button.

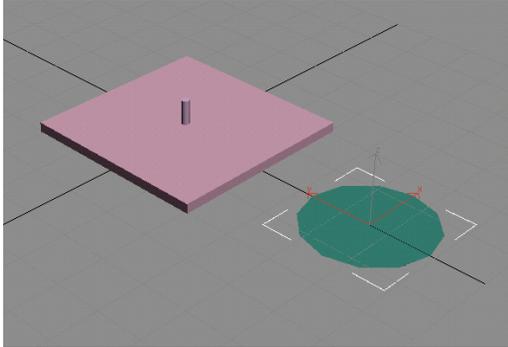
Modeling the Main Compartment

Now that we have our platform all set up, it is now time to model the main structure that would house the passengers on the ride. To accomplish this, we will have to look outside the basic Standard Primitives. Fortunately, 3DsMax has more options listed under Extended Primitives. To access these, click on the menu that contains Standard Primitives.

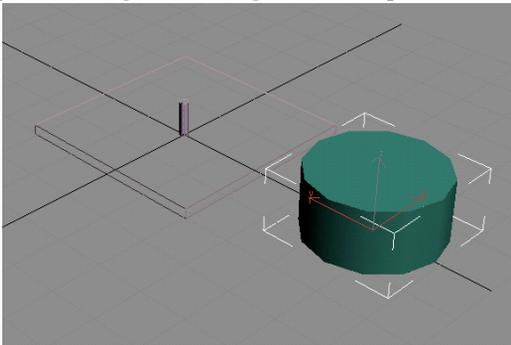


Once you have the Extended Primitives buttons available, select the one that says ChamferCyl. This stands for Chamfered Cylinder.

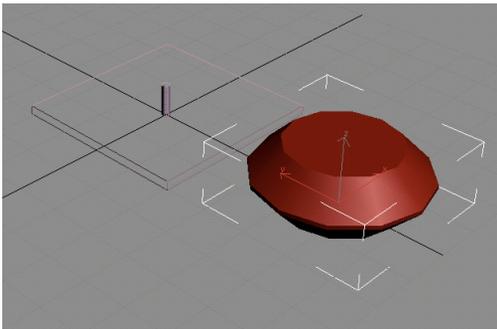
To create this model, I suggest do so off to the side of the platform so you can really tell how the model is will look. You want to make the model look as much like the real thing as possible. To begin, click & drag somewhere just to the side of the platform.



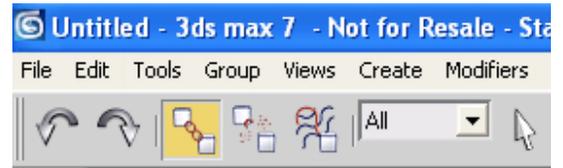
Once you have the basic 2D shape, drag the mouse upward to begin extruding the 3D shape.



Finally, click & drag upward again with the mouse to add the chamfer to the cylinder.

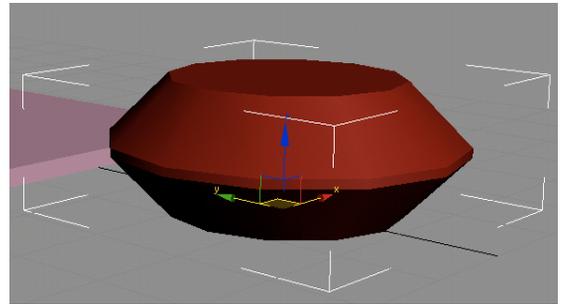


Time to Link:



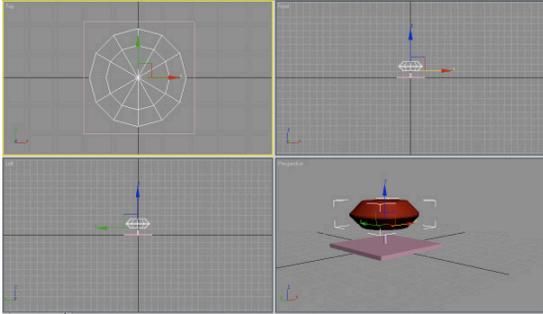
Now that we have the shape, we are now going to link the model to the shaft (while the shaft is still easy to see). With the chamfer cylinder selected and using the link tool up at the top of the screen, click & drag from the selected object to the shaft (cylinder). We are building the hierarchy structure with each new object we add to the scene.

Now that the ride is now linked to the shaft (which is linked to the platform), we can now move it into place. To do this, you simply right click on the chamfer cylinder. When you see a menu appear, click Move. You should see 3 colored axes appear over the object. If you don't see the 3 colored axes (below), press the X key on the keyboard.



If you click and drag on the Z-axis (blue arrow) & drag, it will move the object straight up. If you click and drag on the X-axis (red arrow), it will only move along on that axis. Likewise, the Y-axis (green arrow) will allow you to move the object toward or away from the platform. Your positioning and arrow colors may vary. The important thing to remember is to always click directly on the arrows or unexpected movements will result.

Use the Top view, Left view, & Front view windows to help you position the ride into place on the shaft and platform.



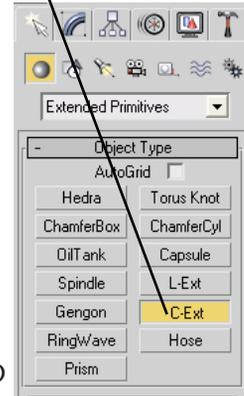
Place the ride just slightly above the platform centered on the shaft cylinder. This is really a judgement call on your part as to how far off the platform you want your model to be. Try to make the model appear as accurate as you can by always referring back to the photograph of the actual ride.

If you notice, the Gravitron ride almost always has a display overhead that has the name of the ride in lights. Although it is possible to create lights in 3DsMax, we will keep the modeling simple and just create the static display.

To accomplish this, we will again need to select a

tool in the Extended Primitives category. The tool we want to select is called C-Ext.

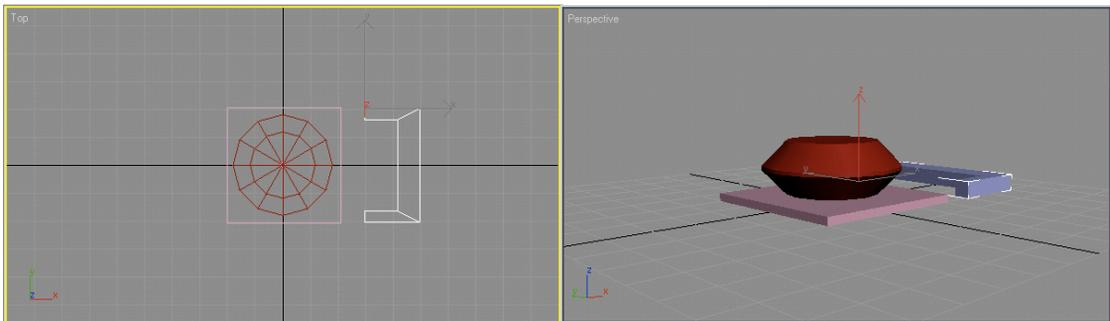
Using this tool will most likely take some practice to get used to how it works. To begin, you click & drag to the side of the platform (so you can get a good look at what you are creating). You will begin to see a C-shaped object form. Once you have created the basic 2D shape, you can then click and drag up to create the extruded 3D shape. You then either click up or down on the mouse until you have a shape that will not interfere or intersect with the movement of the gravitron ride.



Time to Link:

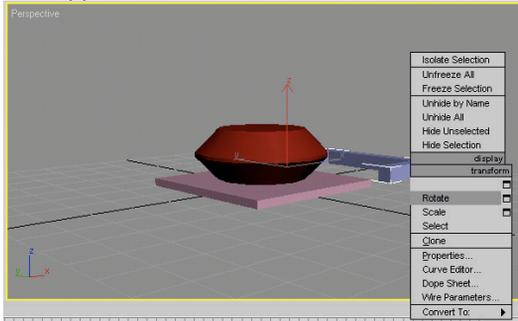


It is time once again to link the new object.

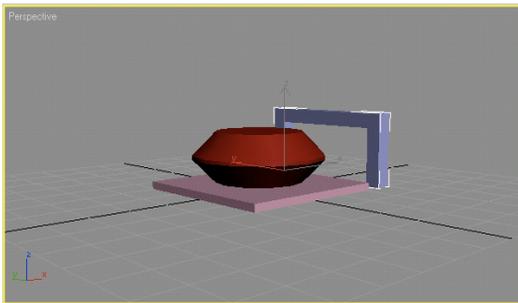


Select the C-Extension object using the Link tool. Click & drag from the C-ext. to the Platform.

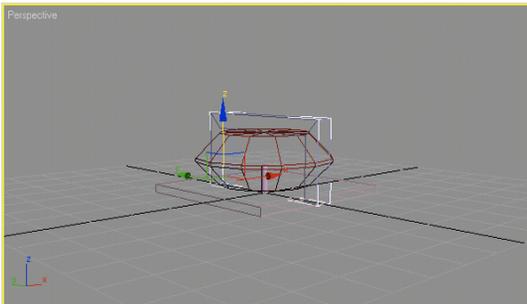
It is now time to rotate the overhead display into place. Right click on the object and you will see a menu appear. Select Rotate from the menu.



You should see 3 colored circles appear representing the 3 axes of motion. Just like the Move axes, you can limit the rotation to a particular plane by clicking on a particular color. Rotate the display exactly 90 degrees so that it looks like the one shown below.



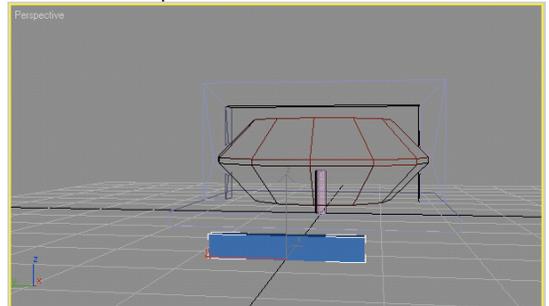
Now right click on the object and select Move. Use the colored axes to move the display into position directly over the ride.



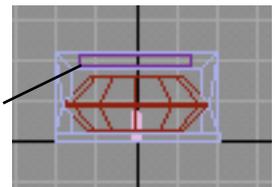
Note -

If your display is too large for the platform or comes in contact with the ride itself, you can delete the object and create it again. However, it is also possible to right click on any object and select Scale. The Scale axes work in a very similar way to the ones for Move and Rotate. Like many tools in 3DsMax, it takes some experimenting to become familiar with how they work.

The final object we will add to our design will be a simple sign that will eventually have the name of the ride textured to it after we import it into Alice. To create the sign, we will need to switch back to Standard Primitives from the menu to the right of the screen. We will use a simple box for the sign. To create it, click & drag to form a rectangle somewhere out in front of the ride. After you have created the basic rectangle in 2D, click & drag up to extrude the shape into 3D.



Right click on the object and select Move. Use the 3 colored axes to position the sign directly above the gravitron ride.



Link the sign to the overhead display framework using the Link tool.

Congratulations - the modeling is finished. Your design is almost ready to import into Alice.

Preparing your Model for Alice

To make your model ready to import into Alice, there are a few more steps you must complete. The first of these is to Reset the XForms.

To do this, you must click on the tab in 3DsMax that looks like a hammer (see image to the right).

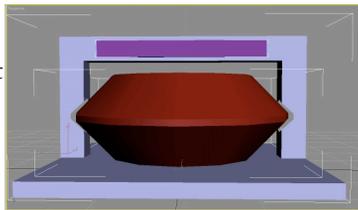
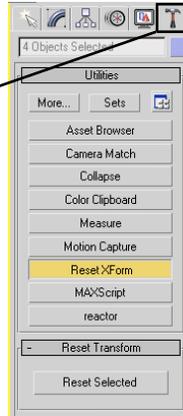
In the buttons you will find under Utilities, select the one that says Reset XForm. There will only be one option under this button - Reset Selected. To use this tool, you must select what you want to reset. Since you want to reset everything, simple hold down the Control key on the keyboard and

type the letter A. This is the shortcut for Select All. You should see white boxes around all of the objects like the image seen here.

When you are ready, click the Reset Selected button under the Reset XForm options.

If it looks like nothing happened consider yourself fortunate. If some of your objects suddenly moved somewhere out of place, you will have to using the Move and Rotate tools to get them back into place. After you get the misplaced part or parts back into place, use the Reset XForm tool on those objects again.

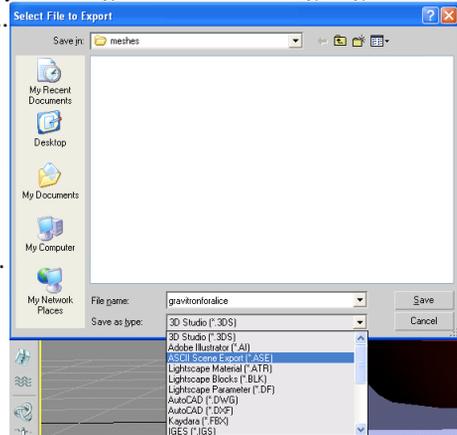
Once all of your parts are in position and surviving the Reset Xform tool without moving out of position, you are ready to export the file into the proper format for Alice to accept it. However, before you export, you should try saving your document if



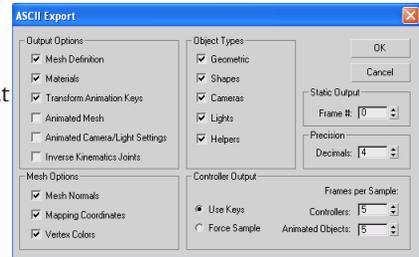
you have not already done so. Saving the document straight saves into the .max file format. You should always keep this file on hand in case you want to modify the ride later or add more detail to it. However, Alice cannot natively accept .max files.

Alice requires .ase files, which are ASCII Scene Export files. 3DsMax allows you to save in this format by selecting the File menu & going down to Export...

You should see a window that looks like this. Under Save as type:, select *.ASE.



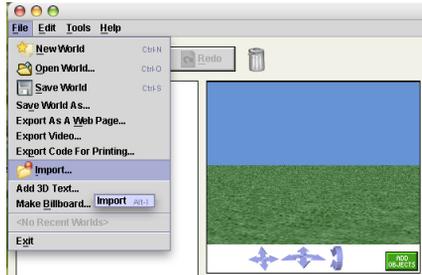
You will then see a window that looks like this. You can choose the default settings or match your options to the window shown here.



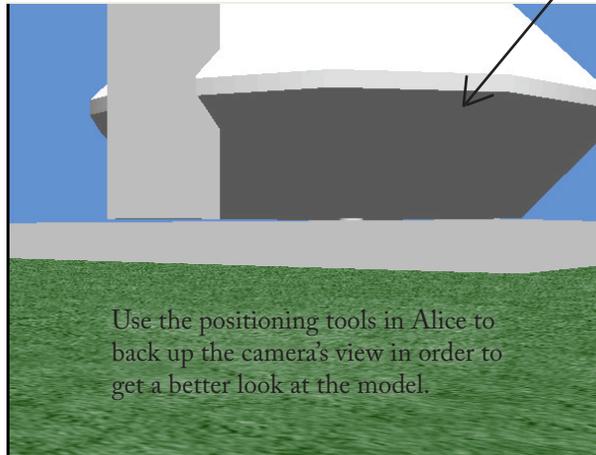
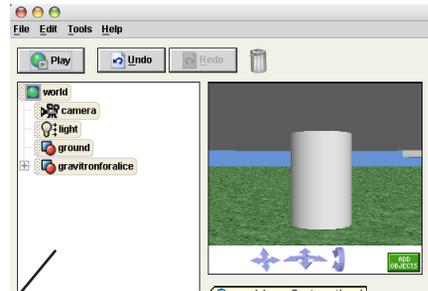
Congratulations - you are finally ready to open Alice.



Click on the File menu & select Import...



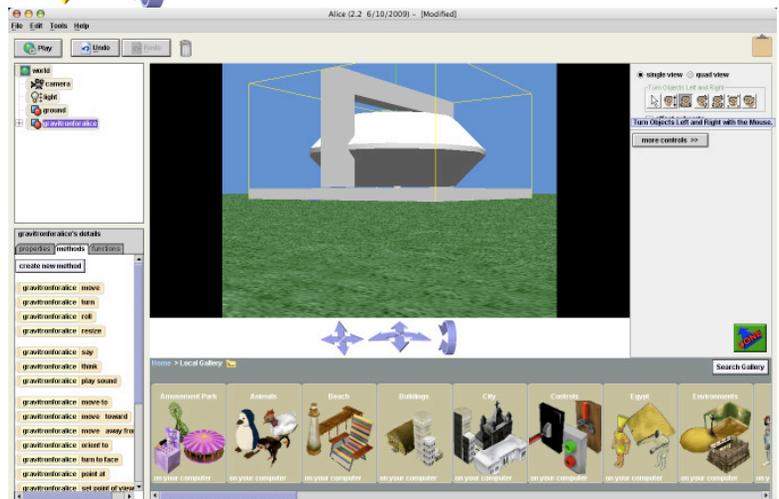
You will likely see something that looks like this.



Note - while it is possible to apply textures in 3DsMax, the steps to do this go beyond the scope of this tutorial. There are plenty of tutorials on how to apply textures in 3DsMax available online or you can consult the 3DsMax Help menu. The textures can and do transfer over to Alice 2.2.



You can use the transform tools inside of Alice to scale & orient the model how you want it. You can also use the Import Texture feature in Alice to add color and materials to the ride. I suggest using a graphic editing tool such as Adobe Photoshop to create the texture of the sign that says the name of the amusement park ride.





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