A Beginner's Guide to Modeling for Midtown Madness 2

By: Silent1Unknown

(MM2C, MMArchive, 3DAutos, SMCars)

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THE SOFTWARE

You will need the following:

1. **ZModeler v.1.07b** - To make your model car. It's free, find it at www.zmodeler2.com.
2. **Adobe Photoshop** - To make textures (paintjobs) for your models. If you don't have Photoshop, you can download The Gimp for free.
3. **MS Paint** - Loads much faster than Photoshop and is used for some shortcuts.
4. **MS WordPad/Notepad** - Used to edit tuning files for the car.
5. **MS Sound Recorder** or **GoldWave** - If you want custom engine sounds and such. Not absolutely necessary.
6. **WinRAR** - To package everything together in the end.
7. **Midtown Madness 2** - To test out and have fun with your car!

If you have all of the above with the exception of #5, you're ready.

LESSON 1: BLUEPRINTS

Choose a car you want to model. Since you're a beginner, it's advised to pick a boxy car. For this tutorial, I've chosen the Jeep Grand Cherokee (2003). You can just copy it.

Also since you're a beginner, you should use blueprints. Some good sites to find blueprints are

There are good blueprints and not so good blueprints. You can quickly test out your set of blueprints to see how good or bad they are.

Test:

Open up the blueprint in MS Paint. Making sure the side view and front view are at the same level (see green lines below), connect features like the top of the headlights from side view to front view (see red lines below). You can also check side and back views. If the red lines are perfectly horizontal, it means the blueprints are MOST PROBABLY (98%) good. Also, look at the front view and trace the outlines of the hood (see blue lines below). They should taper downwards. If they taper upwards or don't taper at all (parallel), the blueprint is NOT COOL!!! Also, good blueprints come with a top view, but not always necessary.

EDIT: Take a look at the side view. On good blueprints, you should see more than just the headlights on the front end, including some of the grille and on the rear end you should see more than just the tail-lights. This is because most cars don't have flat fronts or backs and so you should be able to see some details beyond the headlights and tail-lights in the side view.

NOTE: Before you test out your set of blueprints, you must be sure that all the heights and widths match up. The heights of the front, back and side views should be the same. The widths of the front, back and top views should be equal. It's obvious that you shouldn't compare the blueprints yet, say, if the back view is twice as large as the front.
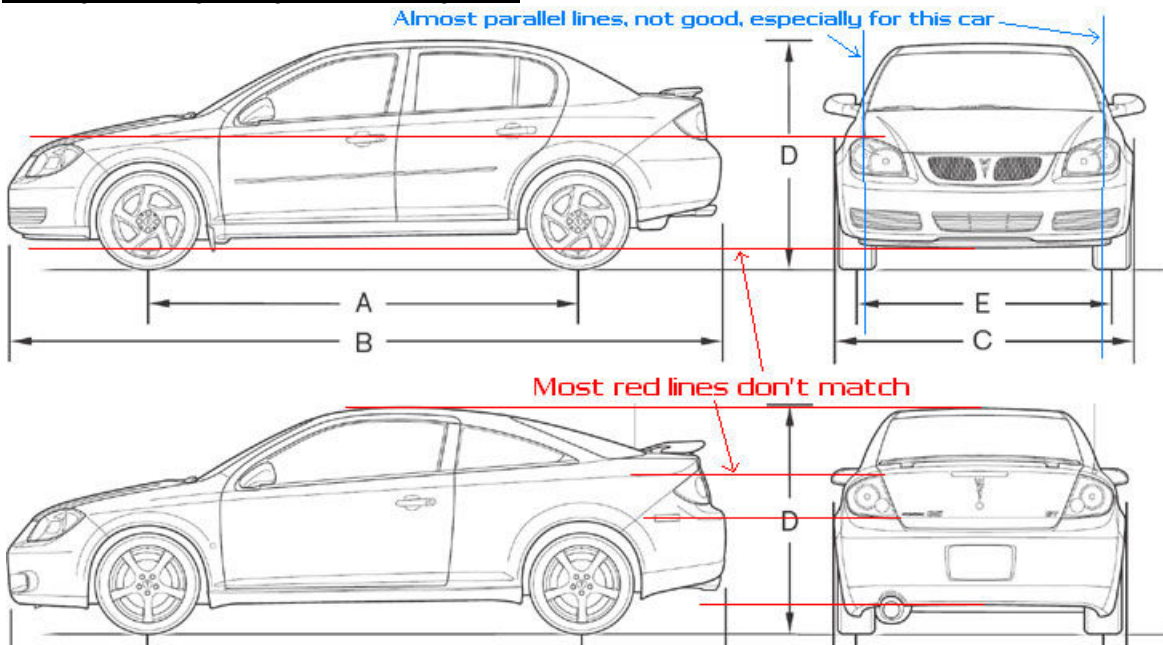
Example of a fair blueprint:

Back and Side views are level

Pretty good match

4610 mm / 181,5"

Blue lines taper down
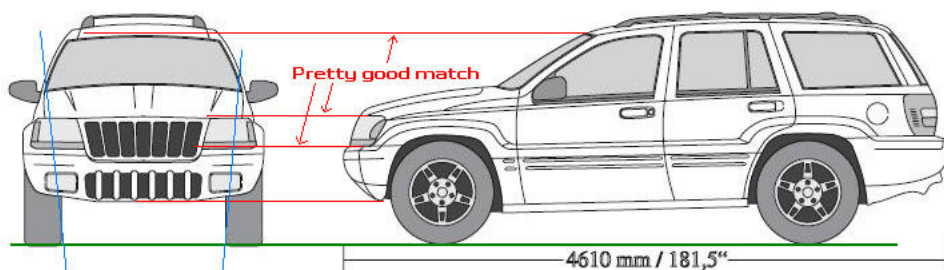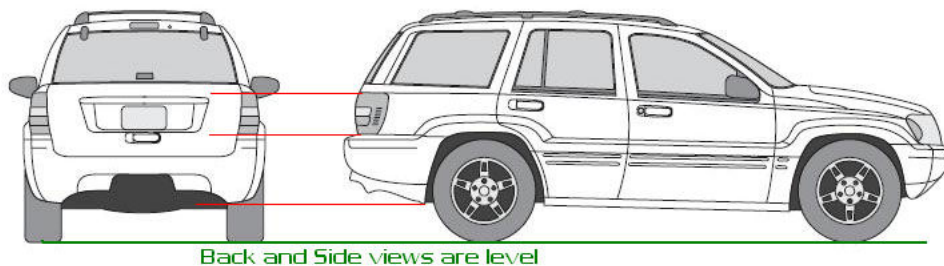
Perfect horizontal line -->
Imperfect horizontal line -->

Example of a poorly done blueprint:

Now we need to prepare the blueprint for putting into ZM (ZModeler). Simply make new images containing only ONE view each and make sure it's centered. The images should be saved as bitmap (.bmp) or targa (.tga) formats. If you want more details on how to carry out this step, read below. Otherwise, you can skip to the next lesson.

Open up your blueprint in Photoshop. **ROUGHLY** select the side view using the rectangular marquee tool and copy (by pressing Ctrl+C),
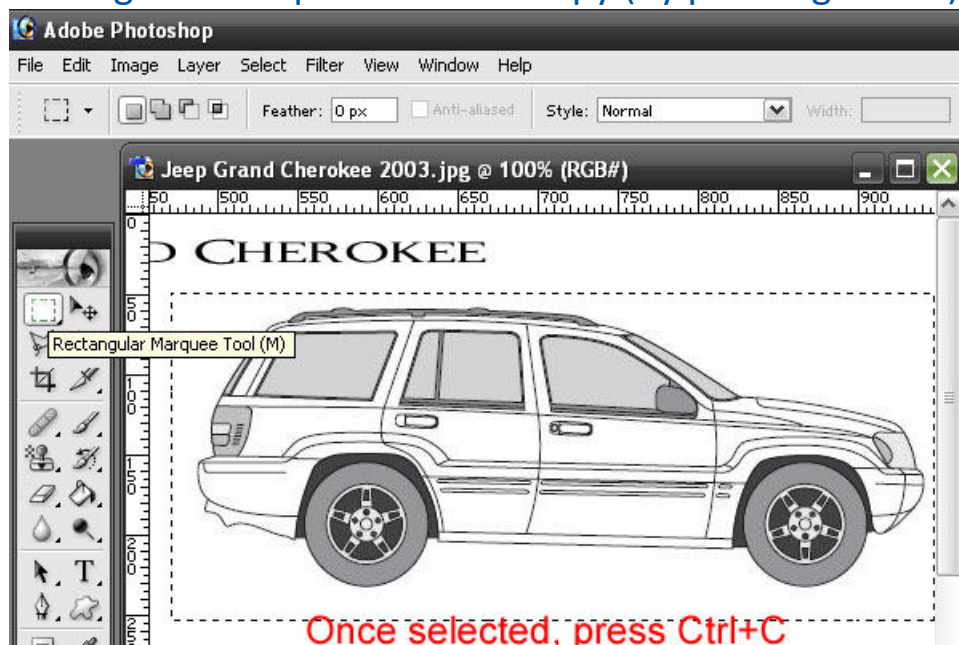
Then go to File>New... and a box will appear. Don't change anything, just press OK and then paste (by pressing Ctrl+V) the image there. Now use the Magic Wand tool to select the area outside of the side view of the car and then right-click it, go to Select Inverse.
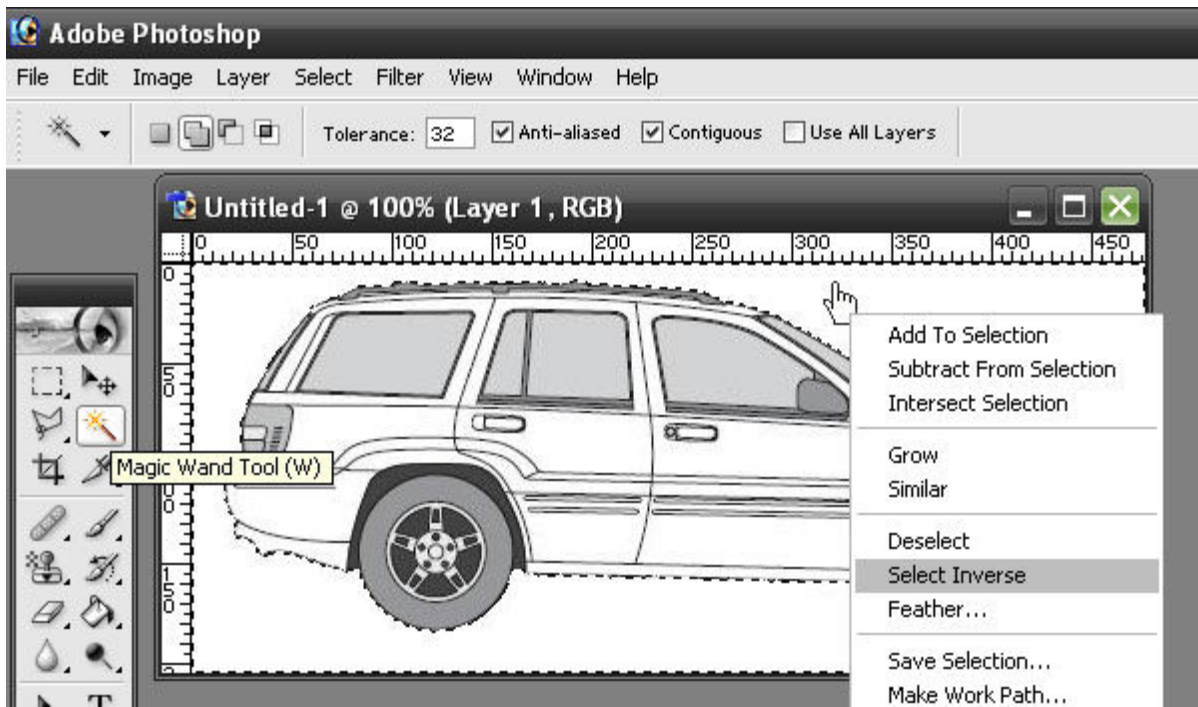

Only the side view should be selected now and no white space around it. Copy and Paste to another new document, you should get something like this:
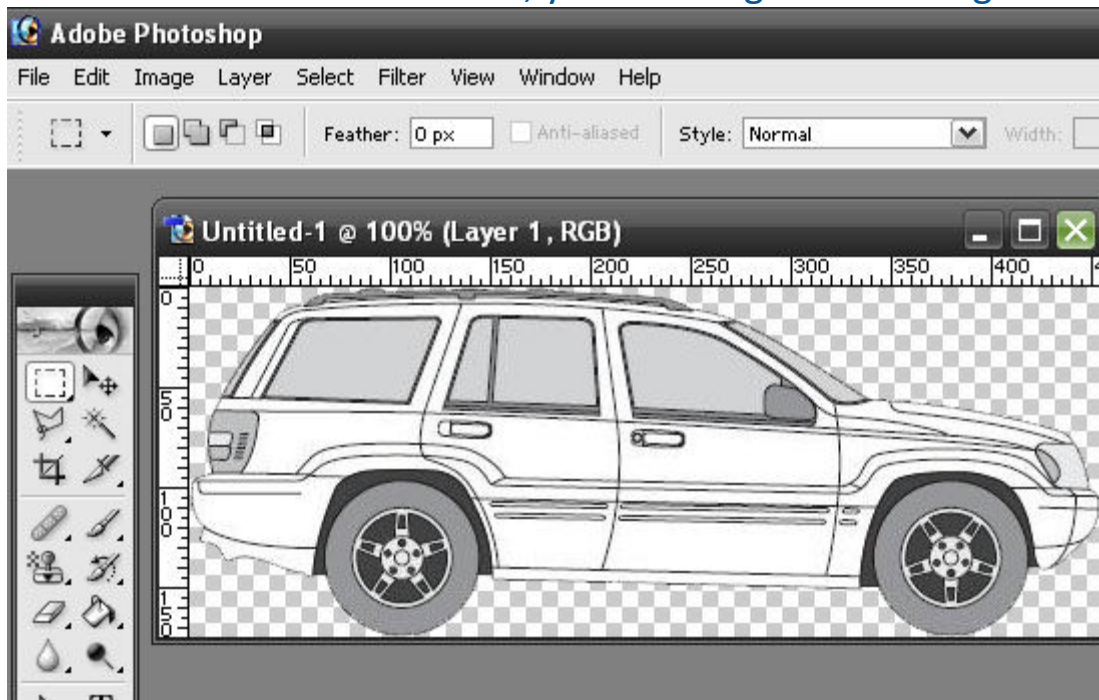
Go to Image>Canvas size... and you'll get the box shown below with the same numbers if you did everything right.
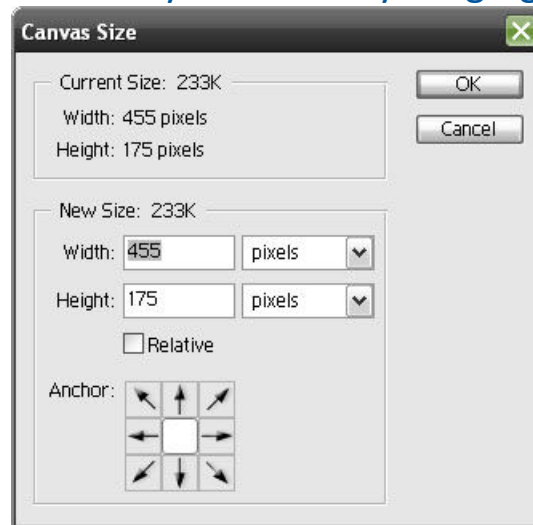
The image should have dimensions such as 128, 256, 512, 1024 ...etc. So pick the next highest number than shown for current width and height. In this case, change width to 512 and height to 256. DO NOT TOUCH THE ANCHOR, it should be at the center box. Paint the transparent area white. Your final image of the side view is centered on the canvas and should like this:
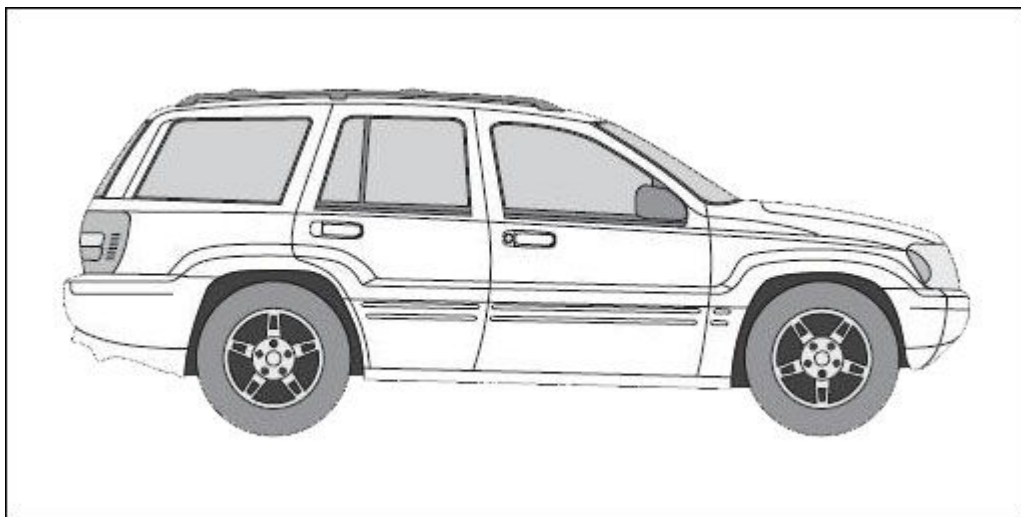
Finally, save it by going to File>Save as... and save it as either .bmp or .tga. I choose .bmp because the file size will be smaller and there is nothing transparent on my canvas.

Pick either of the two formats. I prefer .bmp
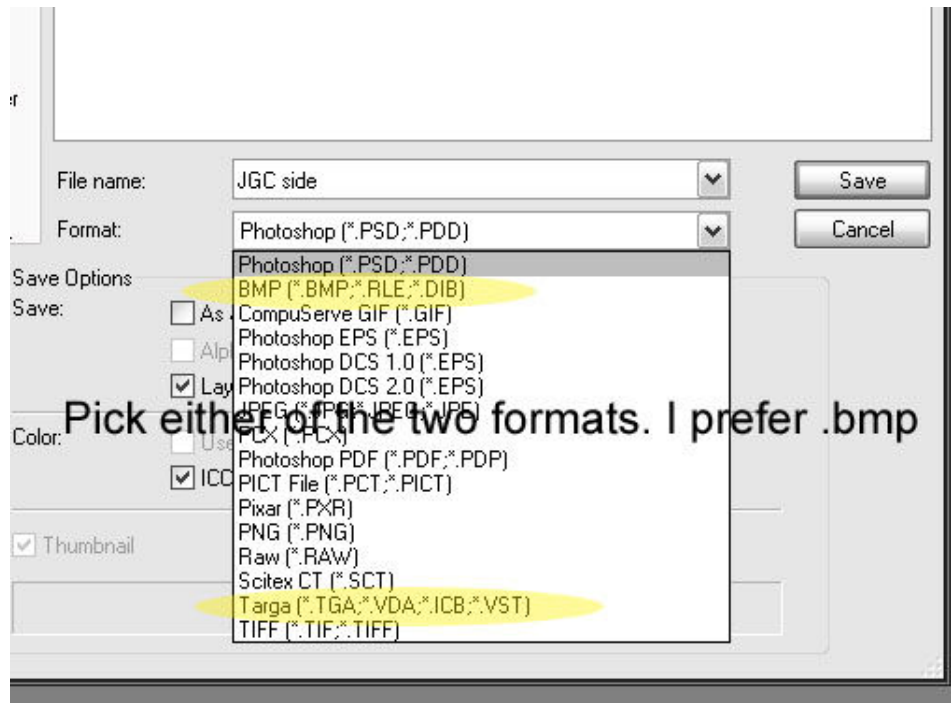
Repeat for front, back and top views.

Few notes:
-When preparing the top view, it should be oriented so that the headlights face down and taillights face up, just like in the blueprint I found for the Jeep Grand Cherokee. Otherwise, select the top view and go to Edit>Transform>Rotate[degree of your choice] to rotate it to the proper orientation.

-Sometimes, blueprints are very large in dimensions. When you get to the step where you are about to increase the canvas size, resize your image first by going to Image>Image size and make sure constrain proportions is checked. Ideally, you want the width of the side view to be 512 pixels. That also means that the height of your top view (if you have one) will also be 512 pixels. Remember, when changing the front and back views, their dimensions should match. Also their heights will equal the height of the side view and their widths should equal the width of the top view.

-You also probably want some photos of your car for reference. The lighting and coloring on photos tells you depth of the car, where there are curves, how much of a curve and other such details. Collect some dynamic shots from sources like Google Image, Yahoo Autos, Motorcities or even the car maker's site.

That's it for now I think. Next lesson, we'll start modeling.

LESSON 2: MODELING
PART 1: The Side

Open up ZM (ZModeler). First thing you want to do is load your blueprints. To do so, click on the corner button (as shown below) and go to Background>Image>Load Image... and a box will appear. Click Add... and load all your blueprints one by one.
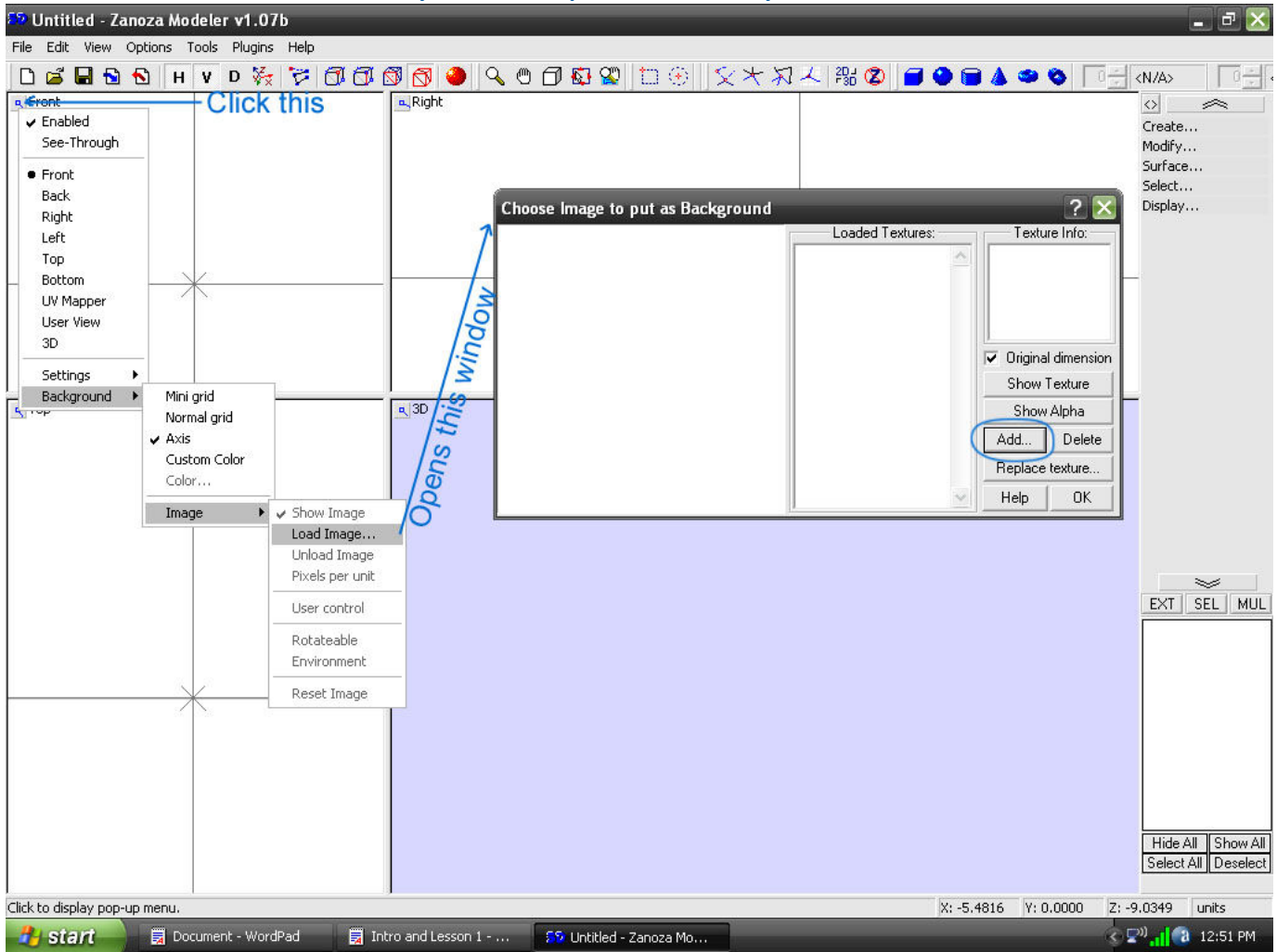
Pick the correct view for whichever window you opened it through (i.e. load front view blueprint in the "Front" window, side for right, top for Top...etc) and then click OK. Repeat for Side and Top view windows. We'll load Back view later when we need it. Your screen should now look something like below.
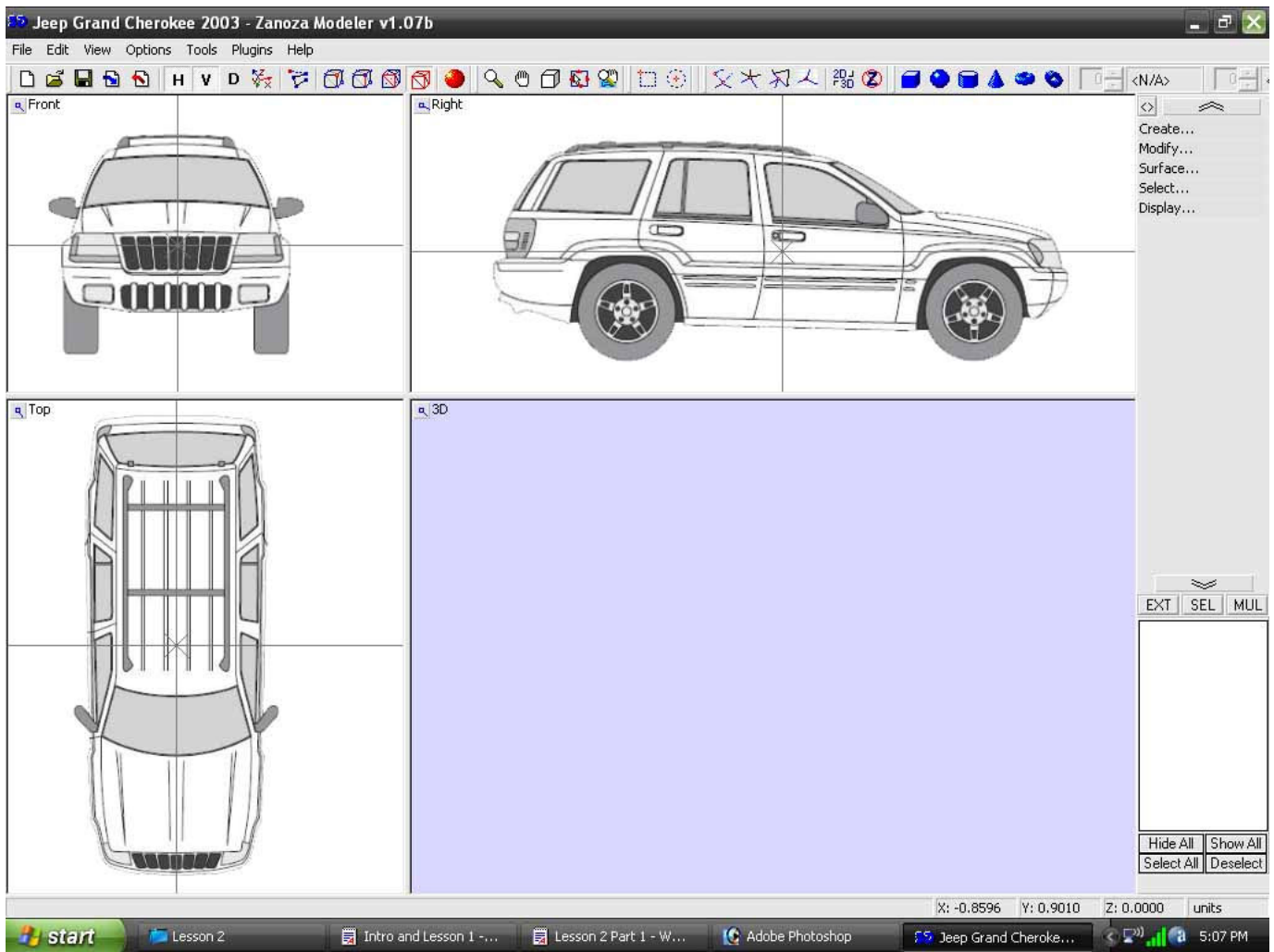
When modeling, we should also refer to those photos (angled shots) of the car to develop a plan for how we're going model. Don't load them into ZM. Just refer to them. Here are some shots I found on Google Images:


We'll focus on the side view window first.

On the side toolbar, go Create>Surfaces>Flat. On the "Right" window, click and drag to make a rectangle and then release the mouse button. A box should appear indicating the name of the object you just created.
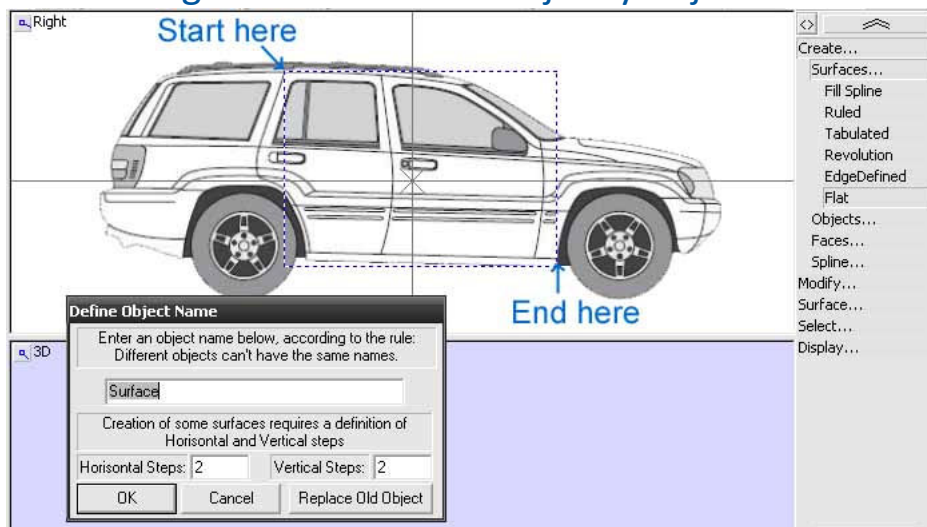
Rename it if you want. Change Vertical Steps to 1, press OK and now your screen should look like this (except I changed the color of my lines to light blue because its easy to see, yours should be black):
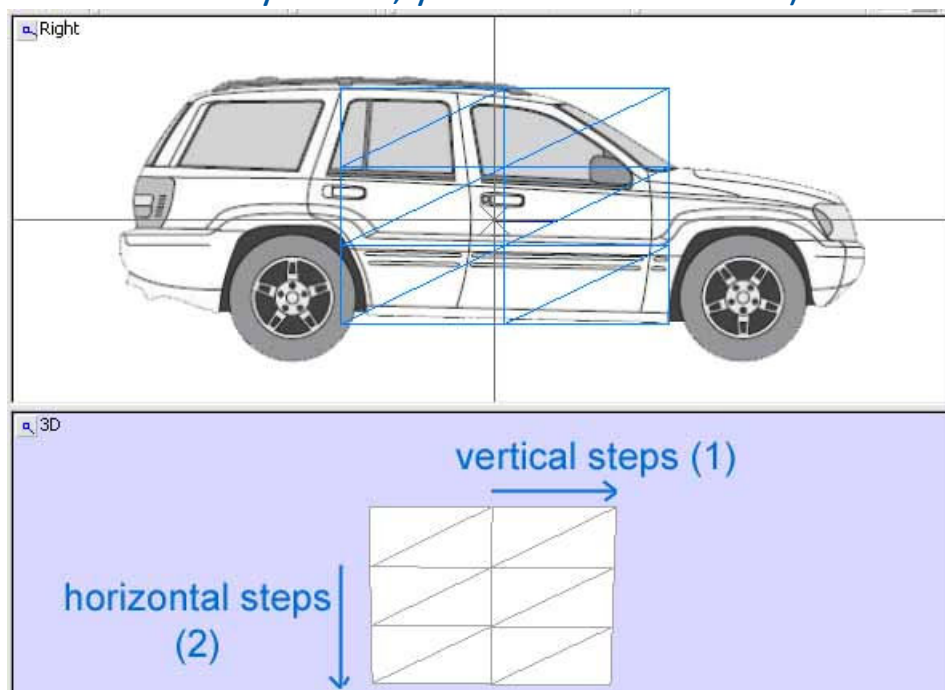
Now go to Create>Faces>Single and click once anywhere on the object you just created. You'll notice little red dots appeared at the intersections. Click once on the top-left red dot, then click on the dot just below it (middle-left) and then click

some distance to the left of the object like so:
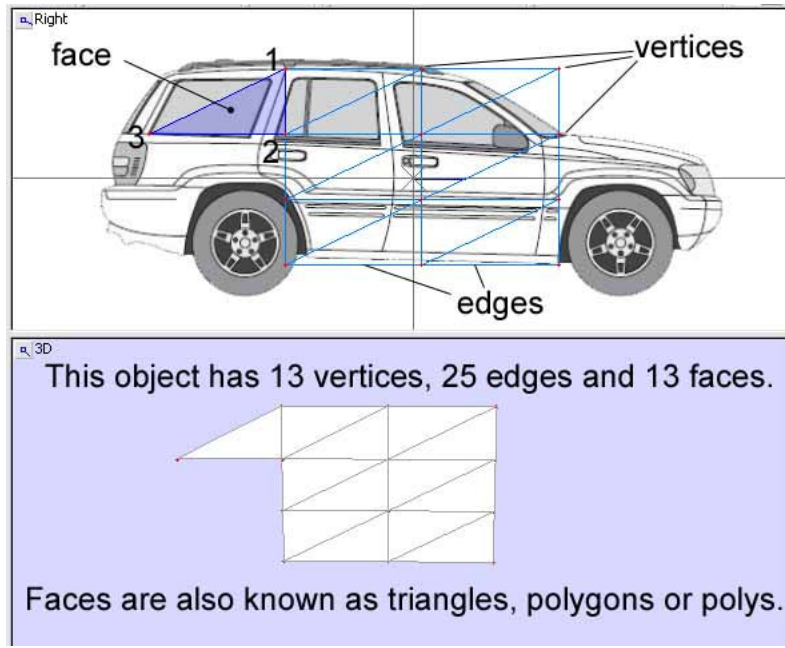
Now we learn to move the vertices around. Go to Modify>Move, click on a vertex you want to move and drag it to another position. Keep moving vertices and creating faces until you get this:
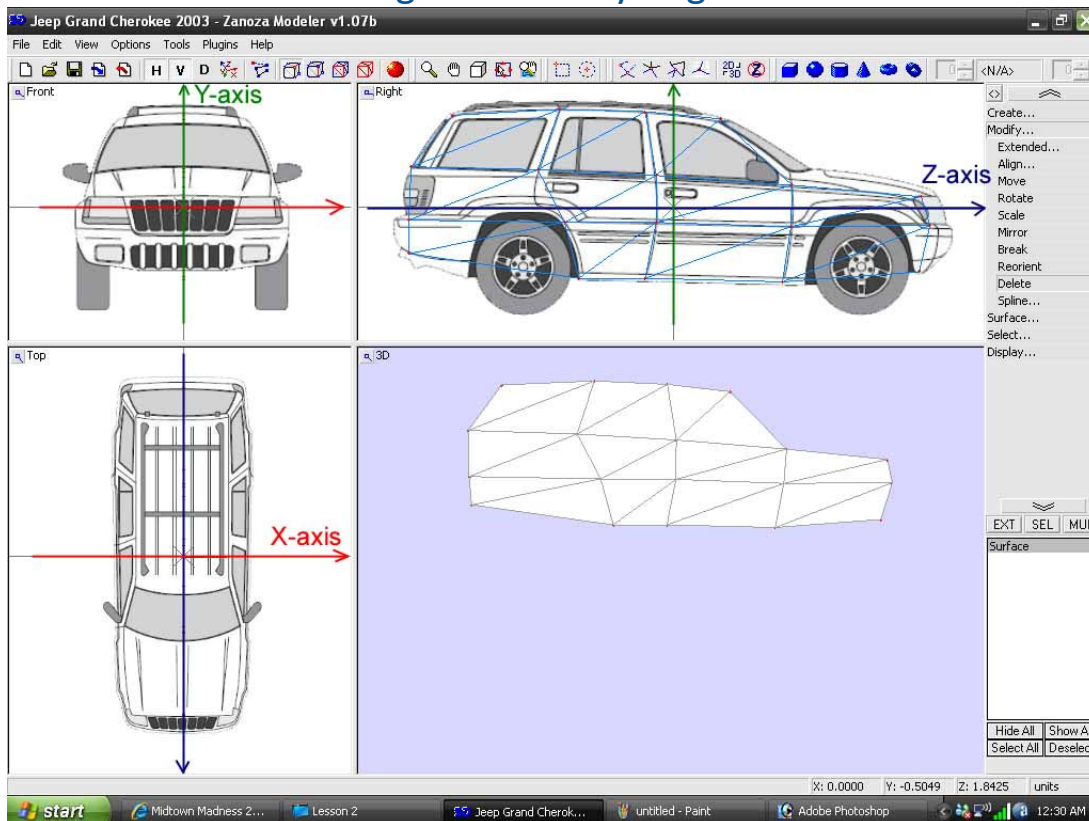
If you look at the toolbar at the top, you'll notice a group of buttons H V D ⤢. The H and V are selected and because of this, you are allowed to move the vertices in any window ("Right", "Top", "Front"...etc) up, down, left and right. If you press the XYZ button that has the 3 arrows ⤢, it changes the group of buttons into this set --> X Y Z ⤶. Whichever one button is selected, either X, Y, or Z, that's the direction you can move your vertices, edges, faces or objects, no matter which window you use.

Look at the Front view window or the Top view window and you'll notice that the vertices and faces you made in the Right view window are all in one line, in the center. Every time you make a new vertex, it is set at that center and you'll have to move it manually to its proper position (I'll show an alternate method next lesson).

Right now, we want to move the faces along the X-axis so that they sit at the side of the Front and Top views. To do so, select the Rectangle selector tool found at the top (⬚) and select all the vertices in the right view how you normally would with a lasso tool (click and drag to cover the vertices). All the selected vertices and surrounding faces will turn red like so:
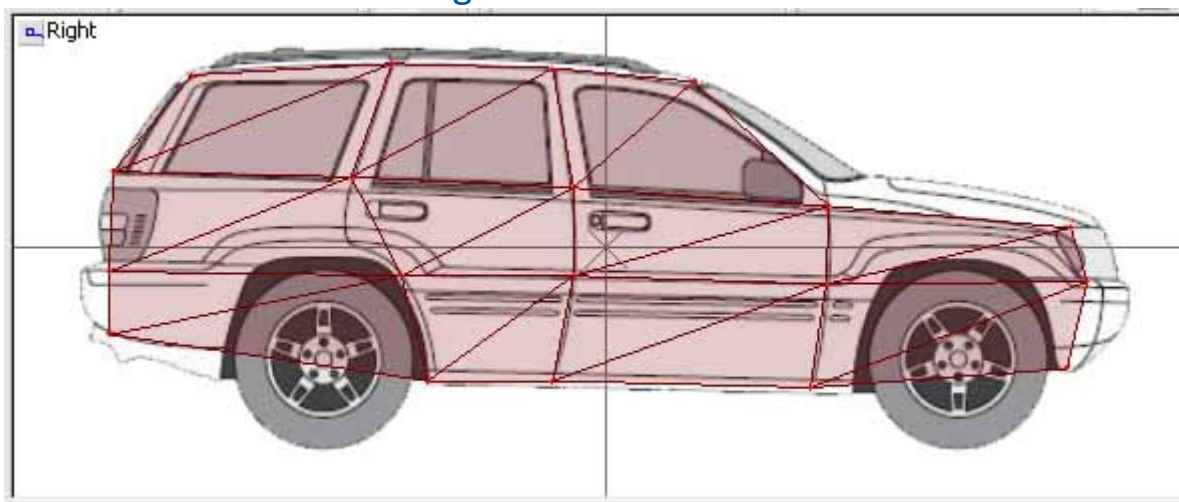
Now click on the X-axis button and also go to Modify>Move. In the Front view, hover for a moment, your cursor on any vertex (until you see the movement icon near your cursor, a plus sign with little diamonds on the edges) and then click and drag to move the whole thing to the edge:
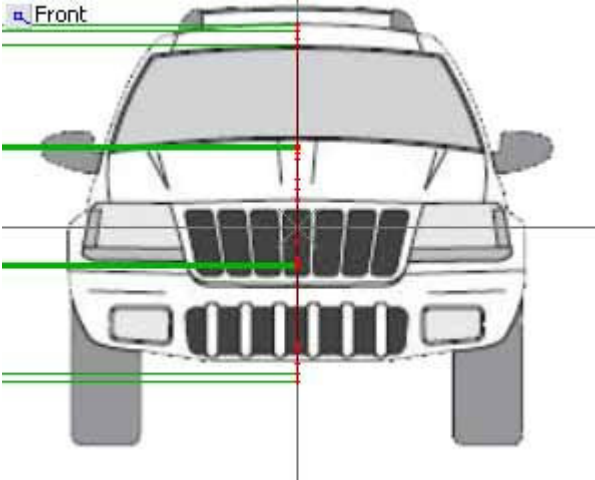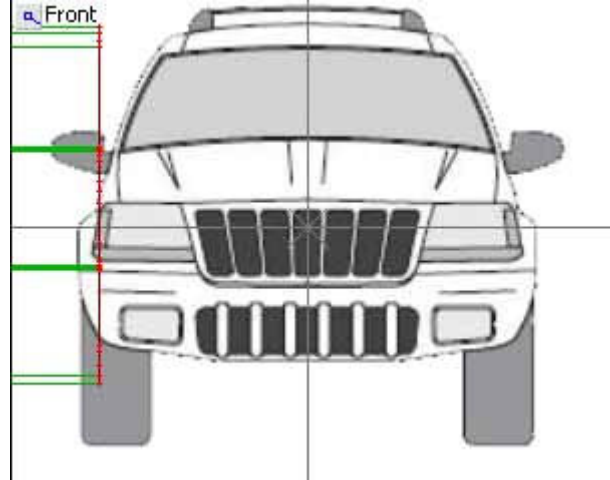
IMPORTANT NOTE: Whenever you select multiple vertices or faces and want to change something about them, make sure the SEL button (look at toolbar on the right) is on. When moving a single vertex or deleting a single face or whatever, the SEL has to be turned off.

To unselect all the vertices, just select some empty space.

If you want, you can unselect the Rectangle selector tool. Then move back some of the vertices on the top so that they touch the edge of the roof in Front and Top views. You might want to do this in Right view while keeping your eye on the front and top views. Final Progress:
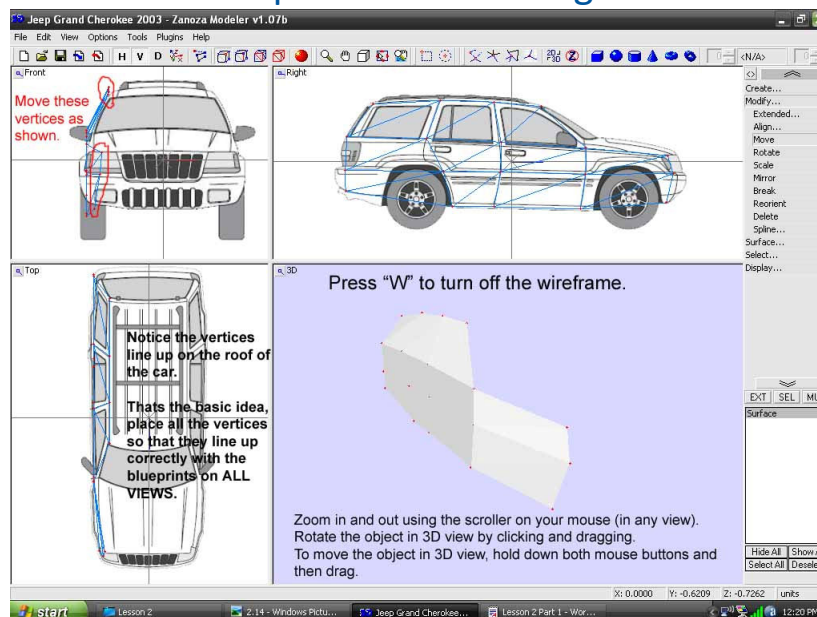
<u>NOTES:</u>
-Save your work often by pressing Ctrl+S.

-At the top, go to Options>Settings>Open/Save and uncheck the "Enable Auto Saving" feature. I like this off because sometimes, if you carry on with a mistake and save, you can't undo it. It's better to save manually and often.

Next Part, we finish up the body.

LESSON 2: MODELING
PART 2: The Rest of the Body.......or at least half of it

Yes, there is a shortcut. Once we make half of the body of the car, we can duplicate that half, flip it and stick the two halves together. But first, we complete half the body. Let's go!

Let's continue by making the top of the car. Go Create>Faces>Single and make a face in Top view like this:
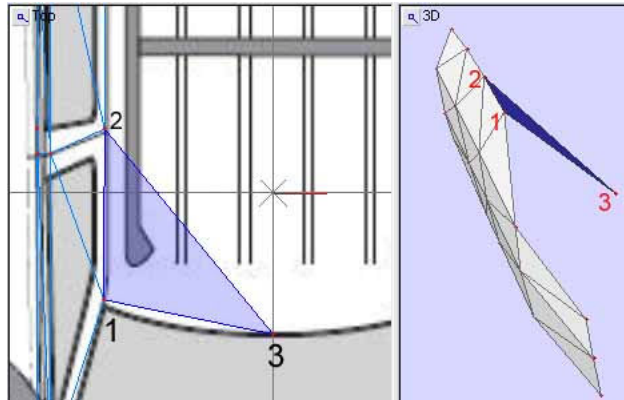
Notice where the last vertex is placed in the 3D, Right or Front views. Its placed on that center plane again. No matter, we'll make the whole top before we move around those vertices. So make every part of the car you can see in the top view like so:
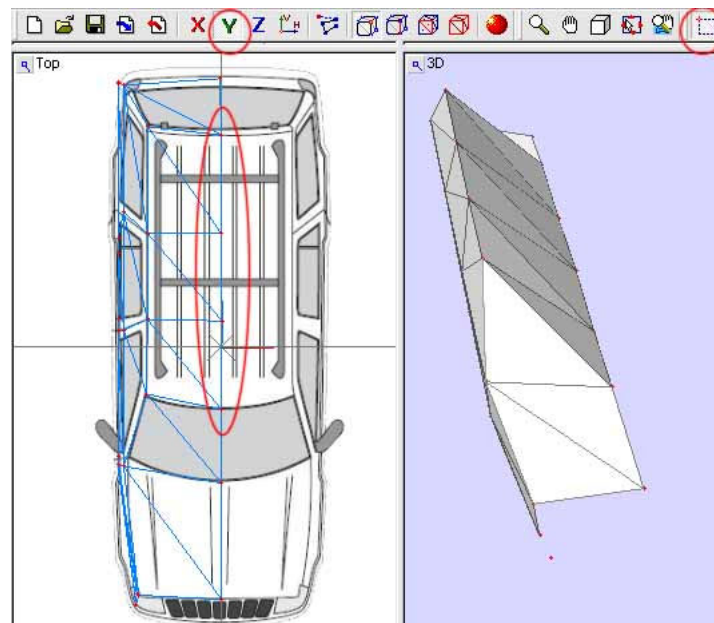
Select the vertices as circled above using the rectangle selector tool. Go to Modify>Move and select the Y-axis button. Move the selected vertices to their

proper position using the Right view or Front view.
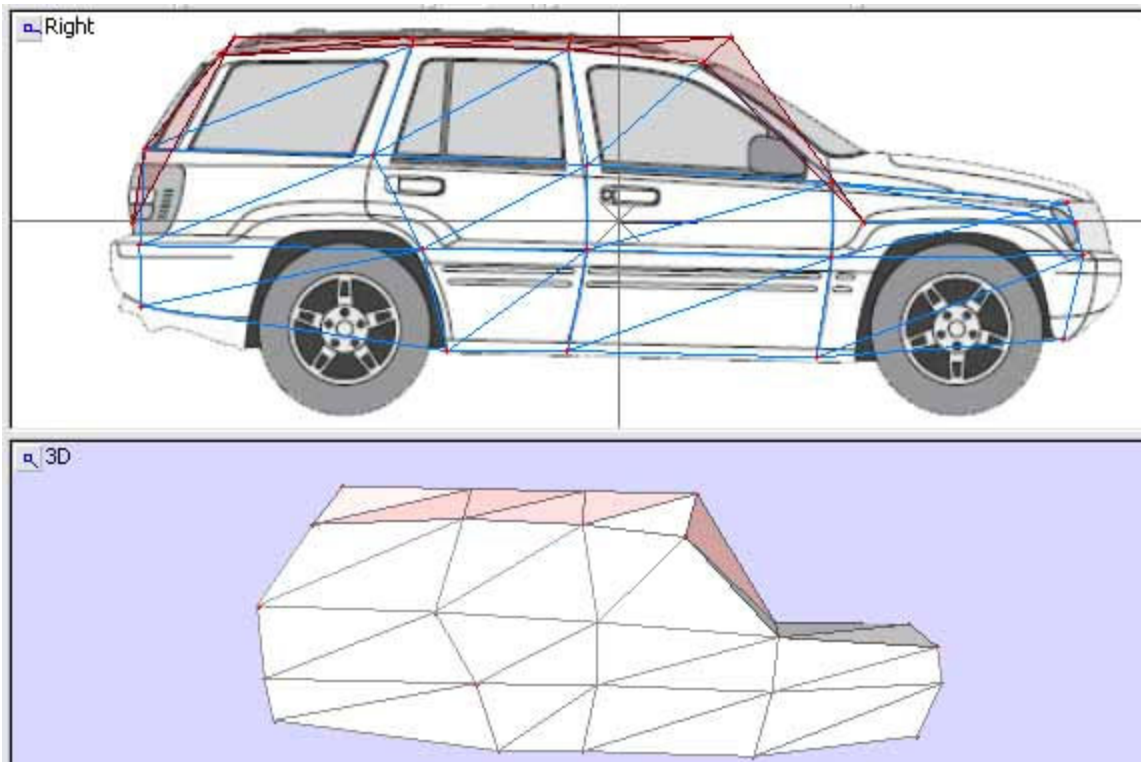
Unselect those vertices and continue to move the other recent vertices to their correct positions. You may have to switch between the X, Y, Z and H+V locks to help you achieve this:
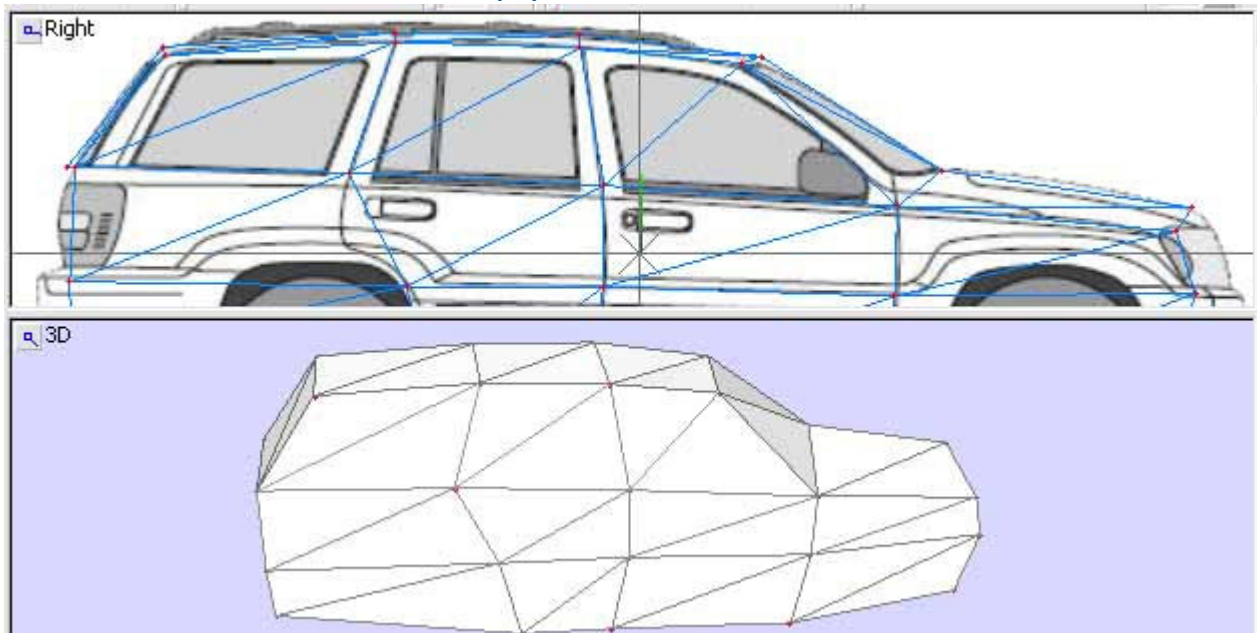
Then complete the front and back views in a similar manner. When the new vertices fall on that center plane, move them out using the Z lock. To access back
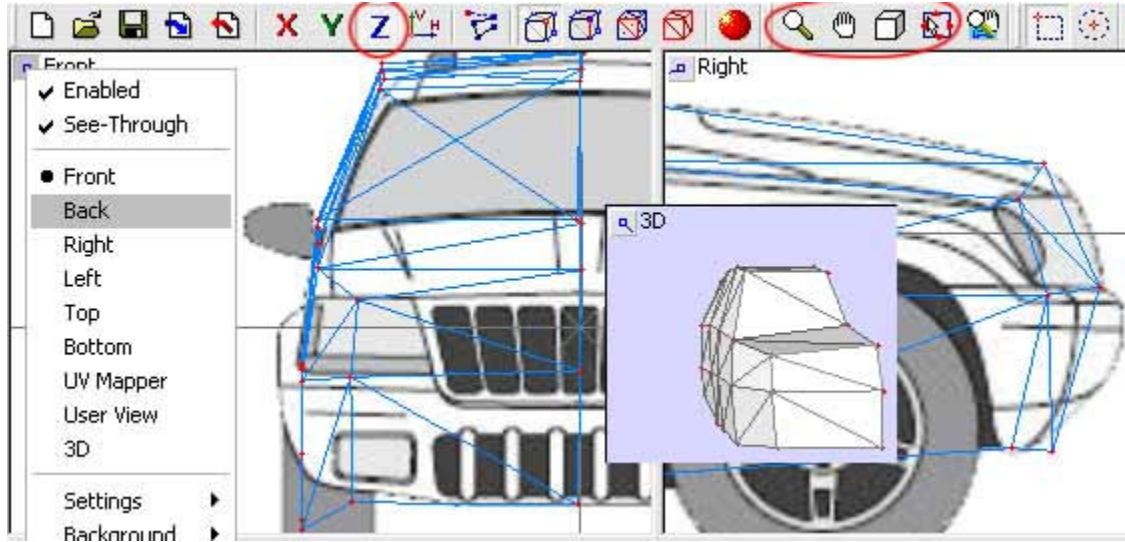
TIP: I circled a few useful tools in the picture above. They help you to zoom in/out, pan view and things like that. I find them pretty annoying so what I do is I just use the mouse scroller to zoom and pan. How? Suppose you're zoomed in somewhere near the front of the car in top view and now you want to quickly view the back of the car. Use your scroller to zoom out until you see the whole car, move your cursor over the back of the car or wherever you want and then scroll again to zoom in there. I find this much faster than using the above mentioned buttons. Just thought I'd share this.

Finishing the back will be a bit tricky since you'll be seeing all the faces you've made in the front and so it might confuse you. First, disable the "See-through" feature in Back view. Then, click on 2 vertices in the Right view window and click a third time in the Back view window.
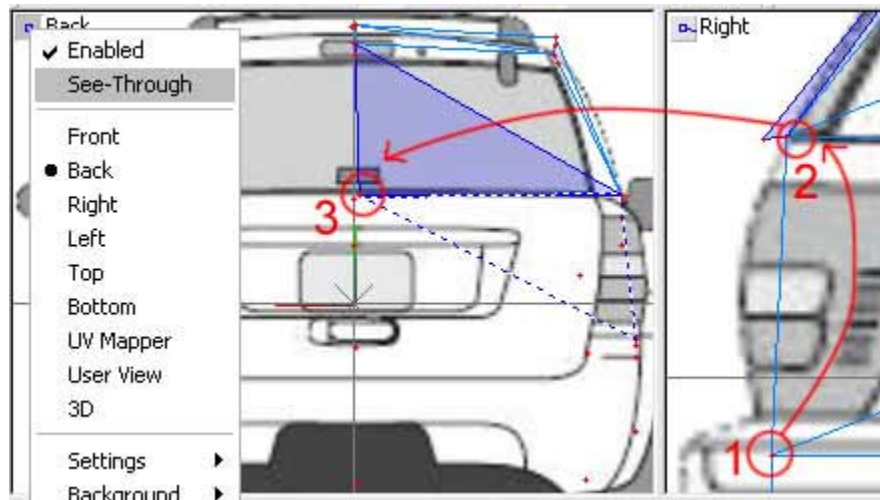
<u>NOTE:</u> Faces are one-sided, meaning that one side is solid gray and the other is transparent (you won't be able to see it). Whichever viewing window you finish the third click to make a face, that's the view you'll be able to see the face (solid).

<p align="center" style="color:blue">Finish up the back view.</p>
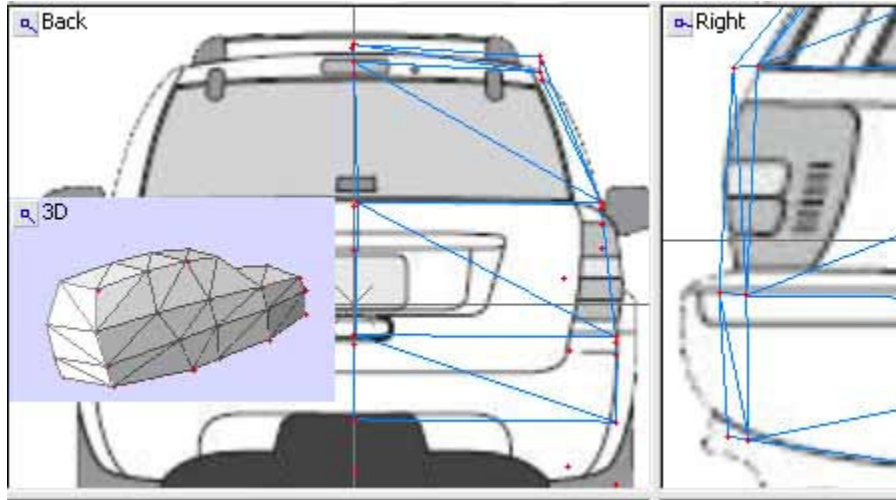
<u>TIP:</u> Make one face, move its vertices to their correct places, make another face, move its vertices...repeat.

By now, you must be thinking, "This is a pretty shitty model, what about all those details?".... because I'm thinking the same thing. But I chose this route because it allows me to show you a very powerful method - BREAKING. (Thanks to Burner for introducing this method)

You can break either edges or faces. Let me demonstrate the power of breaking.

<p align="center" style="color:blue">Let's focus on the Right view window. Go to Modify>Break and either click the button circled in red (see below) or press 2 on your keyboard and then click once on your car to set it on "Edges" level. Then click on the two edges as shown below and vertices will appear there!</p>
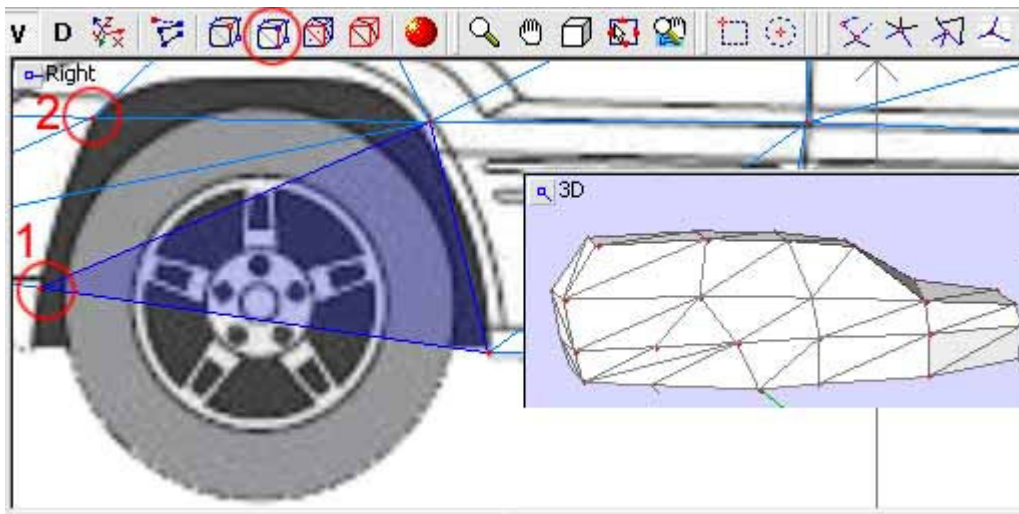
Now go to Modify>Reorient and click the edge as shown below.
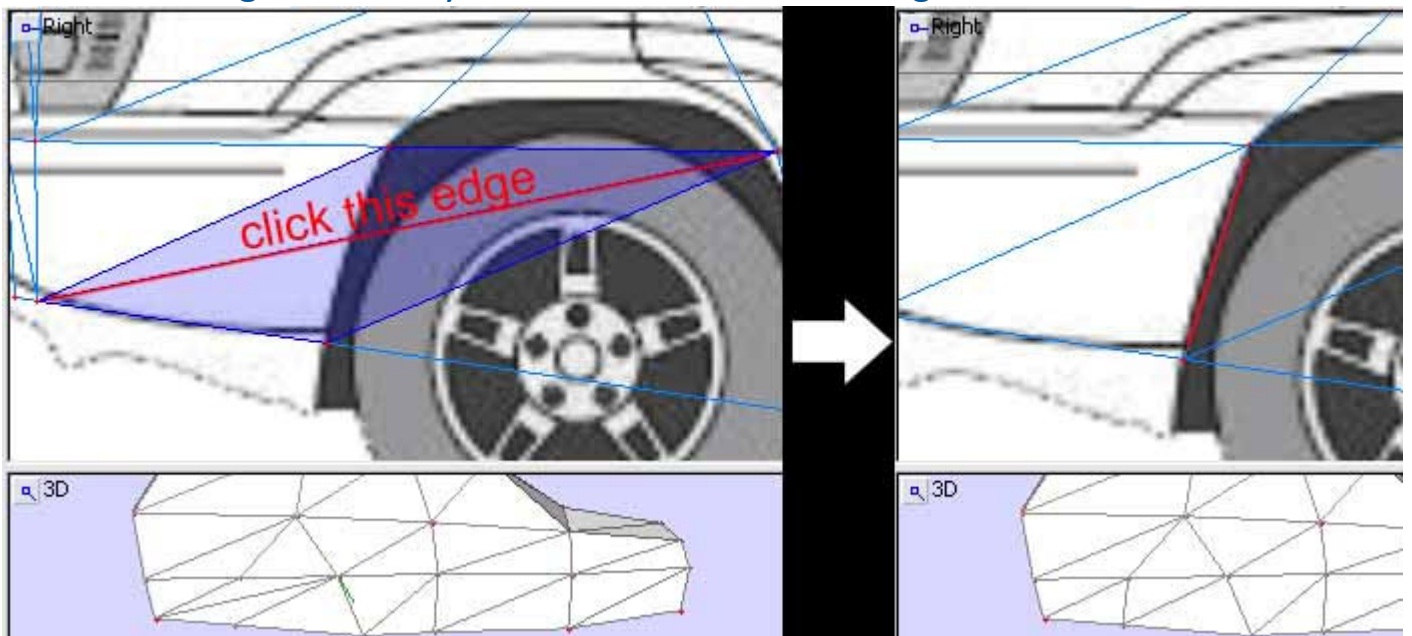
To see how this works with faces, get into faces level by pressing 3 or clicking the "Faces" button and clicking once on your car. Go Modify>Break and click anywhere in the middle of any face and that's where a vertex should appear. Reorient edges if necessary. Delete those extra faces by going to Modify>Delete and clicking on the faces individually. Make sure you are on FACES level when deleting the FACES.
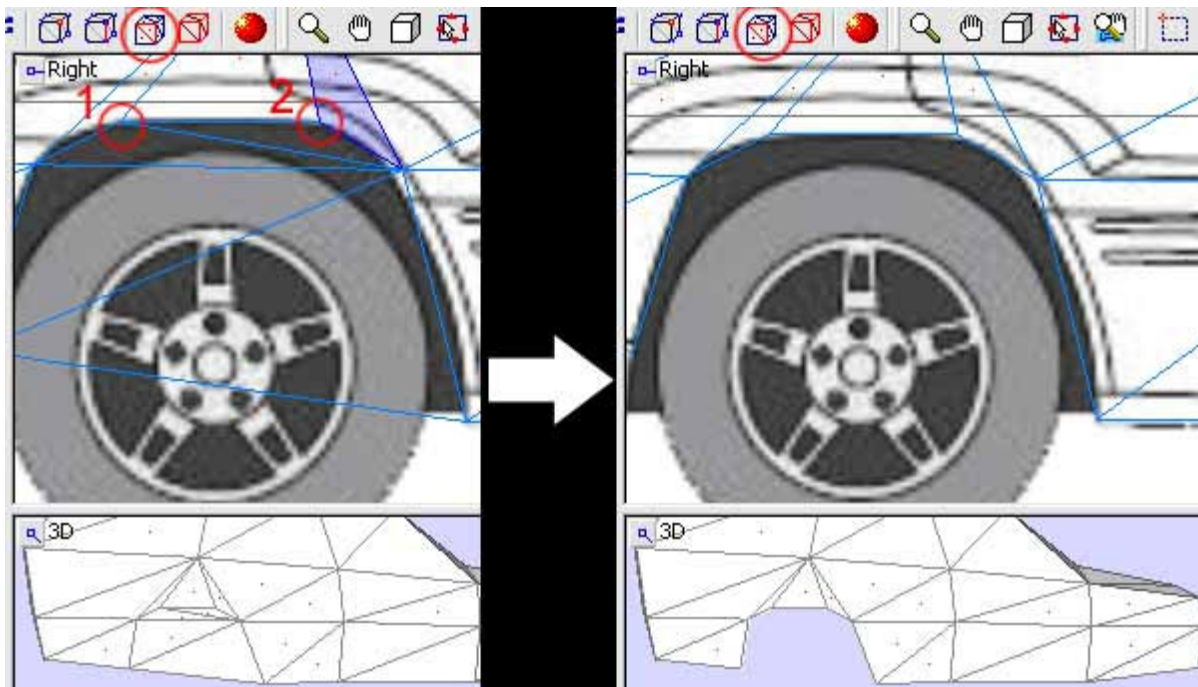
TIP: When breaking and reorienting edges, it may get a little confusing if you leave all the reorienting for later. So break a few edges/faces at a time, reorient them and repeat. It's best to make a line of vertices (not on the same edge) all the way around the model and reorient nearby edges. Example:

1. Break edges at blue points

2. Reorient highlighted edges
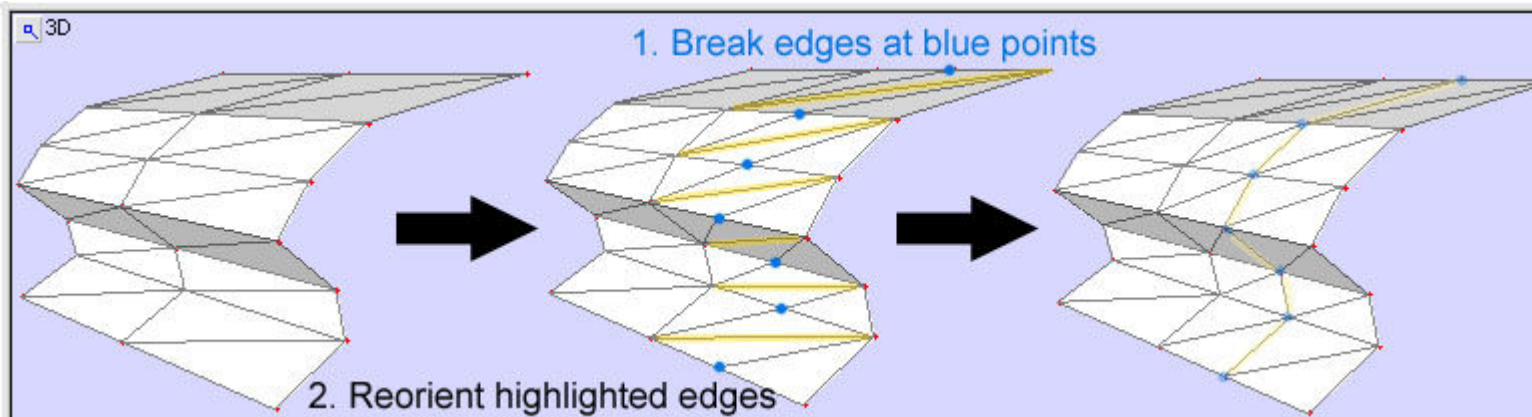
The idea now is to make edges so that they can define details of the car such as headlights, windows, wheel wells, curves, bumps ...etc. Continue to break, reorient, move and delete until you something like the picture below. Refer to your photos to see where you need to add curves and such details. You can add as

Press W to turn on/off wireframes.

This is called the flatshaded view.
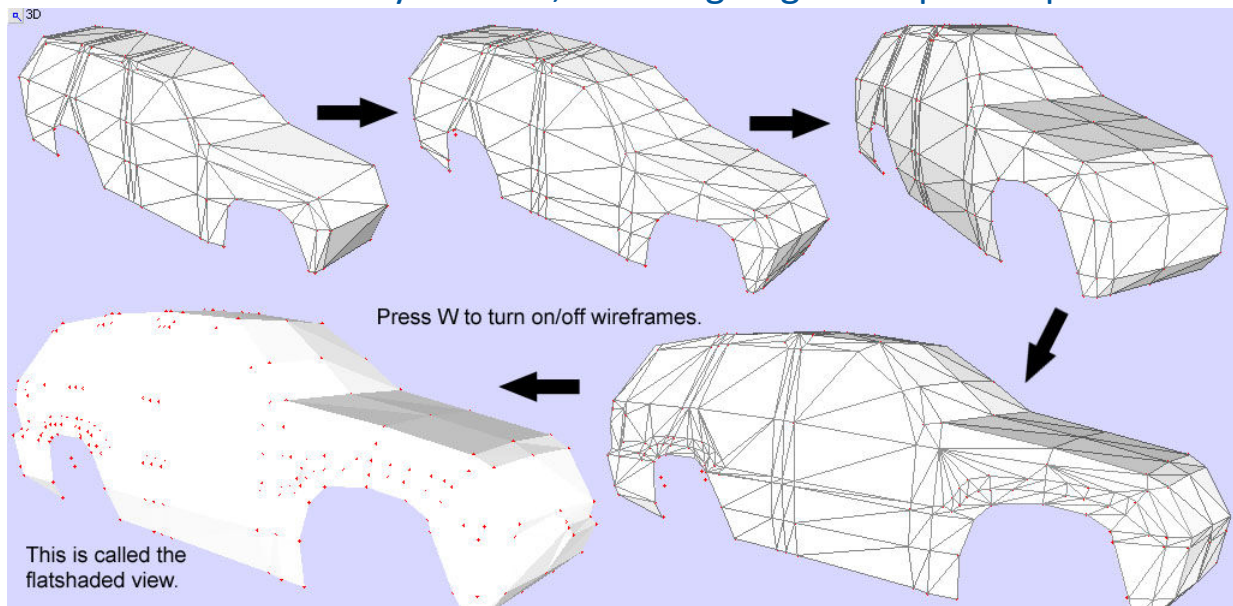
TIP: When moving vertices, make sure to keep the body smooth. Press W to turn off (if on) the wireframes and this view can help you determine how much to move the vertices to keep the body smooth.

If you didn't understand the power of detaching, let me put things in perspective. We could have made all those details face by face. And every time you make those faces, the new vertices would have been placed on the center plane and you'd have to move them all to their proper places. This would take a long time and make it difficult to get a smooth shape. When you make a simple box (like we did in this tutorial) and start breaking to make faces, it preserves the shape you already have and you will only need to make slight adjustments to make a nice, smooth shape of a car.

You should've noticed by now the blueprints aren't that accurate. Recall that when I mentioned the blueprints test, I said the positive results MOST PROBABLY (98%) indicate a good blueprint. There, no one can sue me now. Maybe we should have checked if the Front and Top views matched. I should also add to that test; in the Side view of the car you should be able to see full headlight and tail-light, some of the grille (front portion of car) and license plate area (back portion). I only hesitated to mention this before because the Top view showed that the Jeep has a pretty flat front and back so I thought it wouldn't show those details in Side view.

But anyway, do the best you can. Keep those reference photos handy.

Start making the bottom:
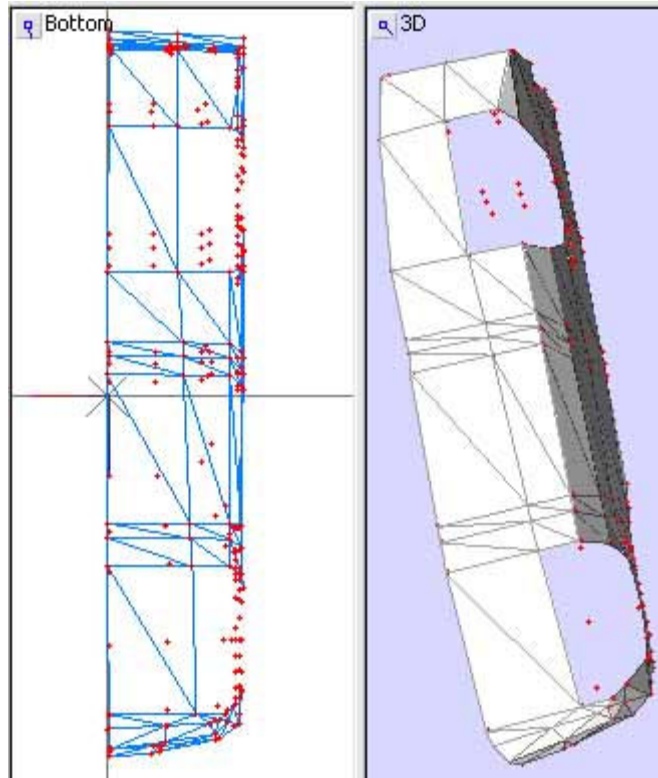
Now, we make the wheel wells. Go to Create>Faces>Fan and make the faces like below:
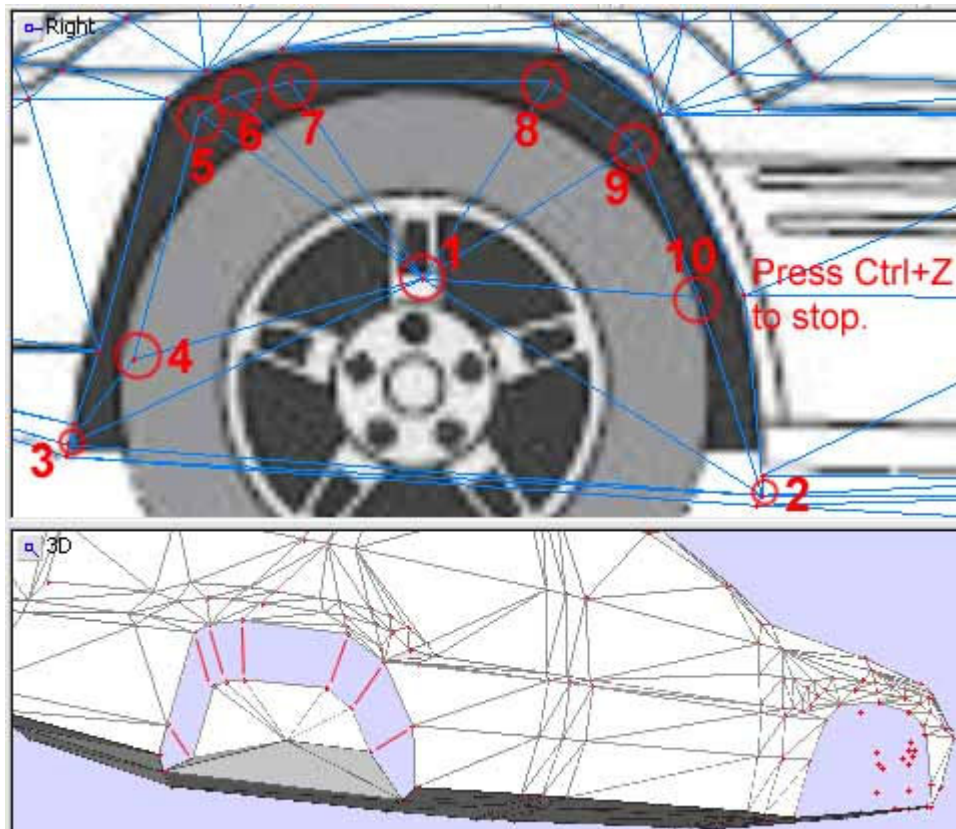
Then fill up the empty space with faces (Try using Create>Faces>Strip) and bring them away from the center plane to somewhere near the middle. Position those vertices correctly. Repeat for wheel wells near the front of the car.
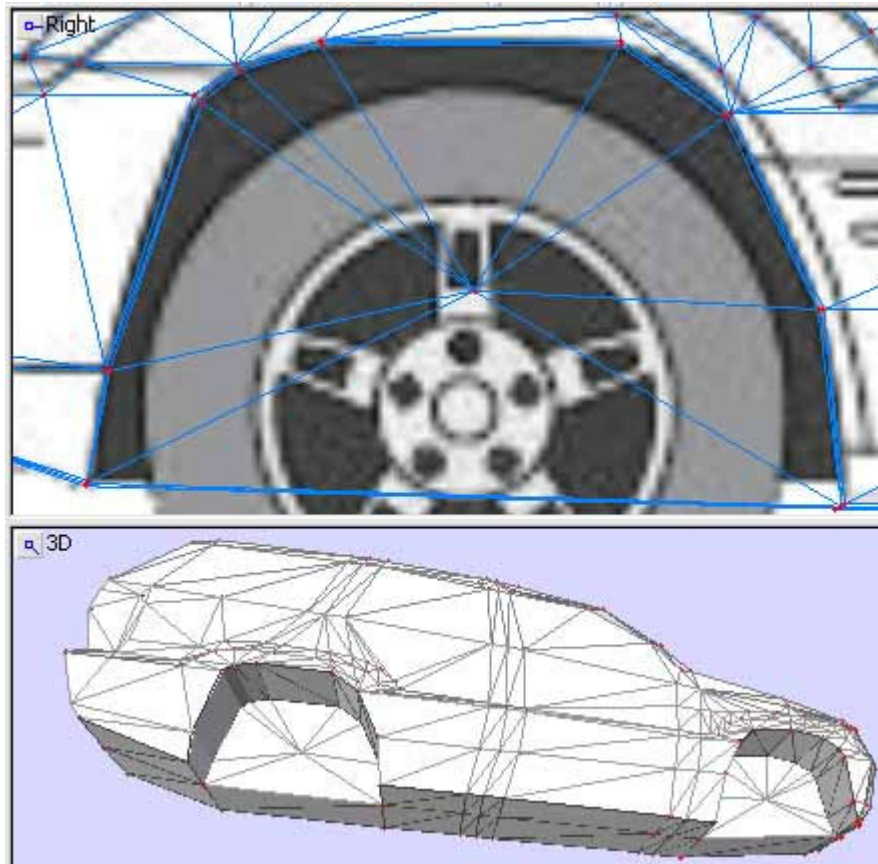
Pressing "Q" on your keyboard turns on/off the flatshading view.
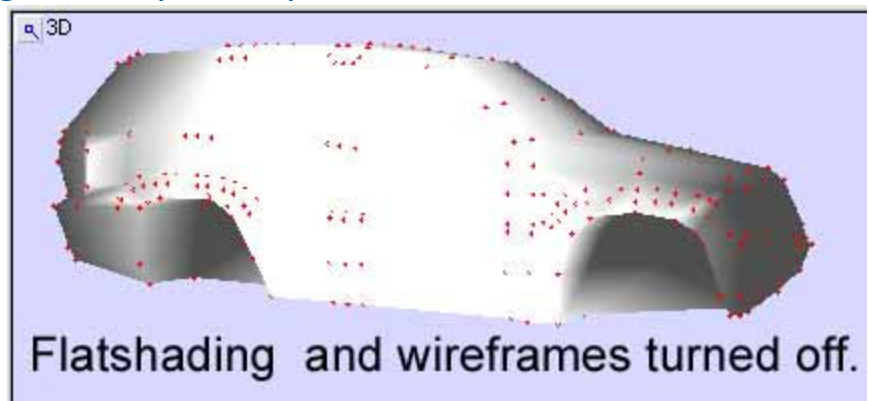
When flatshading is turned off, this view will represent what the car will look like if you decide to put it in Midtown Madness 2 or any other game. You see a lot of dark areas? We need to fix that by calculating normals.

How to Calculate Normals:

In vertices level, go to Select>All and right-click on any vertex. All the vertices in the object should be selected. Press "Space" on your keyboard to turn on SEL. Then go to Surface>Normals>Calculate and left-click once on any vertex. Most of the dark areas should have disappeared. Unselect all the vertices by going to Select>None and right-click on any vertex. If there is any darkness left, it should be around those faces that are nearly perpendicular or make other sharp angles with each other. To fix these dark areas, we need to detach some faces.

How to Detach Faces:

First, you should think for a moment about which group of faces you want to select. You want to select all the faces between two or more **edges that you want to show up as sharp.** In faces level, go to Select>Single and right-click a face to select it and repeat this to select all the necessary faces. Turn on SEL and go to Create>Objects>Detach and then left-click on any selected face. A box will pop up asking for the name of the new object you just created. Rename to "Surface2" and click OK. Unselect the faces by going Select>None and right-clicking on any selected face. Switch to Objects level (press 4) and also Select>None here. Now we have to join the objects back together again.
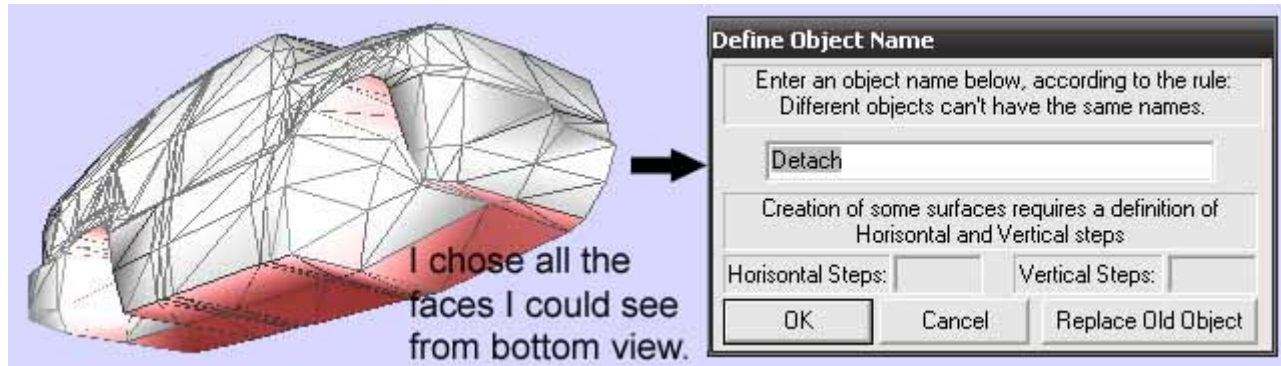
How to Unite Objects:

In objects level, Select>Single and select the two different objects by right-clicking on each. Making sure SEL is on, go Create>Objects>UniteSelect and left-click on any selected object. Rename the new object to "half-body" and click OK.

Select>None on objects level to deselect everything.

What's the point of detaching and reattaching as we did? The objects are reunited but not the faces we detached earlier. Calculate normals again on the final object and......VOILA! We are done half of our model!

Detach some more

My model here is pretty inaccurate since it's meant to be a quick model. But it serves well enough to allow me to show you the basics. I hope your model looks better than mine.

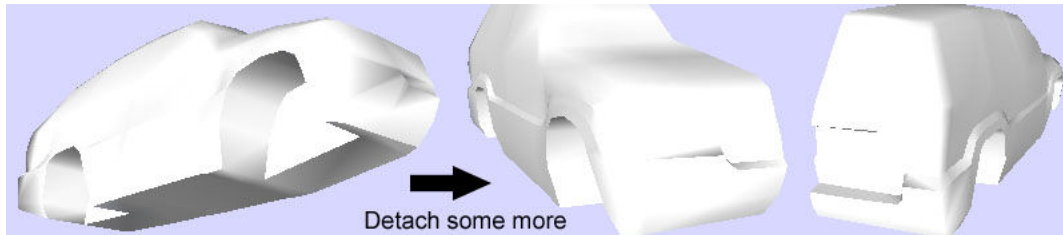NOTES:
-When making faces, try to develop a pattern so that all the triangles are pointing the same way or every other edge is nearly parallel. Do { |\|\|\|\|\|\|\| } instead of { |\|/|/|\|/|/|\| }. If you've already made the faces without pattern, just reorient that edge by going Modify>Reorient and clicking on the edge.

-If nothing seems to be happening, check whether SEL is on or off. Remember, for single items (vertex, edge, face, object), SEL should be off and for multiple item**s** (vertices, edges, faces, objects) SEL should be on.

-If you make a mistake, quickly undo by pressing Ctrl+Z. Redo by Ctrl+Y.

-When breaking edges, skip every other edge. The edge that you skipped is the one that will be reoriented....most of the time. This saves you polies.

-If a view looks crowded due to all the faces and vertices from before, you can temporarily hide them. Select the vertices or faces and go to Display>Hide and click on a selected vertex or face. POP QUIZ: Will SEL be on or off? 🌀 If you want them back, go Display>Unhide. CAUTION: DO NOT HIDE ALL THE VERTICES OR FACES IN AN OBJECT AT ONCE!!! NEAR IMPOSSIBLE TO RETRIEVE. You may want save just before this procedure.

-Go to Options>Normals and turn off Automatic Update. Otherwise, it can give you normal problems later on.

That's all for now I think. Next lesson, we learn to texture (color) the body.

I apologize for the poor quality screenshots last time. I guess I got stingy over a few KBs but my upload speed is kind of slow or at least I don't like to wait for uploads. I realized, however, that it's worth the wait to get better quality screenshots up, so I fixed this lesson. I may replace previous pics.

<center>************</center>

LESSON 3: TEXTURING

So we made our half-body last time. Before we duplicate it, lets texture (color) it first. To texture, we need some images (aka textures). These images must have square dimensions (32x32, 64x64, 128x128, 256x256...) and they must be saved as .bmp or .tga.

I've already prepared all the textures we'll need. You can just copy them since they satisfy the two conditions mentioned above.

1.   2.   3.   4.   5.   6.

Their names should be as follows:

anything black   cherokee_blue   cherokee_green   cherokee_red   details   wheel
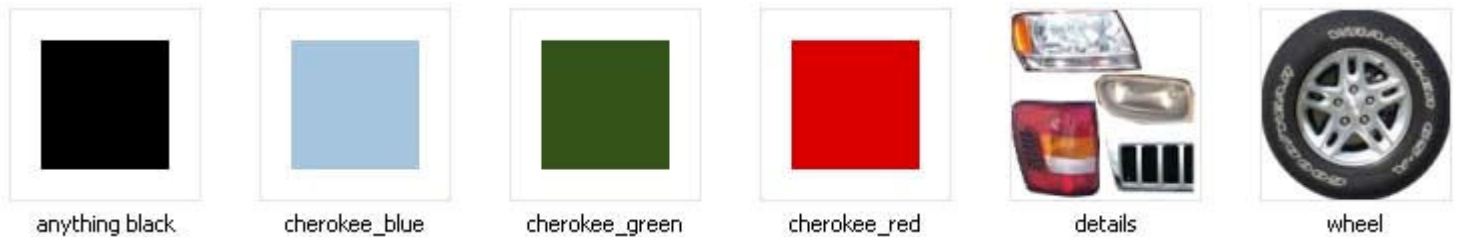
Keep these in a new folder named "TEXTURE" and have no intention to move the folder around to different places in the future. Might as well make a folder named "03 Cherokee" first and have inside it the .Z3D file, blueprints and the "TEXTURE" folder.

In ZM, press "E" on your keyboard or click the button circled in red to bring up the Material Editor. There's only one material present at the moment and its called <default material>. Copy it 3 times to get a total of 4 copies.
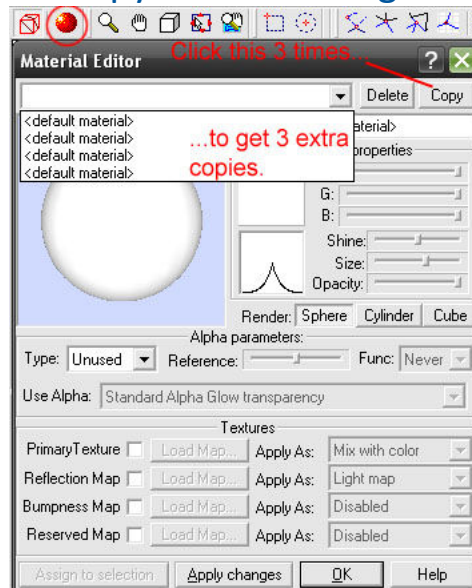
Choose one copy and rename it to "details". Also, load the "details" texture I provided for Primary Texture.
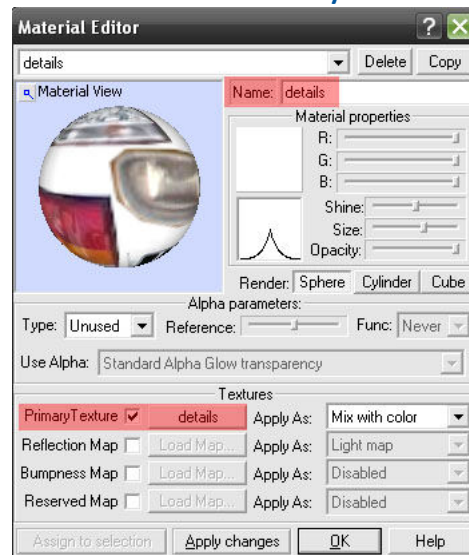
Similarly for the other 3 default materials:
Rename: black; Load the texture called "anything black" for Primary Texture.
Rename: main body; Load "cherokee_green"
Rename: wheels; Load "wheel"
And then press OK.

EDIT: It's always a good idea to keep another extra copy of the <default material> just in case. We might need it later.

Let's texture the headlights first. Make sure to have Front view and 3D view active. Change another of the remaining windows to UV Mapper view.

Select the faces (in faces level) in the Front view that make up the headlights.
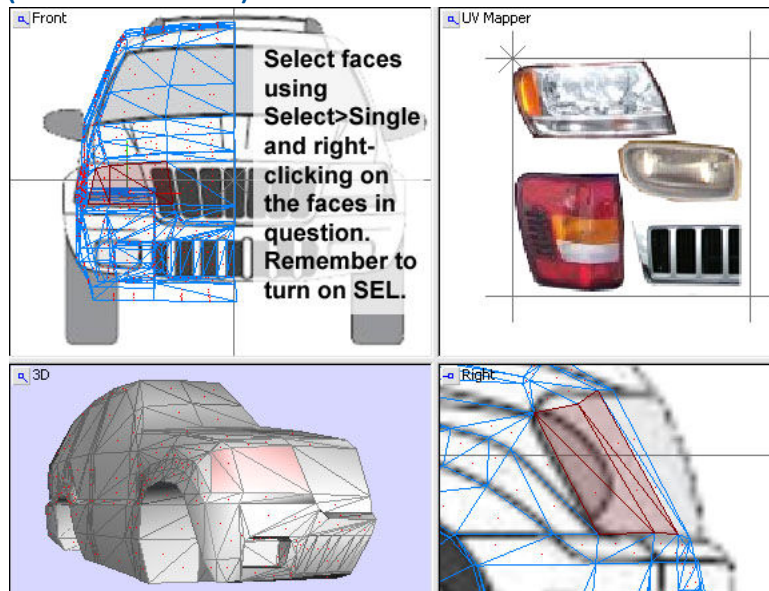
Now right-click on "half-body" in the objects list and go to Faces>Properties. A new box will appear. Select "details" from the list in the drop-down menu and then click OK.
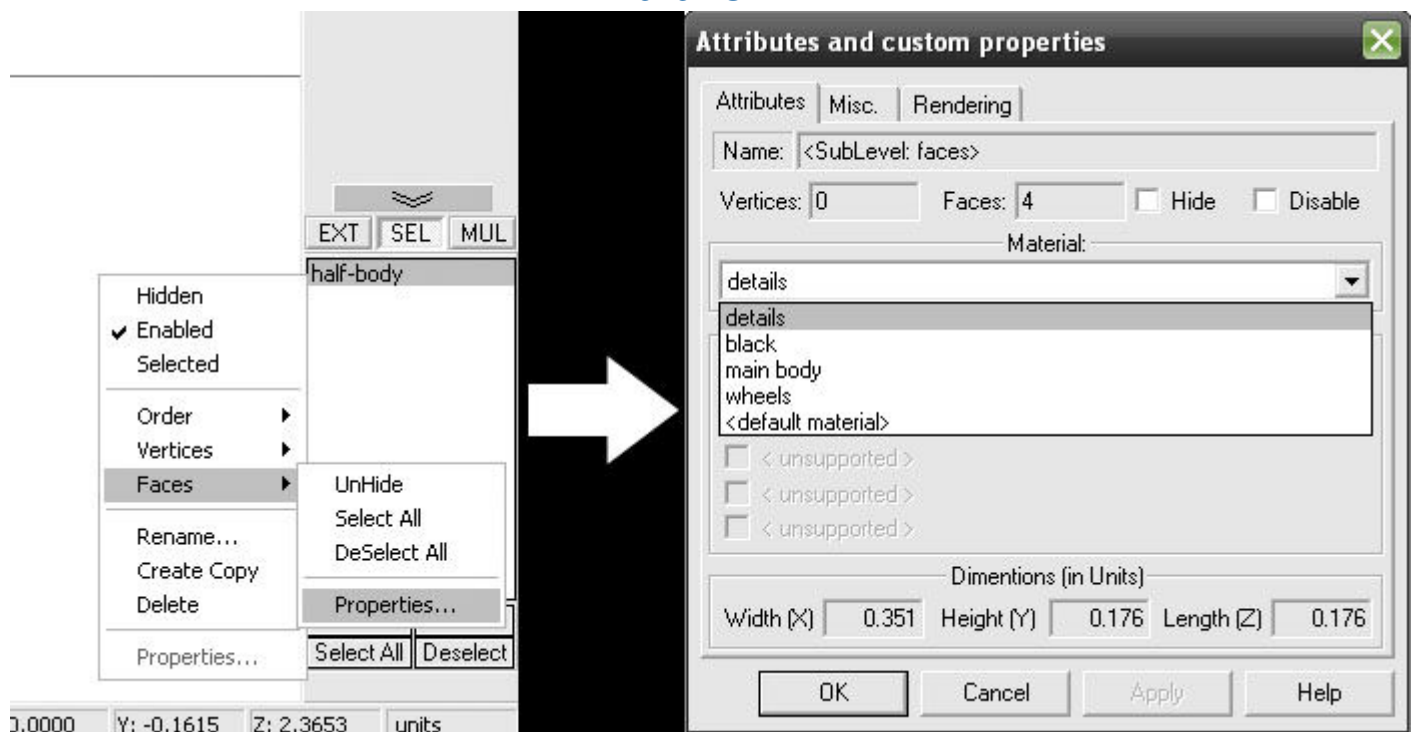
While Select>Single is on, also go to Surface>Mapping>Assign UV. Then click on a selected face and your UV Mapper view should look like this:
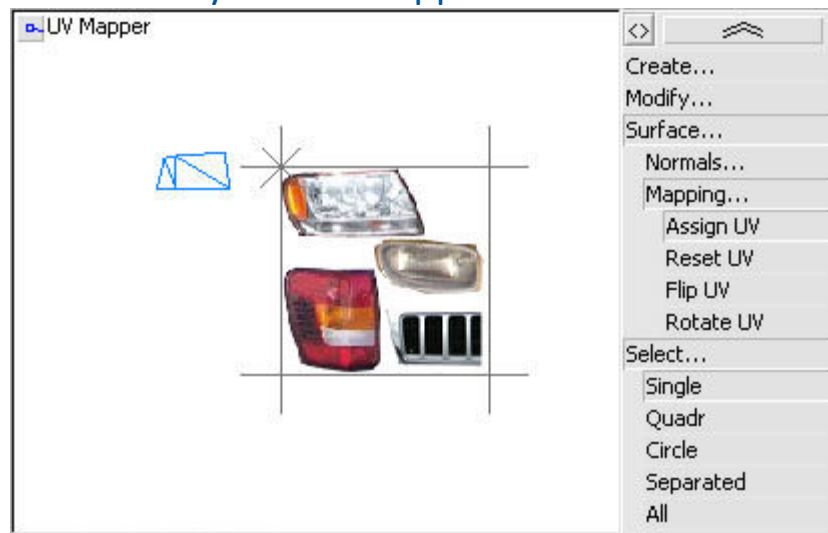
Unselect all selected faces by going to Select>None and right-clicking on any selected face. Get into objects level by pressing "4" and turn off SEL. Hide Surface>Mapping>Assign UV and Select>Single and go to Modify>Move instead.

Move your headlight faces in the UV Mapper view until they match the headlight texture. My headlight faces appeared to be a bit smaller than the picture of the headlights. Get into vertices level and move the vertices until they match the picture. If you move them one by one, you'll notice the vertices come apart, but don't worry about it. Whatever you do in UV Mapper view doesn't affect your model's structure in any way. Rather, it only changes the texturing scheme of your model...where the colors go. While texturing, refer to the 3D view to see if the textures have been placed the way you like.
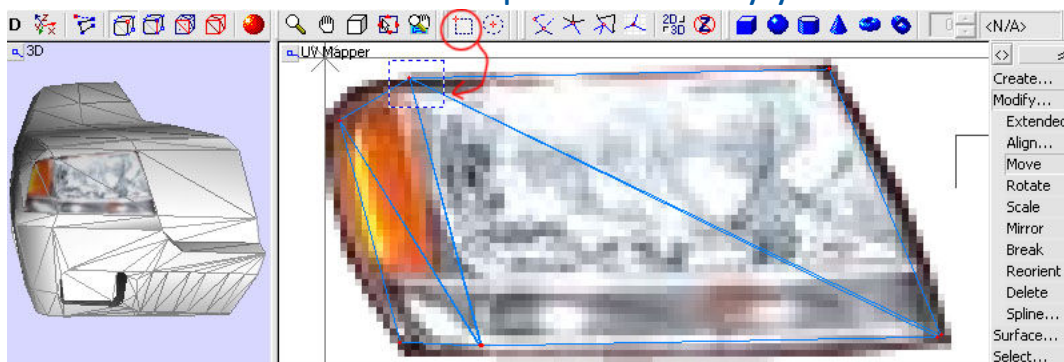
TIP: Use the rectangle selector tool to select all the vertices at an intersection point and then move them.
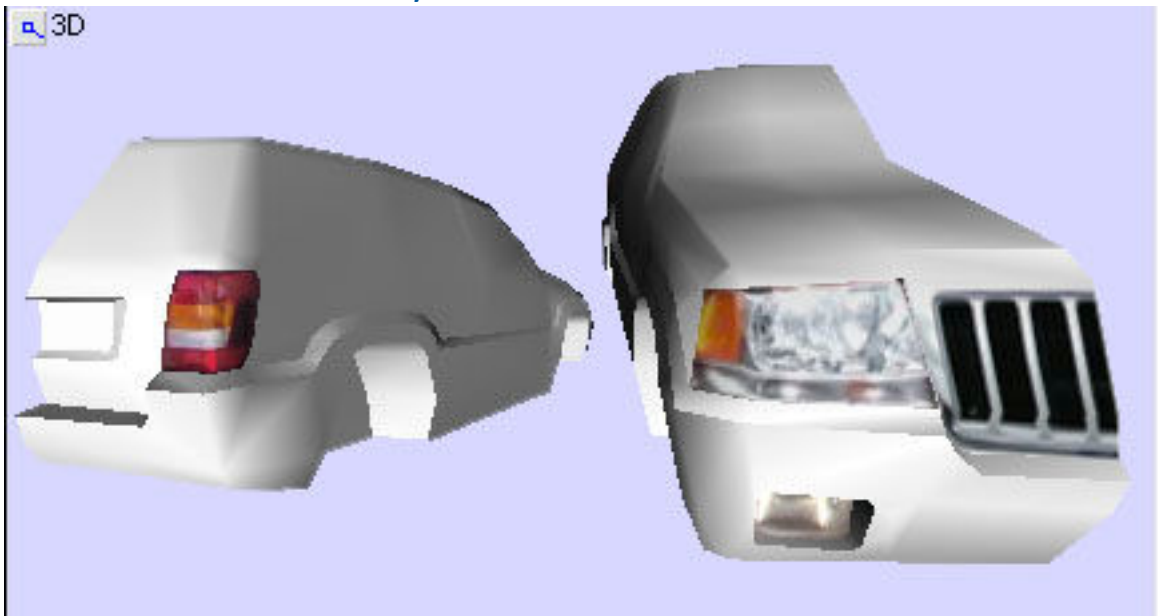
UV Mapping is easy if you remember the rules.

The Golden Rules of Texturing:
1. Load textures in Material Editor.
2. Select>Single and select the desired faces.
3. Check the properties of the newly selected faces and select the correct material for them.
4. Making sure SEL is on, go to Surfaces>Mapping>Assign UV and click on a selected face in faces level. They will be transferred to UV Mapper.
5. Unselect the selected faces (not in UV Mapper) and turn SEL off.
6. Modify the object in UV Mapper view if it's necessary to make a nice fit.
7. Save your work.

Next, we do the body.

Select all the faces of the body. You many want to use the rectangle selector tool for some parts or select all faces (Select>All) and subtract (Select>Single and right-click on selected faces) the headlights, windows, bottom and such. Change the material to "main body".
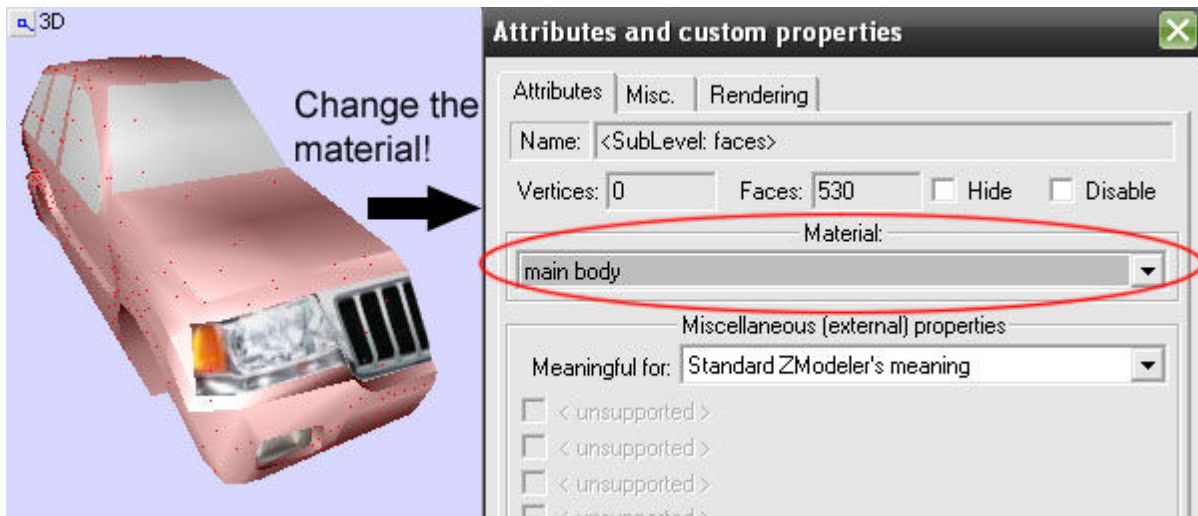
When you get the faces into UV Mapper view, they will be larger than the texture. Go to Modify>Scale and make sure the H and V are locked (not X,Y, or Z). Click and drag on the object (in object level) to shrink its size and then move it on top of the texture.
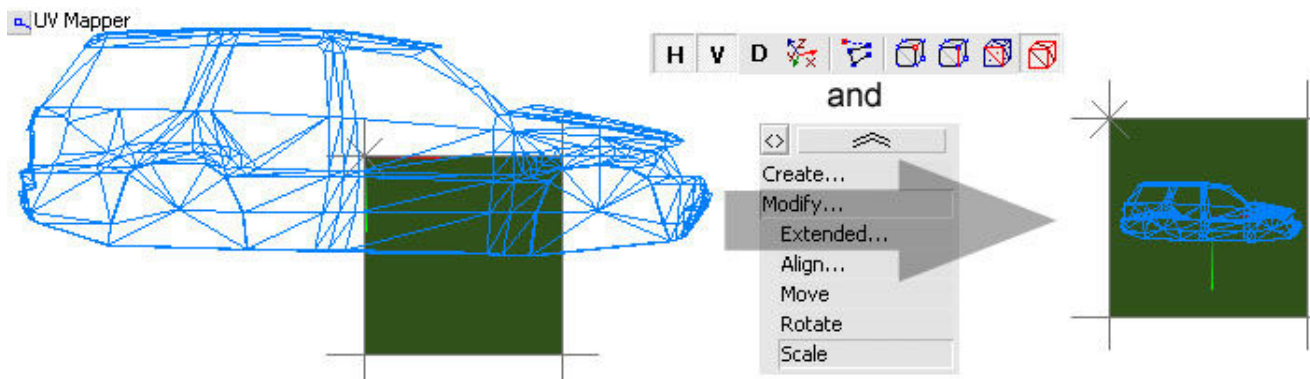
Onto the windows, wheel wells and bottom of the car. These will be colored black so change the material to "black". I "accidentally" forgot to subtract the bottom faces when texturing the main body so the bottom is also green. Before going to Surfaces>Mapping>Assign UV, go to Surfaces>Mapping>Reset UV and click on the selected faces. All previous textures will disappear from the selected faces. Now continue on with Surfaces>Mapping>Assign UV and you should get something like this:

<u>NOTES:</u>
-For a different lighting scheme in 3D view, you can go to Options>3D-View and turn on Specular Highlight.

That's all for now I think. Next lesson, we do some finishing touches to our model and maybe move on to other small but necessary objects.

LESSON 4: MODELING REVISITED
PART 1: Finishing Touches

We left off last time texturing our half-body. It looks much better with the textures and colors but something seems to be missing and keeps the half-body looking very plain. We need to add the doorlines and other outlining details and there are a few ways of doing this.

Method 1

Draw the outlines in the textures so that when the textures are mapped, the outlines will fall into place.

Method 2

Make a thin line of polies where the outlining details should be and texture these polies black or similar dark colors.

Method 3

Carve out the outlines by making two or three thin lines of polies where the outlining details should be, detach the whole group of them or each strand, move the middle line of vertices/polies a bit inside and texture them the same color as the body.

Method 1 takes too much effort and you don't get your bang for the buck most of the time. I've never tried Method 2 but it seems very easy and effective. Beginners should try it. I will show Method 3 below because it looks the best, is 3D and that's how I planned this tutorial. It will be very easy to do now because the texturing is already done. We just have to break, reorient and detach.

Identify where all the door outlines are in the Cherokee. Don't forget to check the hood, roof, rear and near the windows. Using the Break&Reorient method, make 2 thin lines of polies around these outlines (as shown on the blueprints).

Before:
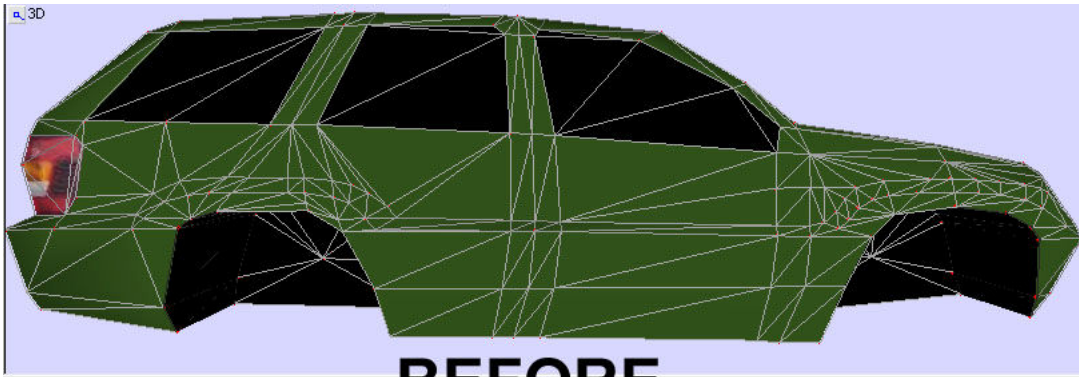
BEFORE
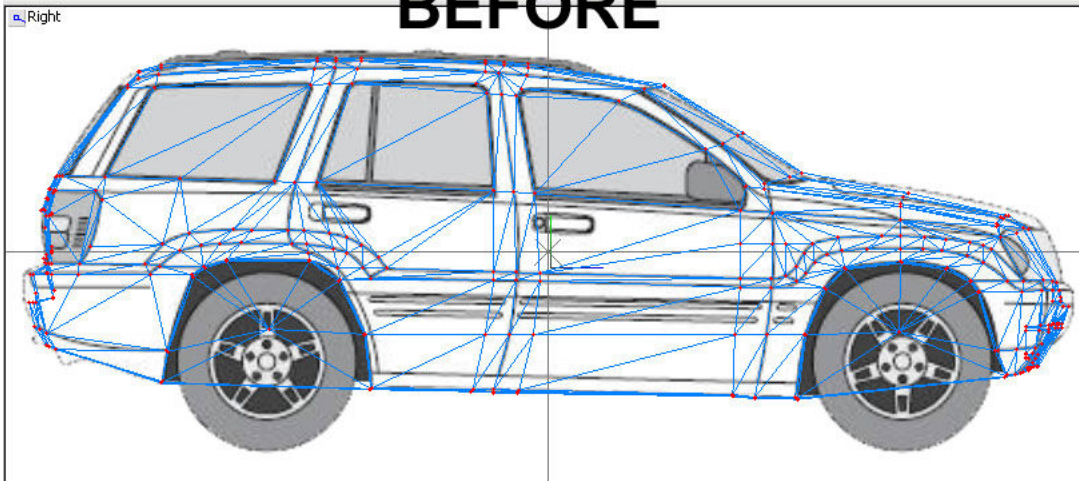
After:
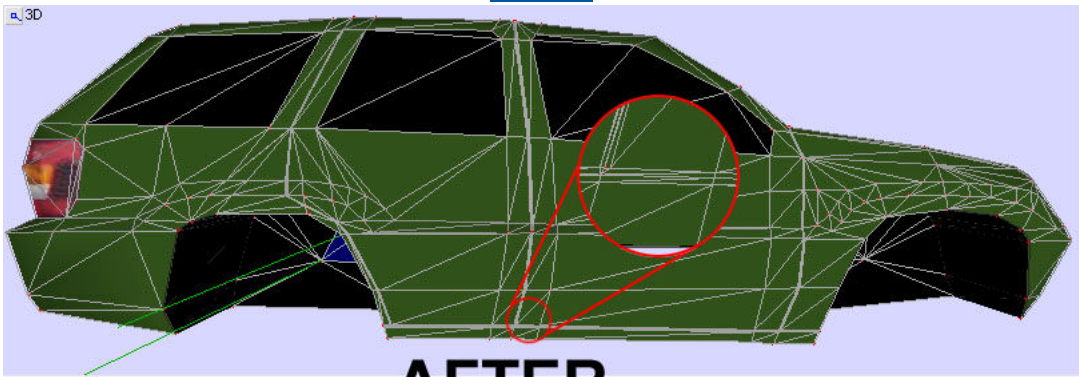
AFTER
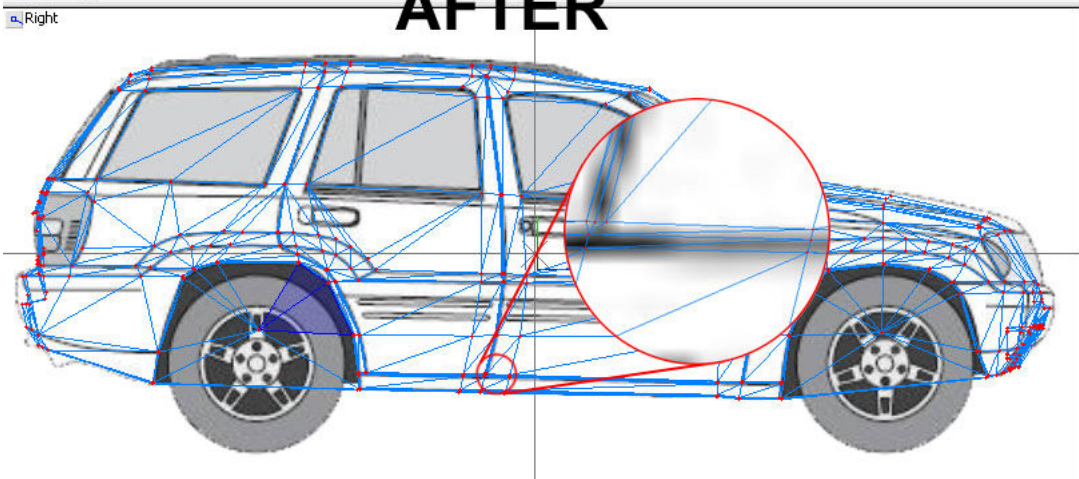
Select the vertices in between the 2 thin lines of polies and move them inwards a bit. Then detach both thin lines from the rest of the body and reattach to the body. Calculate normals and you should get something like below.
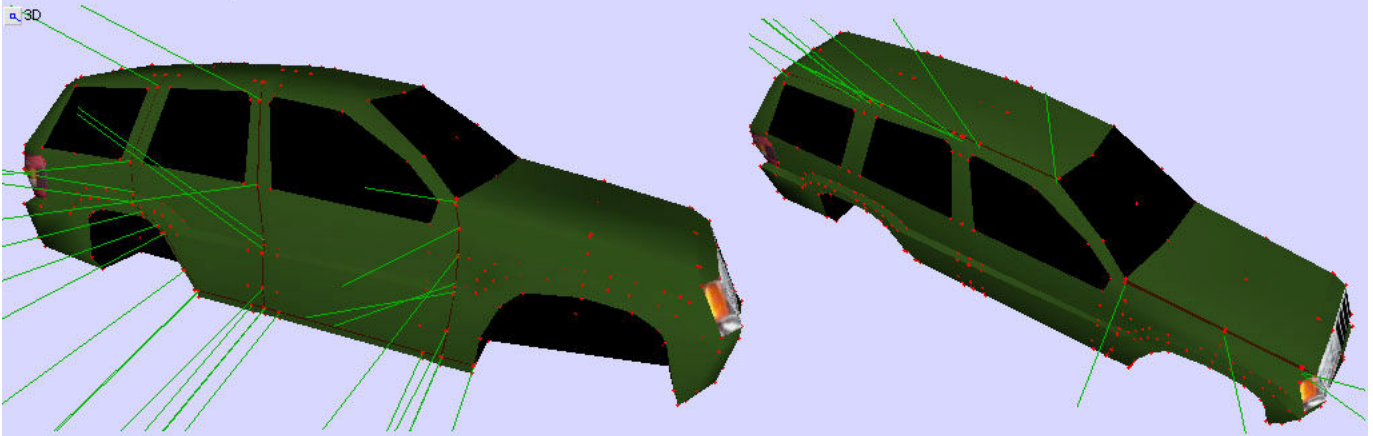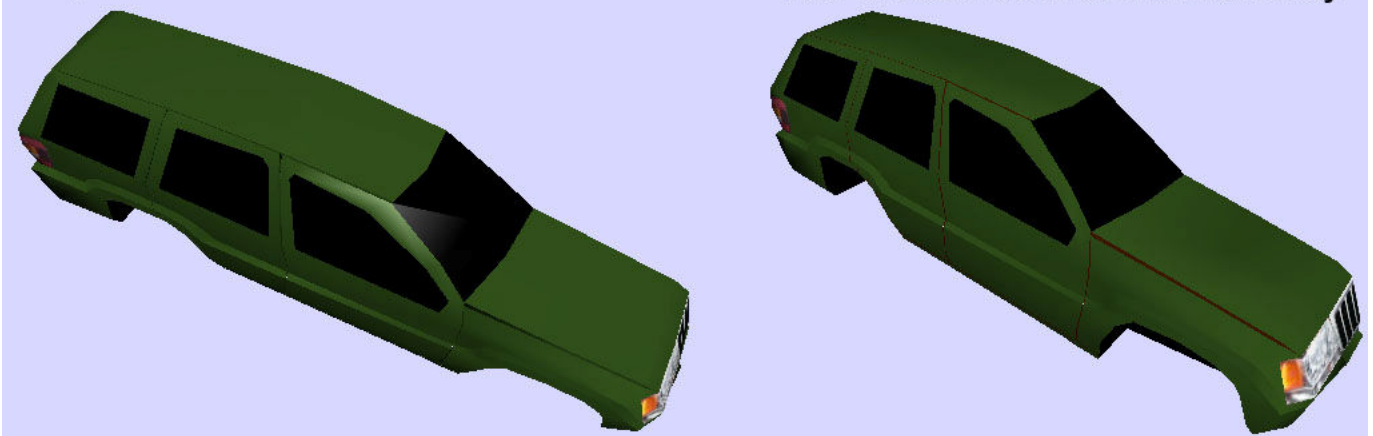
Actually, I think it would have been easier to detach the faces first and then move the vertices inwards. Then you continue by reattaching the faces to rest of the car and calculating normals. Sorry, but I just realized this as I was going along.

Anyway, you can also make the handles using the breaking method, but I won't for this tutorial.

We are almost ready to start the duplicating process. Check to make sure that everything is done on the half that we made so far. IF there is nothing else to model, nothing else to texture, we can go ahead.

One minor thing to fix is the alignment of the vertices that are on the open edge. In either Top, Front or Back view and with the "See-Through" feature **enabled**, select the vertices using the rectangle selector tool. Be very careful and **DO NOT** select any vertices that are not on the edge (zooming in may help). Then go to Modify>Align>View and turning SEL on, click on a vertex in Right view. The selected vertices will snap to an imaginary plane. Then move the vertices to the very center (gray line) of the blueprint using either Top or Front view.
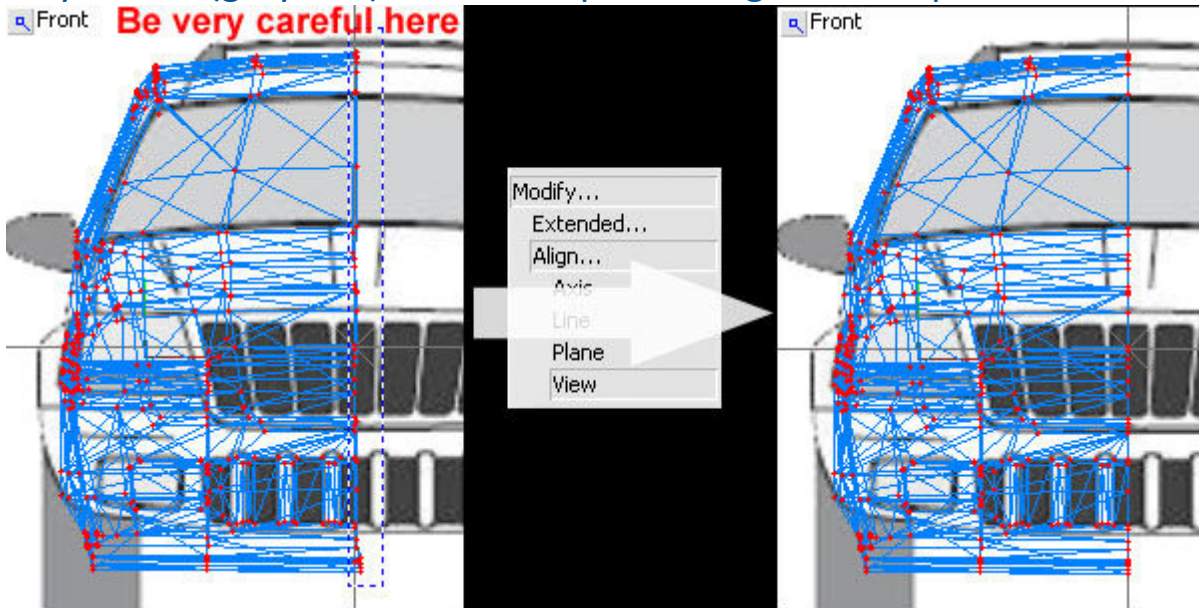
Note: The following procedure may seem a bit tedious and pointless, but please bear (endure) with me. You will thank me later.

We will need some light objects later on, so we can get some from our existing half-body model. First, detach the headlights. You'll see two objects in the Objects List; half-body and whatever you decided to call the headlights when you detached it. Right-click on the headlight object and go to Create Copy and name the new object. Now you have a total of 3 objects. Hide one of the headlight objects by clicking its name in the objects list and move the other one a little in front of the car (use Z-axis lock, in objects level).

Repeat with the tail-lights to get a total of 5 objects.

On the tail-light object that you moved some distance away from the main body, visualize where the reverse-lights, brake-lights and tail-lights of the real car go. To help you do that, you can click the corner button in the Back view window and go to Settings>Shade,Fill and turn on Solid.

Break up the object's faces accordingly and detach the faces into the three categories. Don't worry about the messed up textures since we're going to re-texture anyway. Also move each new object away from each other so that in Top view, you can see all the objects clearly by themselves and not half-hidden by any other object (except two mentioned below). This way, we can detach them easily later on.

Also, make a duplicate of the headlight object that you moved away from the main body and move it even further away.

So, to count again, you should have the following:

-A main body
-A headlight object (not moved from body)
-A tail-light object (not moved)
-A reverse-light object
-A brake-light object
-A tail-light (smaller) object
-A headlight object (moved away)
-Another headlight object (moved further away)

Then attach all eight objects (use Select>All in objects level) together to make one. You can call this final object "right-half" or something like that.
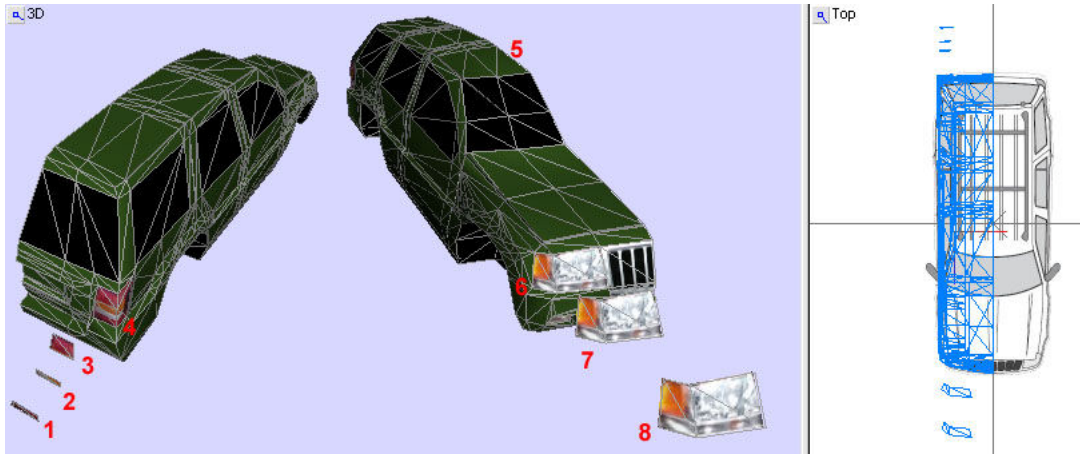
Create a copy of the "right-half" object and name the new object "left-half". Hide the right-half by clicking its name in the objects list. We are going to do 3 important things only along the X-axis, so turn on the X-axis lock.

1. Go to Modify>Mirror and click the left-half object (in object level).
2. Go to Modify>Reorient and click the object.
3. Go to Modify>Move and move the left-half so that the vertices on the open edge are at the center of the blueprints. Or, it's also healthy to keep both the right and left halves a very small and EQUAL distance away from the center gray line.

Then unite the two halves together.

Left-half → Mirror and Reorient → Move to appropriate place → Unite the two halves.
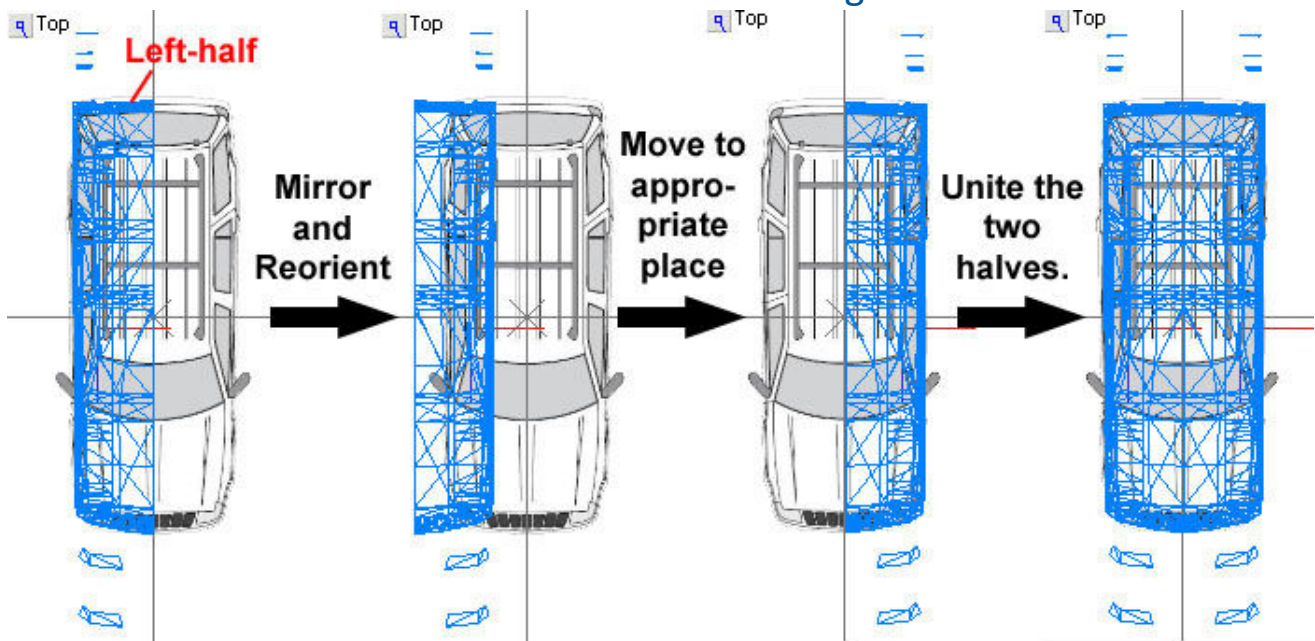
To get rid of the gap between the two halves, we need to select TWO AND ONLY TWO adjacent vertices and unite them. To do this, get into vertex level and go to Select>Quadr. Right-click and drag to make a rectangular selection around two vertices from the two halves that are next to each other.
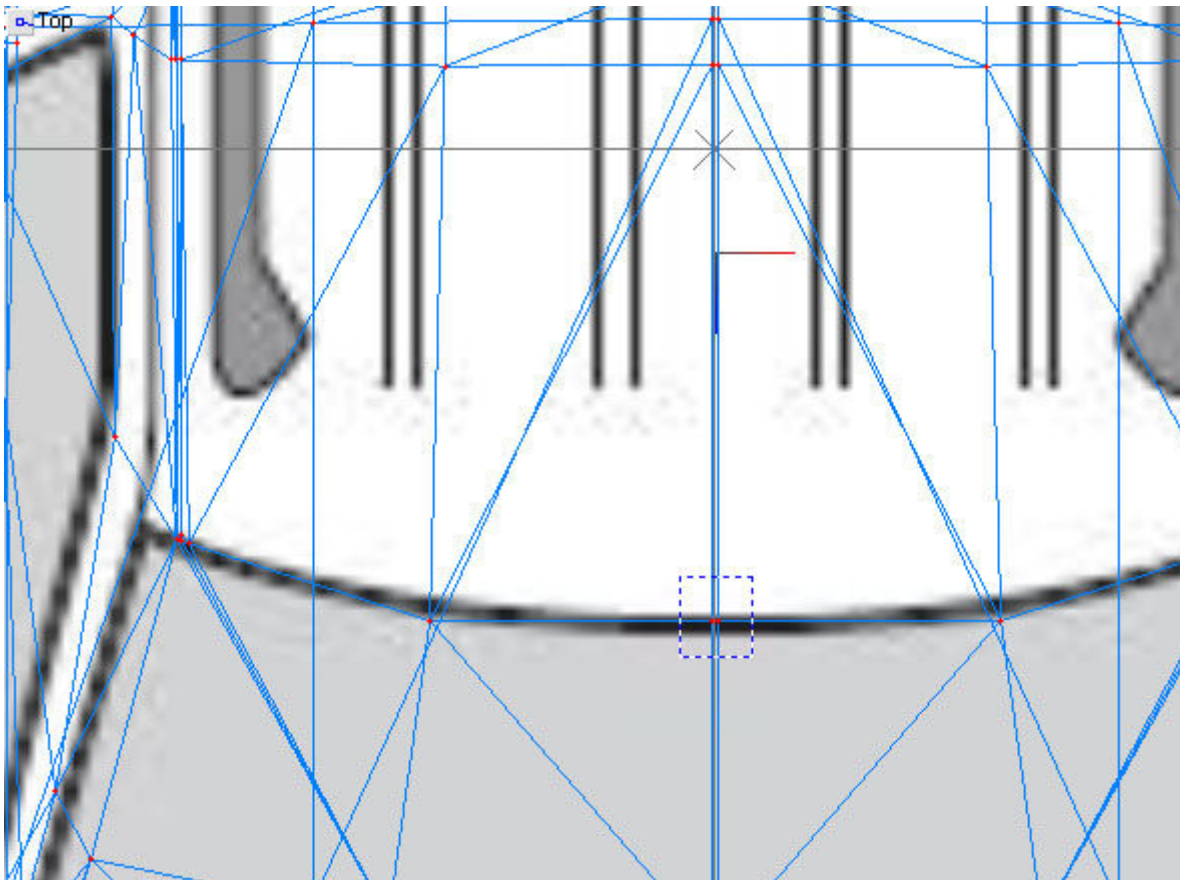
The two vertices will be selected. Then go to Create>Objects>UniteSelect and left-click on one of the selected vertices. Both vertices will fuse into one.

Be careful when you get to the edges that you've detached before. Where you think there is one vertex, in fact, there is two or more vertices. If you think you are selecting 2, in reality, 4 or more will be selected.

How do you tell when there are multiple vertices? Hover your cursor over a vertex. If all the faces touching that vertex are highlighted, that means there is only one vertex. If some faces, but not all faces, touching the vertex are highlighted, that indicates more than one vertex there.
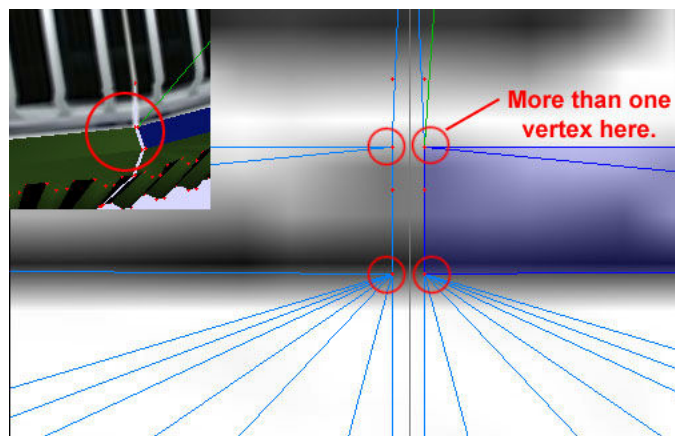
FIX: Move the vertex lying on top or belonging to a certain face or edge first and repeat on left-half. Unite these identified vertices and repeat with extra vertices.
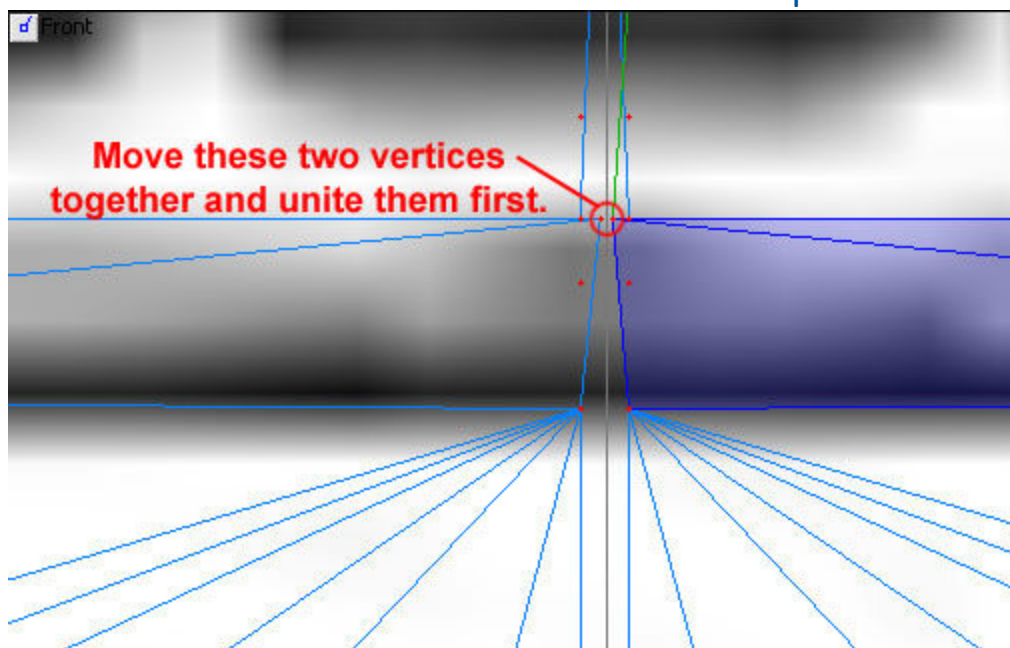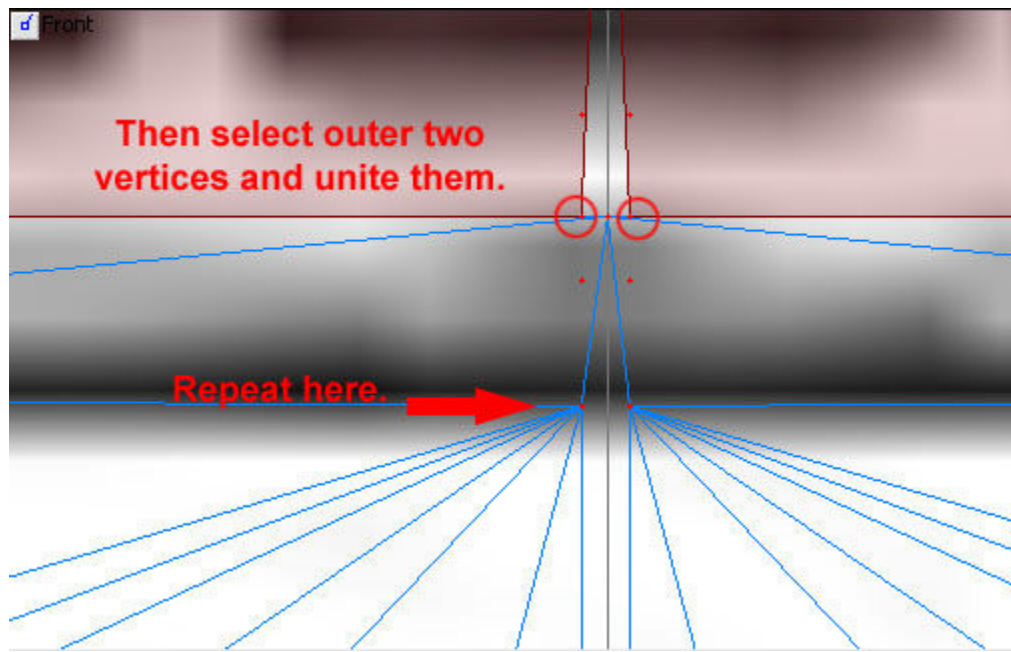
Continue all the way around the model. You will need to use Top, Back, Bottom and Front views but not any of the Side views. It's also a good idea to turn off the "See-through" feature.

NOTES:

-When you detach faces and calculate normals, the edges appear very sharp. What if you just want the edge to be pronounced with a definite shape but not appear as sharp as detaching will produce? Make a thin line or a few thin lines of polies over the edge and let them be very very close to each other, just as did when making the doorlines. But this time, don't do any detaching, just calculate the normals. The edge will appear sharp, but not too sharp.

That's all for now I think. Next lesson, we make wheels and name all the objects properly. That will be all for the modeling part. Then we will move onto putting the car in game.

LESSON 4: MODELING REVISITED
PART 2: The Object List

We're pretty much done modeling our car and light objects. Now we move onto the wheels, shadow and bound. Don't worry, these are very quick models compared to the car.

First, we'll make the wheel and copy it 3 times. I show 2 methods here, one simple and another fully 3D. I recommend the beginner to make the simple wheel.

Here we go!

THE SIMPLE WHEEL:

Find the "Cylinder" button on the toolbar at the top. In the Right view window, click once on the center of the front wheel and move the cursor away to enlarge the circular boundary.
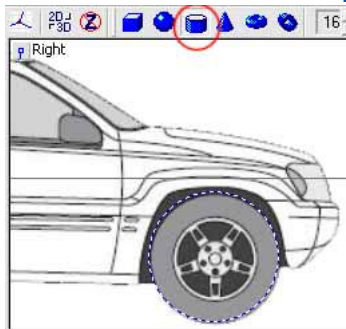
When it's right, click again to set the radius of the cylinder and a familiar box will appear. Name it something like "wheel 1" and then you can change the Horizontal steps and Vertical steps to whatever you like. I set H-steps to 20 and V-steps to 0.
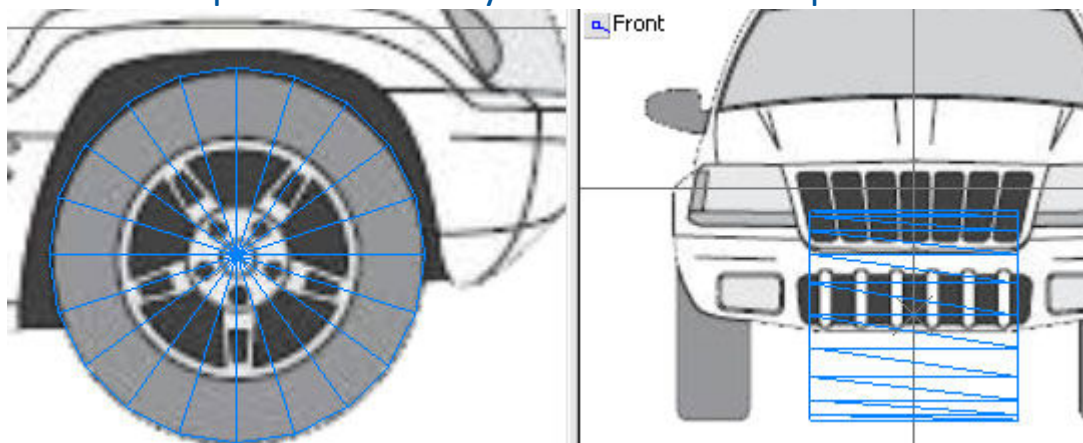
Move some vertices around, detach some faces, calculate normals, texture it and you'll get something like this:

Textured | After detaching faces and calculating normals | Detach these faces and reattach.

That's it for the simple wheel. More advanced modelers may want a more 3D shape though. So...

THE 3D WHEEL:

This time, use the "Tube" tool (found somewhere near the cylinder tool) to make the rubber tire first (textured black) and then make an "inner rim" (textured silver). Click once to initiate making of the tube, click a second time to set outer radius, click a third time to set inner radius and finally, click a fourth time to set width of the tube.

After detaching and calculating normals ofcourse.
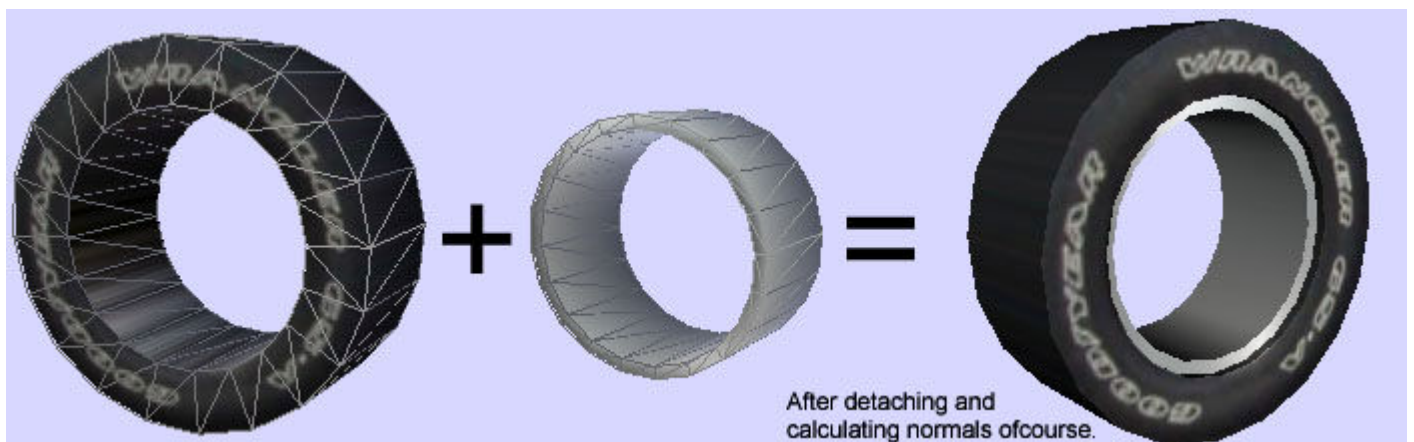
Then create one spoke like so:
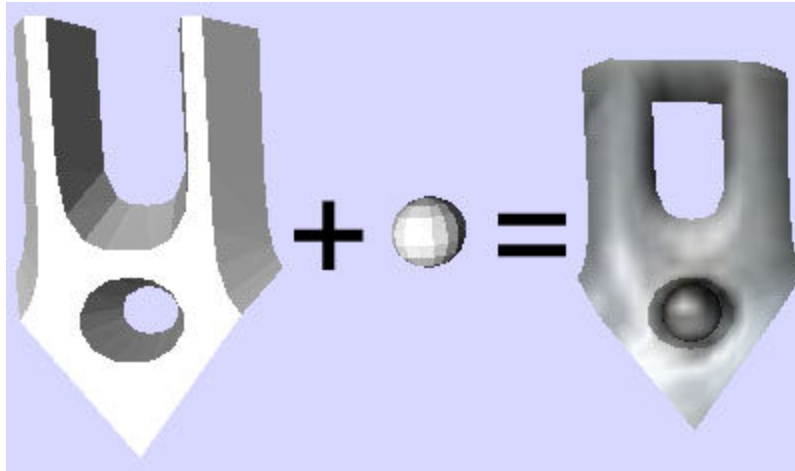
Copy it four times to get a total of five copies.

Go to Display>Local Axis>Move and move the local axis of the spoke to the very tip. Repeat for all spokes.
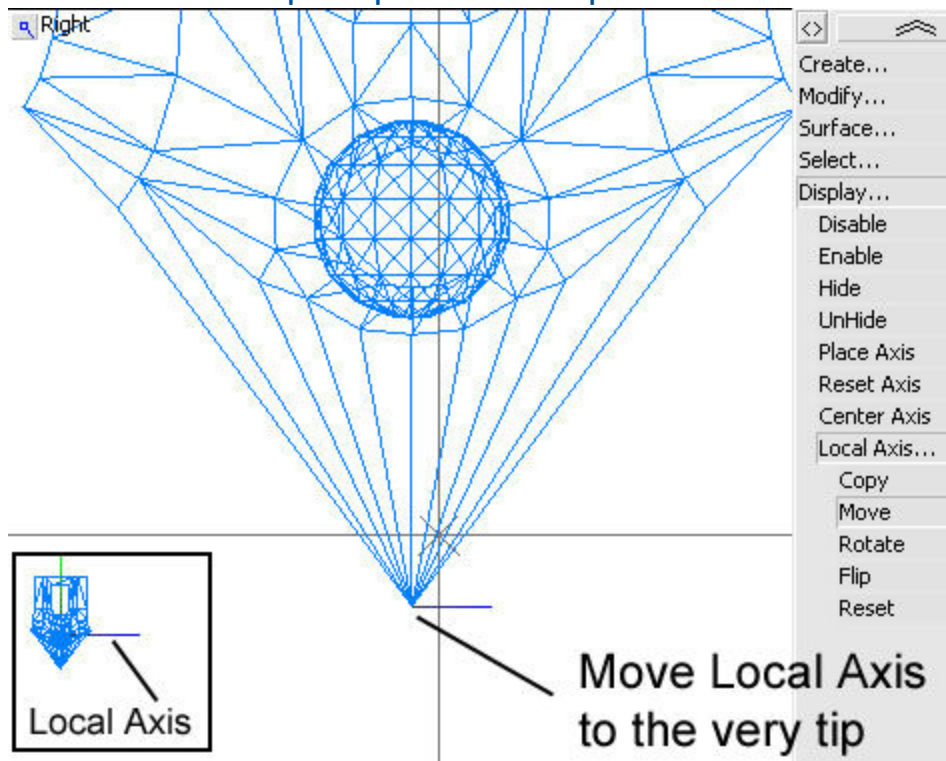
It's also a good idea to go Display>Place Axis and click once at the very tip of a spoke. You only have to do this once because there is only one global axis.

Hide all the spokes except spoke #2. Then lock the X-axis and go to Modify>Rotate. You'll notice a certain toolbar at the top becomes active. Scroll on it until you get 72 (because 360/5 = 72). This means that anything we rotate now will rotate in increments of 72 and only about the X-axis. So rotate spoke #2 until it snaps to the first position (72 degrees).

Spoke 2

Create...
Modify...
Extended...
Align...
Move
Rotate
Scale
Mirror
Break
Reorient
Delete
Spline...
Surface...
Select...
Display...
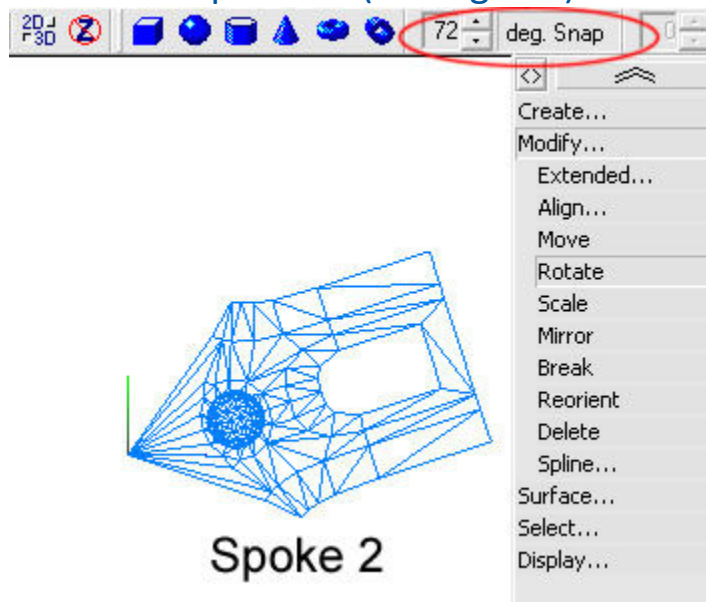
Unhide spoke #3 and rotate it twice. Rotate spoke #4 three times. Rotate spoke #5 four times.

Right
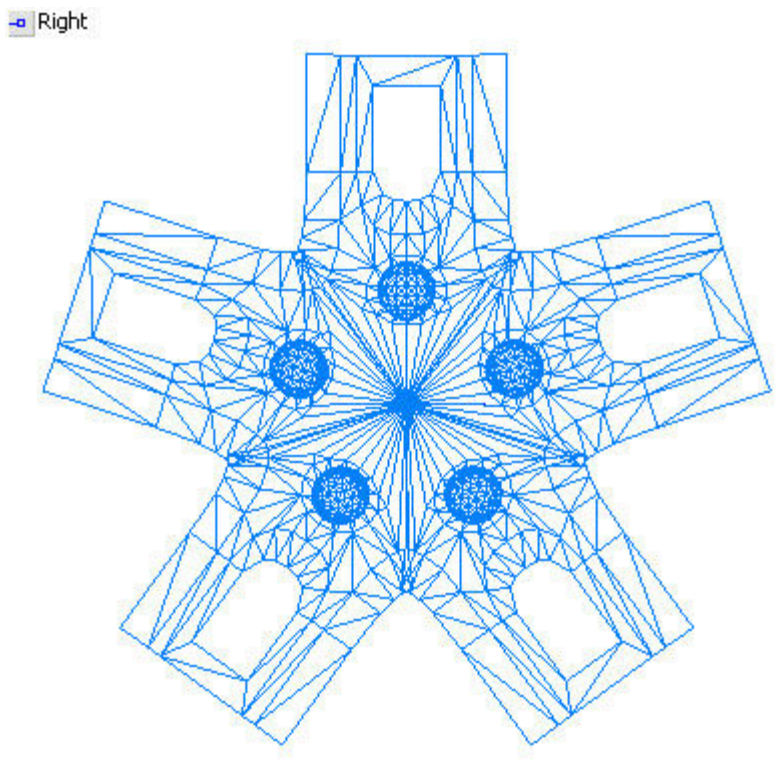
Unite all the spokes into one object. You can also unite the individual vertices as we did with the car. Put it all together and you have a 3D wheel!

Now you can copy it 3 times and put the other wheels in place.

When you name the wheels, they must have specific names.

The front-left wheel will be called **WHL0_H:m**
The front-right wheel will be called **WHL1_H:m**
The rear-left wheel will be called **WHL2_H:m**
The rear-right wheel will be called **WHL3_H:m**

THE SHADOW:

The shadow object is very self-explanatory - its the shadow of the car. It's usually made up of 2 faces, sits at the very bottom and most of the work is done in making the texture. I use Photoshop to get the job done.

First, open up the Top view blueprint and select the car. Create a new layer and paint the selected area black. Delete the background layer and you'll get something like below.
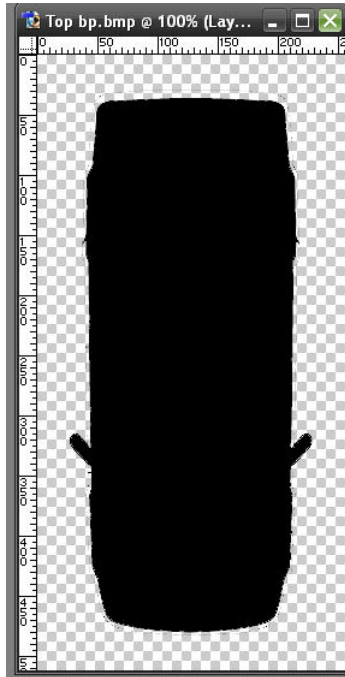
You may decrease the opacity of the layer if you want a better shadow effect (I set it to 50%). Change the canvas size so that it's square and save as .tga format. Remember to save it in the TEXTURE folder.

In ZM, go Create>Surfaces>Flat and create a rectangle-shaped object in the Top view window. Bring up Material Editor, copy the extra <default material> and name it shadow. Load up the shadow texture and set the type to GLOWING (to allow transparent effects).
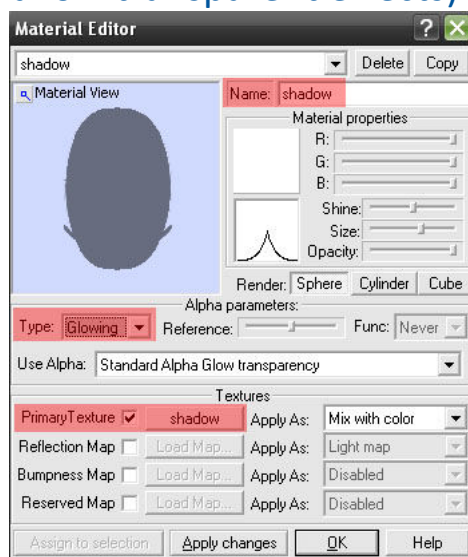
Name the shadow object as **SHADOW_H** and texture it. Next up, the Bound.

THE BOUND:

The Bound is a very simple, exterior shell of the car. When the car is put in game, the bound is what will react with the environment. It is the solid part of the car while the body we made earlier is the cosmetic part. Bounds are kept as low-poly as possible (20-30 faces). The Bound should not cover the wheels of the car, just the body. There's no need to texture it since it will be invisible in game. The proper name for the bound object is **BOUND**.

Here's an example of a bound:

Leave holes for the wheels.

Bound doesn't have to cover the body entirely.
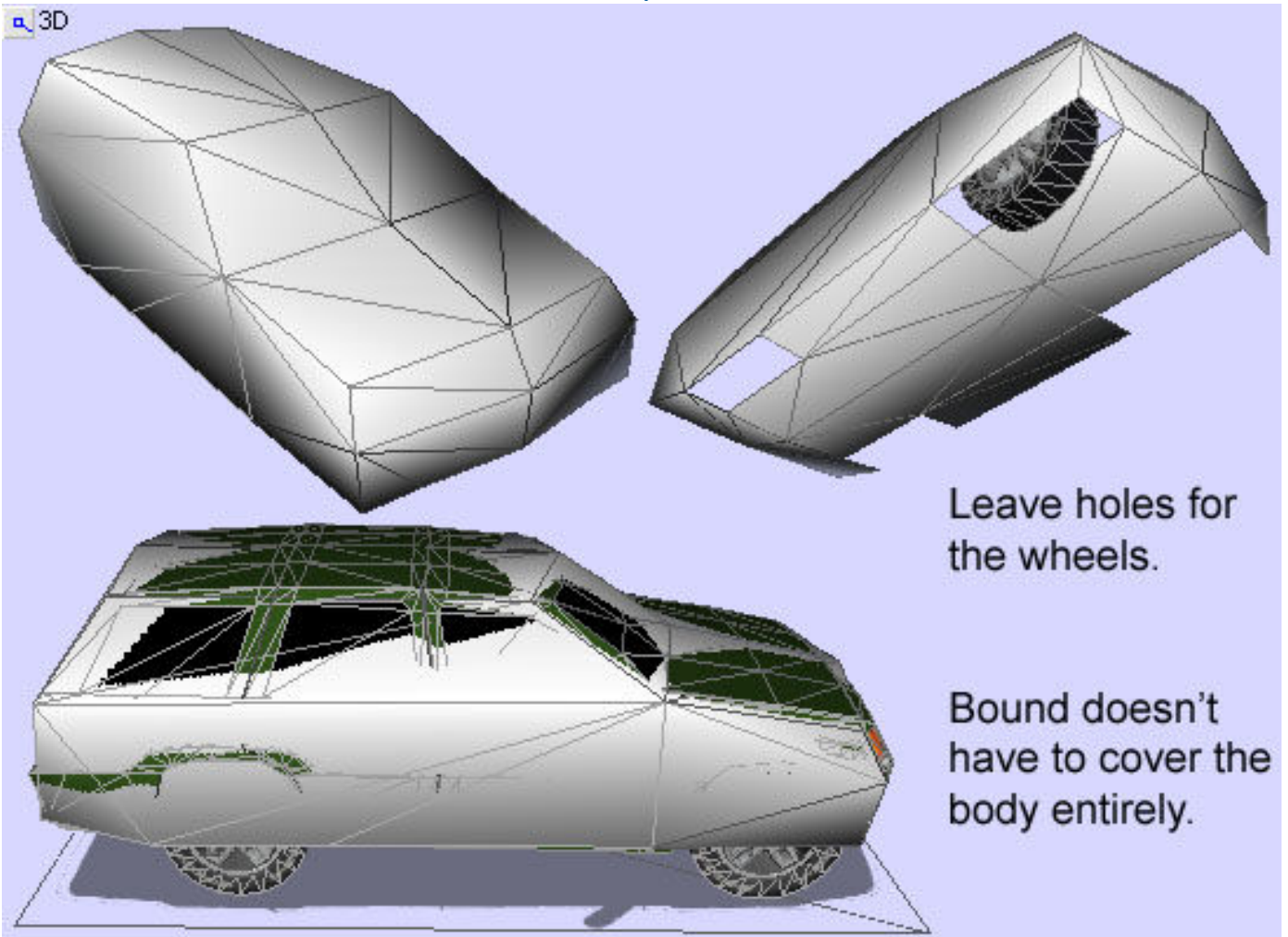
THE LIGHTS:

We already have these objects as part of the body. Separate (detach) each group and name them as shown below.
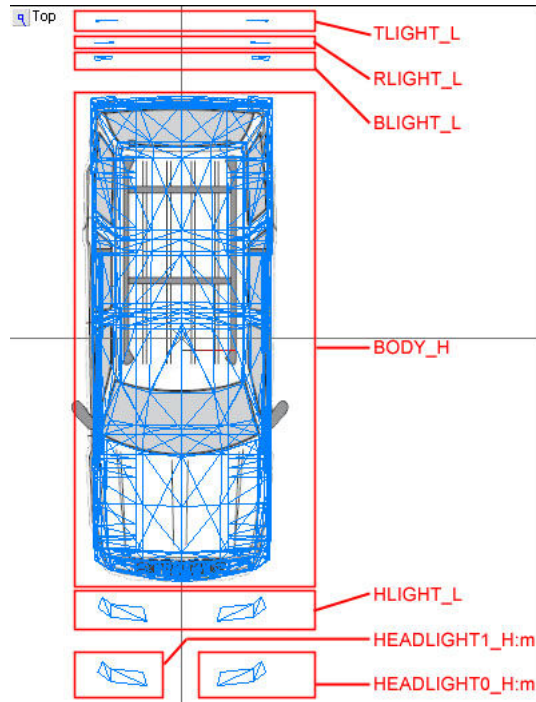
Actually, we should have textured them before we duplicated the body, but I guess I forgot. No worries, texturing isn't too hard.

You can make the textures. For brake-lights (**BLIGHT_L**) and tail-lights (**TLIGHT_L**) paint a 32x32 canvas very bright red. For the reverse-lights (**RLIGHT_L**) and headlights (**HLIGHT_L**), paint a similar sized canvas a very light color like white or very light cream/yellow. I'll share my textures below.

You can also look in the ZModeler directory folder for light textures. The white one is called fxglow (or w_glow) and the red one is called fxglow_red (or r_glow).

When texturing the light objects, set the type to "glowing" in Material Editor. After texturing is done, move the light objects very close the main body object so that they cover the original tail-lights and headlights that are part of the body.

The **HEADLIGHT0_H:m** and **HEADLIGHT1_H:m** objects do not need to be textured nor do they need to be any particular shape. In game, these objects are replaced by glow balls at their centers. So move these objects close to the car but keep some distance.

Now we need to make sure every object has their local axes centered, so go to Display>Center Axis and click on every object to accomplish this.

Also make sure to calculate the normals for every object one last time.

FINALLY, select all objects (Select>All in objects level) and move them up along the Y-axis until the shadow just sits on top of the horizontal (center) gray line seen in Right, Front and Back views. Save your work, we are done modeling!
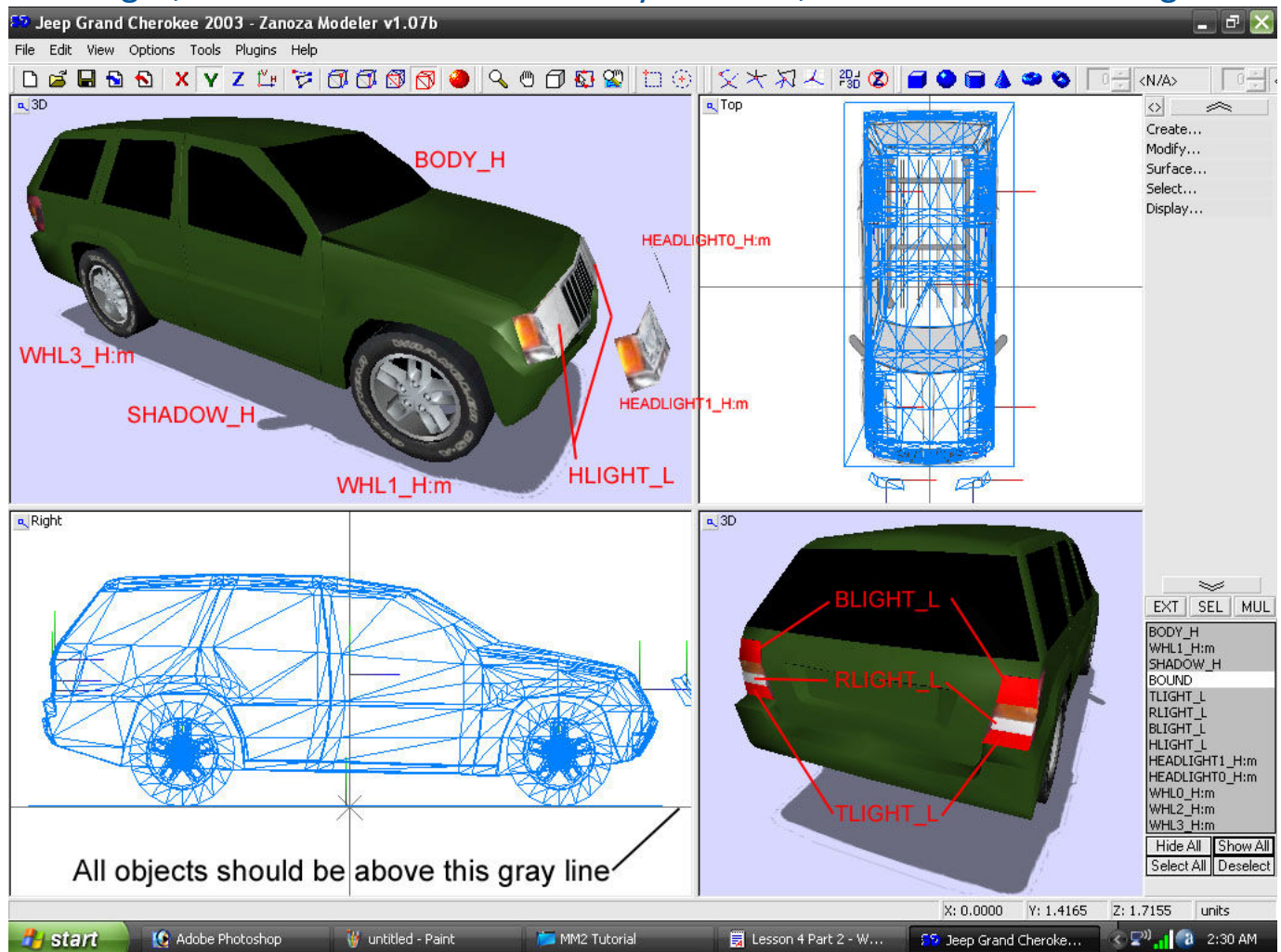
NOTES:
-To put the car in game, you ABSOLUTELY NEED the Body, Bound, Shadow and Wheel objects. The Light objects are all extras and are not needed for the car to work in game.

That's all for now I think. Next lesson, we put the car in game. WOO!

LESSON 5: PACKAGING

We finished all the necessary modeling. Its time to put the Cherokee in game.

First off, make five new folders and name them **AUD**, **BOUND**, **GEOMETRY**, **JPG** and **TUNE**. We already made the **TEXTURE** folder a while back so there's no need to make it again.

Summary of the Folders:
-**AUD**: Its where all the engine sounds and any other audio files go.
-**BOUND**: Leave this folder empty. When we export the car from ZM, a file will automatically be placed in this folder.
-**GEOMETRY**: Same as BOUND folder, leave it alone.
-**JPG**: Some screenshots are placed here.
-**TEXTURE**: All the textures used on the car go here.
-**TUNE**: Contains all the text files responsible for the tuning/performance of the car.

It might be a bit hard for us to make EVERYTHING by ourselves in all of these folders. In fact, the first game modifiers borrowed materials from the game itself....I think. We just need a sample car to get started.

Go to www.mmarchive.com and download the Mazda RX-7 (VeilSide Fortune version) that was made by me (Silent1Unknown). Actually, here is the link to the car --> http://www.mmarchive.com/file_details.php?file_id=932

It's a Zip file. Double-click it to open up WinRAR and then extract it to desktop or wherever you like. You'll get a folder of the same name.

When you open the folder, you see a text document called "Credits" and an AR file called "Mazda RX-7 Veilside Fortune". Usually, to get the car in game, you just stick this AR file into the MM2 directory. But today, we're going to see what's inside it.

The AR file can be opened with WinRAR. So, right-click the AR file, go to Open With>WinRAR archiver. Extract like before and you get a folder named "Mazda RX-7 Veilside Fortune". Open it and you see six familiar folders; **AUD**, **BOUND**, **GEOMETRY**, **JPG**, **TEXTURE** and **TUNE**.

Copy the contents of the **AUD** and **TUNE** folders and place them in the **AUD** and **TUNE** folders belonging to your Cherokee. You can also look inside of the **JPG** folder of the RX-7 to see what kinds of pictures you'll be putting in your Cherokee's **JPG** folder.

OK, now we forget about the RX-7 files and folders focus our attention on the Cherokee files and folders.

THE FOLDERS

AUD
In the Cherokee>**AUD** folder, there are more sub-folders which eventually lead to some files. Wherever you see "rx7vf" in the names of the files, replace only those five letters with "cherokee". Do this to EVERY file you find in the **AUD** folder. An example:
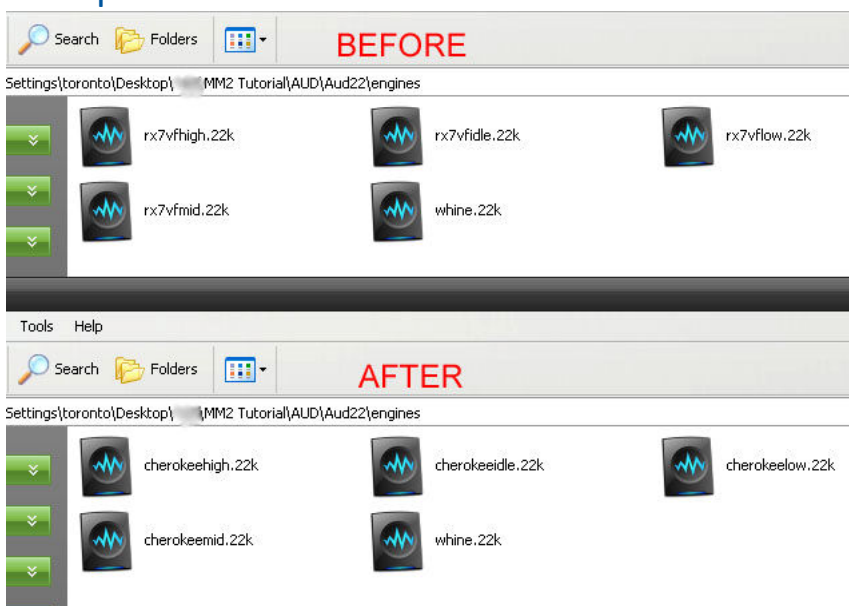
If you ever want to put in your own engine sounds, make sure they have the same properties as these audio files here.

BOUND

Leave this folder alone. ZM will put a .bnd file.

GEOMETRY

Leave this folder alone. ZM will put a .pkg file and a couple of .mtx files. Don't worry, you don't need to know what they do or how they work.

JPG

In this folder, you want two image files that are saved as .JPEG (or .JPG or whatever it's called) format.

1. The first image has to be on a 640x480 canvas and it's usually a photo of the real car (see example in the RX-7>**JPG** folder). When saving, save it as .JPEG and its general name is <your car's name>_show. In our case, it will be named "cherokee_show".

2. The second image is a 219x69 JPEG image with a general name of <your car's name>_ulck. We will name our image "cherokee_ulck". This small image usually contains info like the maker of the car and maybe car specs.

When you're done, your **JPG** folder should look something like this:
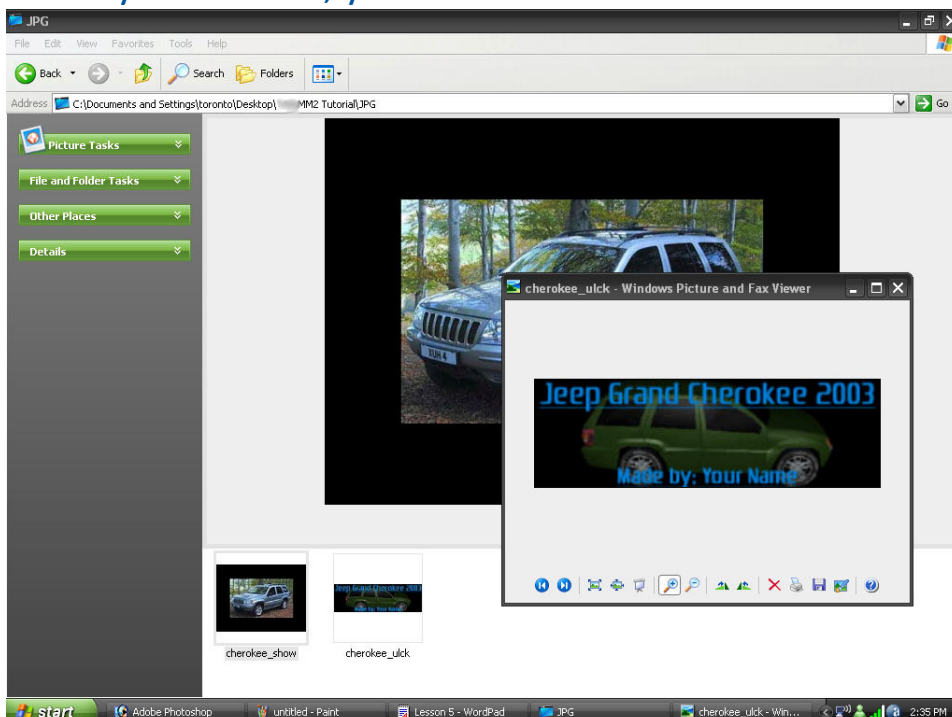
TEXTURE

We're done with this folder. I would just like to bring your attention to two textures we didn't use, namely, "cherokee_green" and "cherokee_red". Notice the names have the base "<your car's name>_color". You need this format when making multiple paintjobs. So in game, we'll have three colors available for our Cherokee; red, green and blue. I don't know what the limit is on paintjobs. I don't go beyond eight, although I've seen people offering eleven or more.

And remember, these images are either .bmp or .tga and will have dimensions like ...32, 64, 128, 256, 512 ...

TUNE

We copied the contents of this folder from the RX-7. There are 3 sub-folders here; "**Banger**", "**Camera**" and "**Vehicle**".

1. **Banger**: Contains .dgbangeradata files. There should be one for every .mtx file in the **GEOMETRY** folder. Start replacing the "rx7vf" on all these file names with "cherokee".

You can delete the _BREAK and _FNDR files here since we didn't make any breakable or fender objects for our car. But I'll discuss them later on, so you'll know where to look for these next time. Also, the .dgbanderdata files are editable with word processing programs like NotePad, WordPad, and Microsoft Word...etc. I recommend using NotePad....that's if you ever need to edit these...which is like never....except maybe with _BREAK files.

2. **Camera**: This folder also has a few files compatible with NotePad. These files contain information that deals with how you view you car in game. Too far, too close, too angled?....edit these files. Or you can get these from other cars that you liked. Or you can download MM2 Ultimate Tweaker do some.....tweaking of the cameras.
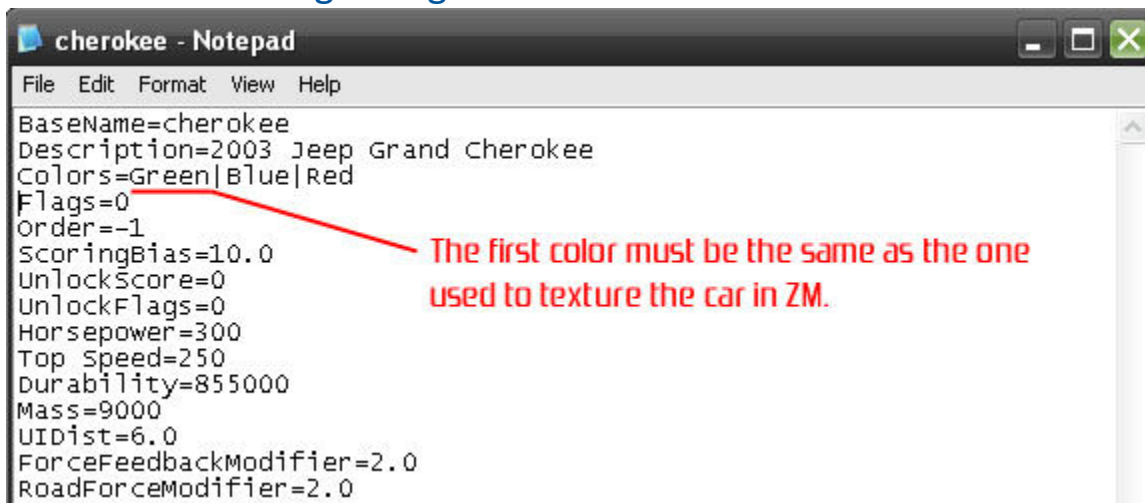
Also replace the names here to "cherokee.whatever"

3. **Vehicle**: More text editable files. Change the numbers around to fine tune your car the way you like. There are tutorials out there explaining what each heading means. I may add it to this megatutorial.

Oh yes...I forgot....replace the names "rx7vf" here to "cherokee" as well.

Back to the main **TUNE** folder, there are some files in addition to the folders mentioned above. Replace the "rx7vf" names with "cherokee as usual.

Perhaps the most important file here is the INFO file. Open it up with NotePad and make the following changes:

The **Basename** has to be a part of the filename of every file in all six folders. In our case, we chose "cherokee".
For the **Description**, It will be name/title of the car as you see it in car selection screen in game.
Colors: The titles of each paintjob. Doesn't have to be boring as red, blue, yellow....you could put Black Mica, Majestic Blue or whatever, doesn't matter the name. What matters is the order. So REMEMBER THE ORDER YOU PUT IT IN!!!
Horsepower, Top Speed, Durability and Mass: These don't have any effect on the car. In the car selection screen in game, these are the red bars that indicate how much your car has of each.
UIDist: Enter a number between 1-10. It's the distance or how far the car appears in the car selection screen.

Replace the other "rx7vf" files here (**TUNE** folder) with the basename we chose, "cherokee".

What about the **BOUND** and **GEOMTRY** folders?

Open up your project in ZM. Make sure all the necessary objects are there, all normals calculated, all axes centered and all objects above the center gray line.

Now, go to File>Export and a box will appear. Get into the **GEOMETRY** folder, name the file "cherokee" and save as .pkg.
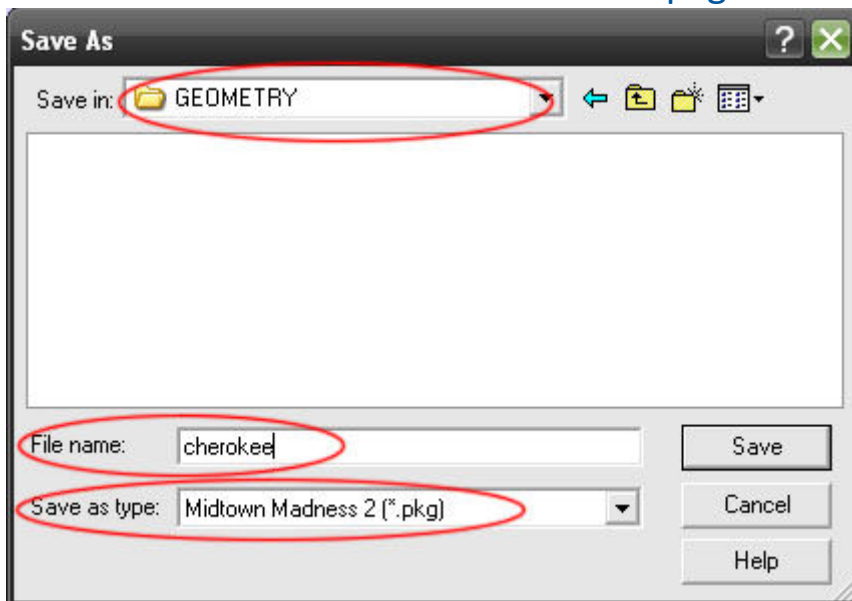
Hit Save and another box will appear. If we didn't have multiple paintjobs, we'd just click Export next. But we do have multiple paintjobs, three of them, so check the Multiple Colors (paintjobs) checkbox.

Then, click the Remove button until the list on the far right is cleared. The one texture that we used in modeling the car is the "cherokee_green" texture. So, where it says [Replace suffix:], type in that box "_green".

We have two colors remaining. Recall the order in which we put the color names

in the INFO file (Green|Blue|Red). Green is already done. In the [...with suffix:] box, type in _blue and click Add to List. Then type in "_red" in the same box and click Add to List again.
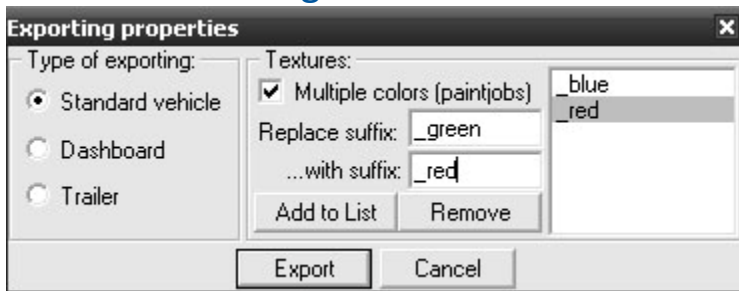
Finally, click Export. You may exit ZM.

Now go to where the six folders are. Make sure all the "rx7vf" names have been replaced by "cherokee". Check that for every .mtx file in the **GEOMETRY** folder, there's a corresponding .dgbangerdata file in the **TUNE>Banger** folder. Delete or move the extra .dgbangerdata files (_BREAK and _FNDR files) someplace else. If you need extra .dgbangerdata files, copy and paste. When you're sure everything is perfect, select or highlight all six folders, right-click and go to **Add to archive...**
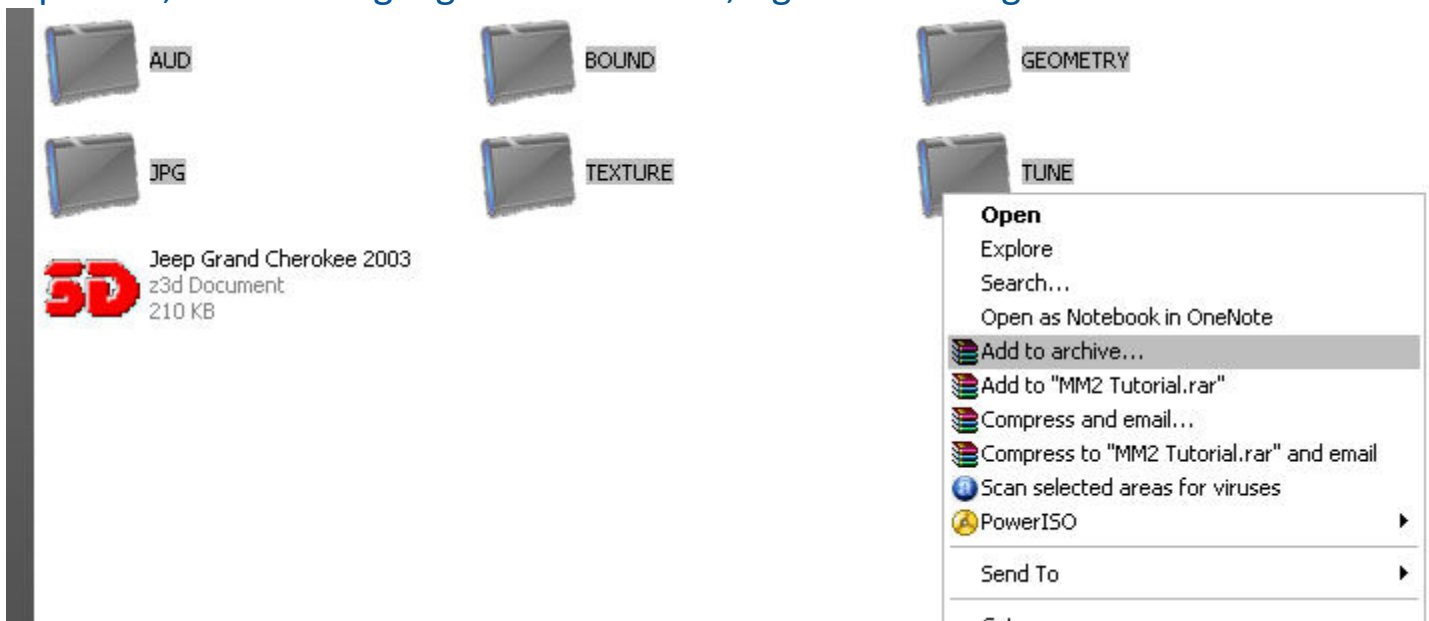
A box will appear. The FIRST thing is to change the archive format to ZIP. SECOND, change the name (before the .zip part) to whatever you want. THIRD, change the

zip to ar. Finally, click OK and you will get YOUR VERY OWN AR FILE!!!
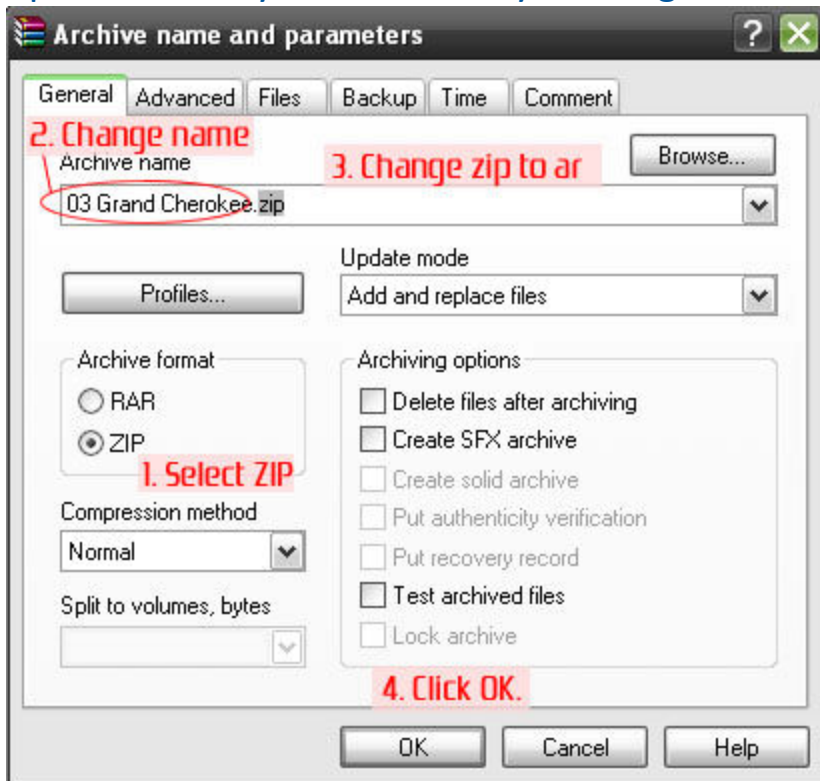
Clarification: Final name before pressing OK, should read "03 Grand Cherokee.ar"

You know the rest, stick this AR file in the MM2 directory and have fun playing with your car.

Here's a screenshot.

As you can see, sometimes textures can mess up. I will fix this wheel texture problem by going into the **TEXTURE** folder and making a duplicate of the "wheel" texture. Then in ZM, open up Material Editor and replace the original "wheel" texture for the wheel material with the new duplicate. The problem fixed:

SLAMMIN', HUH?!

NOTES:
-If you don't like the tuning, you can always change it in the TUNE>Vehicle folder or download MM2 Ultimate Tweaker to make things easier.
-If the car doesn't appear to be the right size, you can go back to the model in ZM, select all the objects and scale to whatever size is right. Make sure to put them back above the gray line.
-For above mentioned edits to take effect, you'll have to make the AR file again.

That's all for now I think. Next lesson, I'll talk about some extras and maybe give some small tips.

LESSON 6: THE EXTRAS

Last time, we put the Cherokee in game and it looked very good. Now, we can make some improvements or enhancements.

The first thing you want to do the first time you put a car in game is to check whether it's the correct size or not. Different vehicles have different lengths in terms of side view. You want to look at the width of the car and how much of the lane it takes up in game because most vehicles have very similar widths.

When I first put the Cherokee in game, I noticed its width was about a third (1/3) of lane width. That's pretty small for a Jeep and compared to the default cars in game. Let's say we want to make the Cherokee bigger so that its width takes up two thirds (2/3) of a lane in game.

In ZM, select all objects (in objects level), go to Modify>Scale, have the H and V locks on and turn SEL on. Then scale the objects while holding down the Shift button (on your keyboard) so that all objects are scaled equally in all dimensions. Scale the objects until they are about twice their original size. You may want to take the front view blueprint and enlarge it first to help with the scaling. Make sure the objects are still sitting just above the gray center line (if not, move them). Export and repackage into AR file.

How to Make Glossy Textures

Want to make your car glossy or shinier in game? You'll need reflection textures for that. You can find some reflection textures in the ZM directory or you can search on the forums or on Google.

Check in my RX-7's TEXTURE folder and you'll see a texture named "reflexion03_bis". Copy it and paste into your Cherokee's TEXTURE folder. To apply it, open up Material Editor and check the "Reflection Map" option which is right under the "Primary Texture" option. Load the reflection texture "reflexion03_bis" and click OK.

While we're on the topic of textures and folders, I'll add an important point made by an experienced modeler, Maxoff. He said, "*I have just one small comment that may save hours of bug finding: use lowercase letters in names (materials in ZM, files and folders) because in some cases MM2 and ZM are case sensitive*".

How to Make Transparent Windows
Suppose you decide to make the interior of the car and you want the windows to be somewhat transparent or translucent instead of the opaque black windows we made for the Cherokee. The fix is simple; in Material Editor, set the "Type" to "Glowing" and then change the opacity to your liking.

Remember that this applies to the texture and therefore, whichever faces that contain this texture will become transparent. For our Cherokee, we used the same black texture to color the windows and the bottom of the car (chassis). So if you change this black texture to glowing and transparent, both the windows and chassis will be affected. If you plan to have transparent windows, keep aside a separate texture just for windows and other glassy faces like headlight and tail-light covers.

Also, there's a rule about transparent faces and what you see behind them. When you make some faces appear transparent, you will only see those faces that were created before the transparent faces were created. Suppose you made the interior after the windows (we made the Cherokee windows way back in lesson 2), you wouldn't be able to see it even if you make the windows transparent. To fix this, you can delete the current windows and make them again (it won't take too long, they're just windows) or you can detach the windows (you may need to make a new copy) and reattach to the body.

How to Make Breakable and Fender Objects
Breakables are objects on the car that fall off when hit in game. They usually represent side mirrors, fins, doors and the like.

Note: Breakable objects do not appear shiny in game.

In ZM, model the parts you intend to be breakable as separate objects (or by detaching). You can have maximum of eight breakable objects on any car. Their names:

BREAK0_H:m -----> breaks when the car is hit on the front-left corner
BREAK1_H:m -----> breaks when the car is hit on the front-right corner
BREAK2_H:m -----> breaks when the car is hit on the rear-right corner
BREAK3_H:m -----> breaks when the car is hit on the rear-left corner
BREAK01_H:m -----> breaks when the car is hit on its front side
BREAK12_H:m -----> breaks when the car is hit on its right side
BREAK23_H:m -----> breaks when the car is hit on its rear side
BREAK03_H:m -----> breaks when the car is hit on its left side

When you export, there will be a .mtx file for every breakable object placed in the "geometry" folder. Remember to add a corresponding .dgbangerdata file in the "tune>banger" folder. See my RX-7's "banger" folder to see how to name the .dgbangerdata files.

You can adjust the sensitivity of the breakable object in the .dgbangerdata file by specifically changing the mass or impulse limit numbers. You can also find the center of mass and similar info about your breakable object in a text file in the "geometry" folder.

Fender objects rotate when the front wheels turn and to the same degree. They usually represent wheel covers (like in the Panoz default car) or brake discs and calipers. I used them to try to make spinner rims on my RX-7 but it didn't turn out too well. (BTW, you can get the RX-7 **without** spinner rims from www.mm2x.com).

You model fender objects separately or detach them from the main body later on just like for the breakables. As far as I know, you can have a maximum of two fender objects on a car. Their names:

FNDR0_M:m -----> placed near the front-left wheel....usually
FNDR1_M:m -----> placed near the front-right wheel

But these don't work by themselves for a reason unknown to me. So make duplicates and name them **FNDR0_H:m** and **FNDR1_H:m** and then export. Also add the necessary .dgbangerdata files (which you probably won't need to edit).

Sorry for the confusing information, but I just recently tried fender objects for the first time and hurriedly looked up some random posts for info. You can do some research on the forums to help you understand better how fender objects work.

Night Textures

These textures appear on the car only at night and are invisible during the day.

Suppose you want the car to appear black in daylight, but dark gray at night. Take that texture of the car that is black and duplicate it and rename it the same as the black texture, but this time add the suffix "_ni" (Example: cherokee_black -----> cherokee_black_ni). In this new duplicate texture, change the black color to dark gray.

You don't have to do night textures on the body only. This method can be applied to make night-time neon underglows or anything else you like.

The Shadow

Instead of the boring old half-transparent shadows normal cars have, you can change the look of the shadow texture in Photoshop so that it appears the car has neon underglow. On top of the normally black texture (on a new layer), make some lines or thin rectangles filled with the color of your choice. Right-click on the layer, go Blending Options and add an Outer Glow. Play around with the numbers, something something, and you'll get some nice underglows on the shadow. Then texture the shadow object with this texture. See my RX-7 textures for examples.

That's all the extras I know of at the moment. There's also a way of adding animated textures and extra wheels but I haven't learned those yet. In the next and hopefully final lesson, I'll go over some tips on how to improve your modeling.
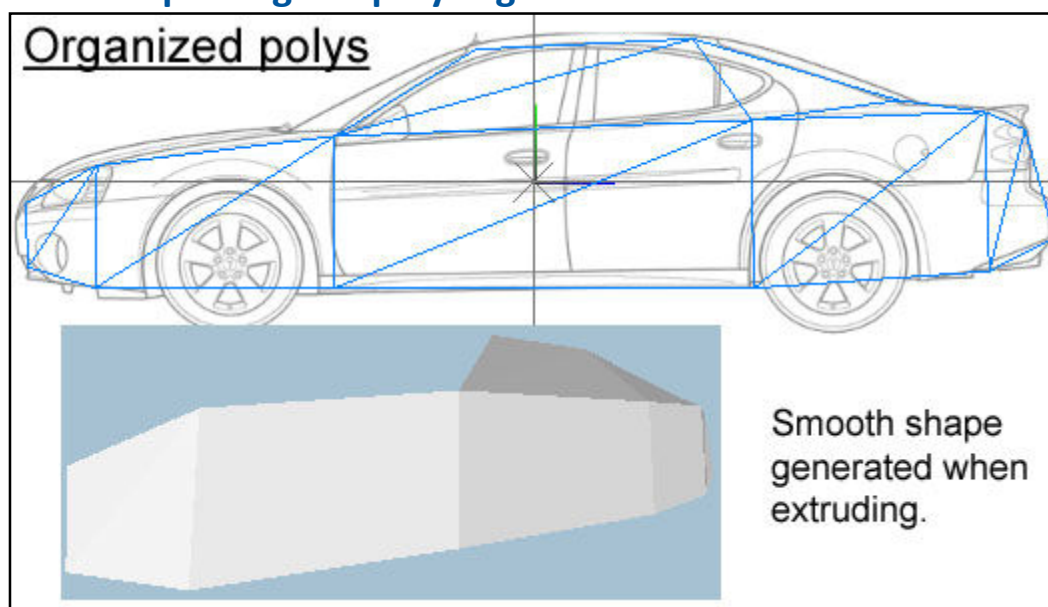
LESSON 7: MODELING REFINED

There's not much to teach in this final lesson. I just introduce some ideas you can use to help you improve your modeling.

If you look back at the Cherokee I made for this tutorial, you should know that it's not the best model in the world. It was a very quick model and its purpose was to show the basic methods and principles of modeling in ZM. Ofcourse, you don't want to stay at the basic level and make boxy cars forever. You want to improve with every model you make. You want to learn to make smoother, more efficient shapes.

So what makes a model smoother? Increasing polycount is only half of the answer. Poly-placement is a more important factor. A model with few but organized polygons will look much better than a high-poly model that has disorganization. Furthermore, when extruding (moving vertices to achieve 3D shape), move the vertices little by little to get smooth curves. You don't want to make large jumps or make sharp angles. Just keep it slow and gradual. And that's what smooth really means, gradual.
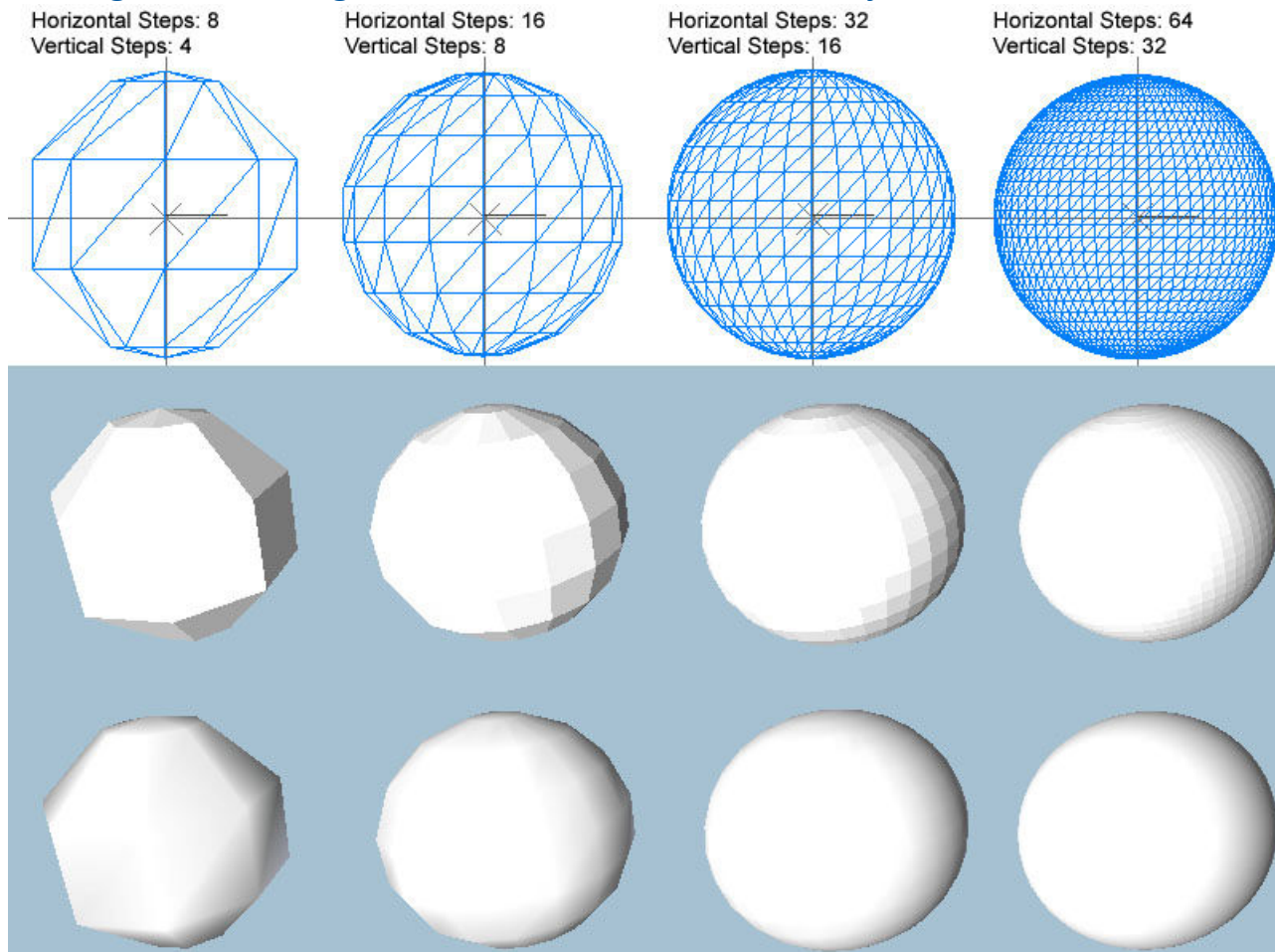
An example of good poly organization:

An example of poor poly organization:

Disorganized polys

Even though there are more polys, extruding shows a rough, irregular shape... NOT COOL!
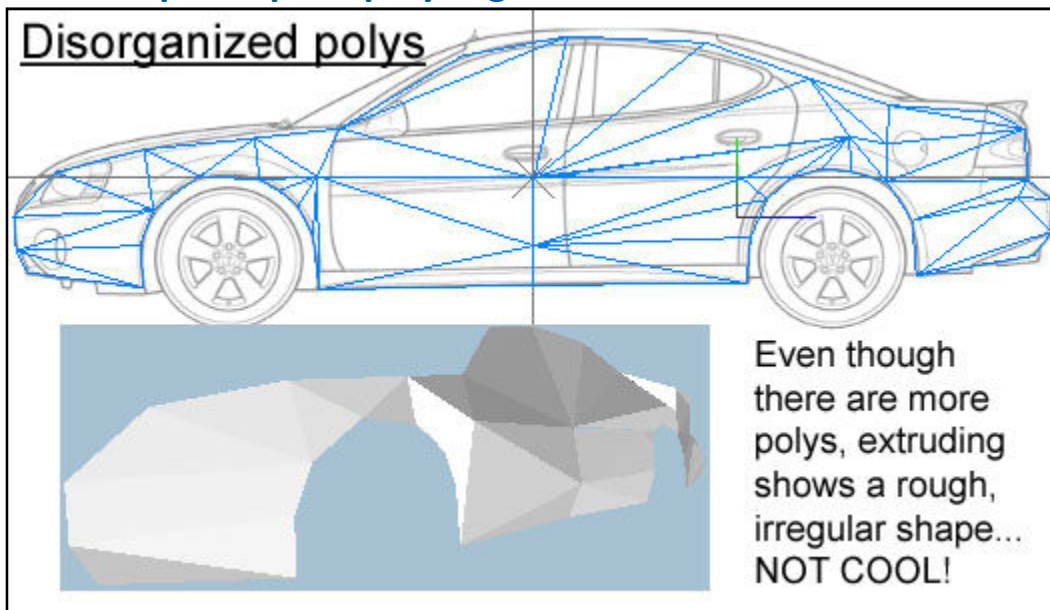
How does adding more (organized) polies help? It allows more opportunity to make gradual changes and therefore smoother objects. Observe:

Horizontal Steps: 8
Vertical Steps: 4

Horizontal Steps: 16
Vertical Steps: 8

Horizontal Steps: 32
Vertical Steps: 16

Horizontal Steps: 64
Vertical Steps: 32

Exercise 1:

First, draw a triangle having all three sides equal in length. Then make a square (rectangle with equal sides). Then make a pentagon of equal sides. Then hexagon (6), heptagon (7), octagon (8)........What shape do you think you'll eventually get if you could continue to infinity? (Answer: Circle)

We know that a circle has a very smooth curve. As you go backwards from the circle, decreasing the number of edges, you can see it as the circle losing its smooth curve (or the curve is getting bumpy) every step of the way until you recognize the common shapes.......hexagon, pentagon, square, triangle, angle, line.

Exercise 2:

Grab a picture of a car (from magazines, internet or wherever). I'll use this:

Imagine cutting the car in half and **draw** on the car where that cutting line would appear like so:
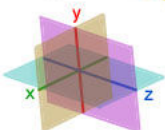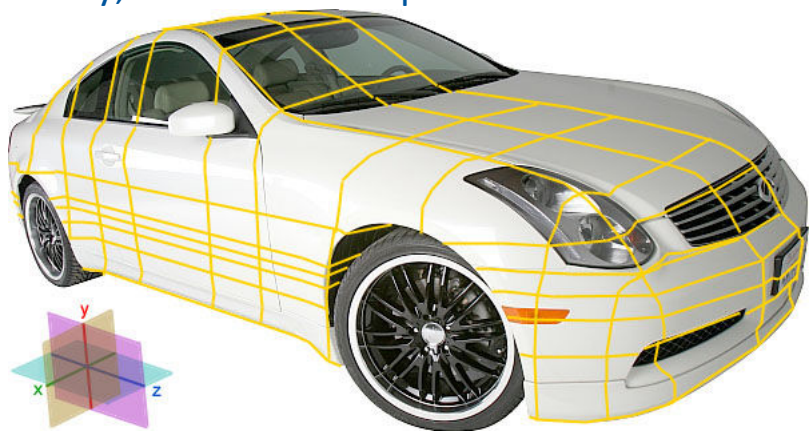
Make a few more cuts until you reach the edge of the car. You don't have to be perfect.


Now make some horizontal (XZ-planes) cuts along the flat parts of the car.
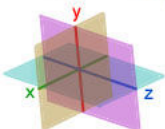

Finally, make some XY-planar cuts.

I added diagonals to all the rectangles in two strips that go along the length of the car. These would represent polygons in ZM. That's the idea of organized polygon-placement, they are basically strips of rectangles (two polies each) that run along the length of the car. You can easily make such rectangles and move the vertices to their correct locations.
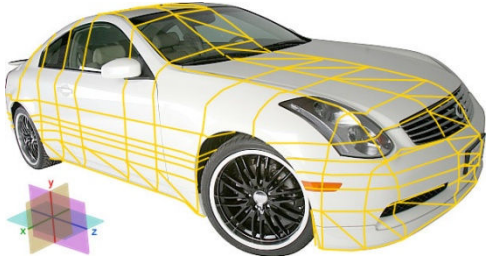
What about the non-rectangular components like the weird curves? Fill them in with multiple triangles!
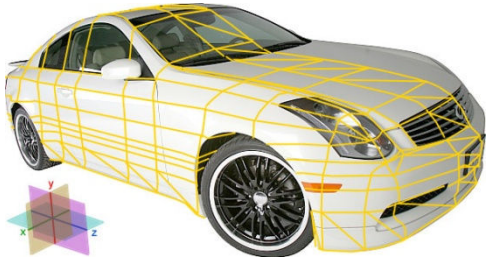
Make more polies around the details. Keep breaking down weird shapes into rectangles and then into triangles until you see nothing but triangles. Curved parts of the car will have more polies ofcourse.
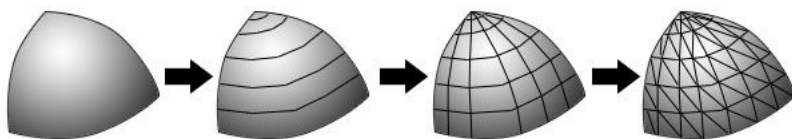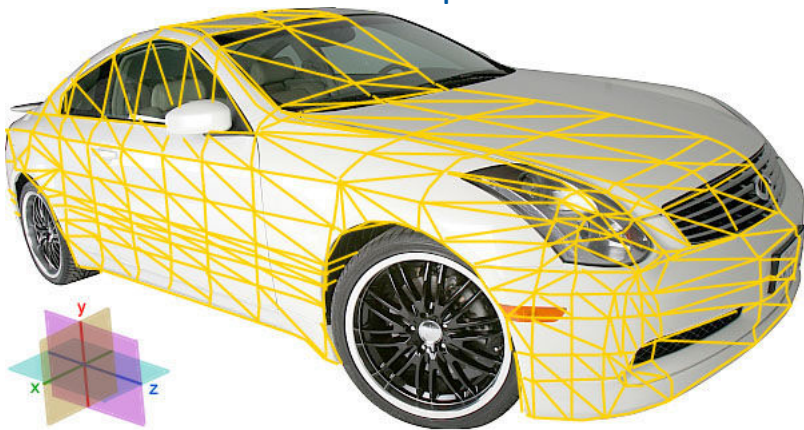
Just like how you drew all those polies by hand, that's generally how you would make a car in modeling software such as in ZM. Except that ZM has shortcuts such as breaking, reorienting, creating strips and fans....etc.

Now, I think you can understand why you wouldn't start making polies like this:
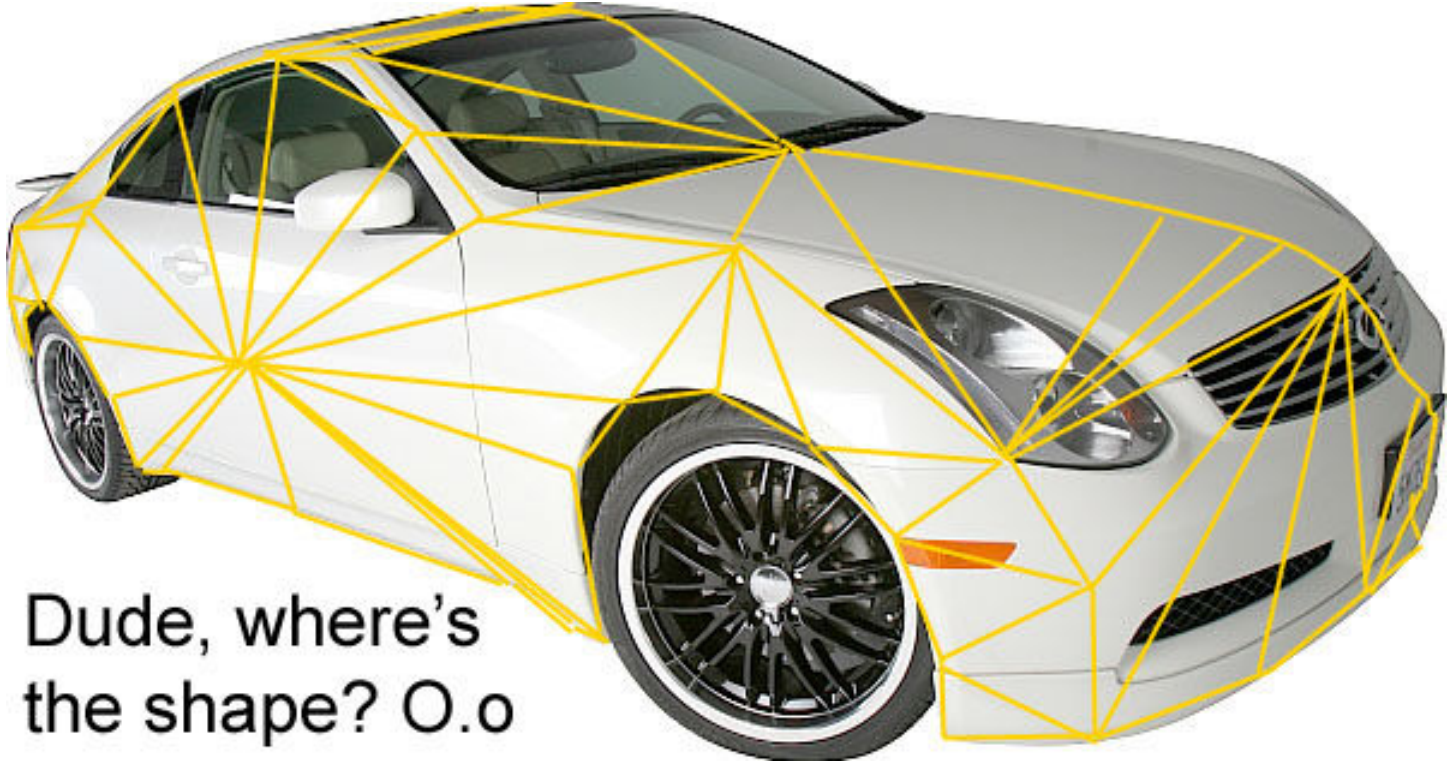

Dude, where's the shape? O.o

So practice this exercise whenever you see a photo of a car in a magazine (or on the net). It'll only take a few minutes of your time, but will teach you a lot about space, geometry and poly organization. You can also do this right before you start modeling a car to sort of plan ahead and give yourself an idea of how you want to approach that specific car. For a low-poly car, make fewer cuts that are spread further apart. For a high-poly car, you would need more cuts that are very close to each other. Also, you don't strictly have to make cuts along those planes (XY, YZ or XZ) all the time, you can make cutting lines pass over nearby details if that's more efficient.

That's all I can tell you about modeling. I'm pretty much a beginner myself. I've only made 4 cars so far. But if you look at my progress, you'll see that I improved from model to model. Note the changes in each wireframe.
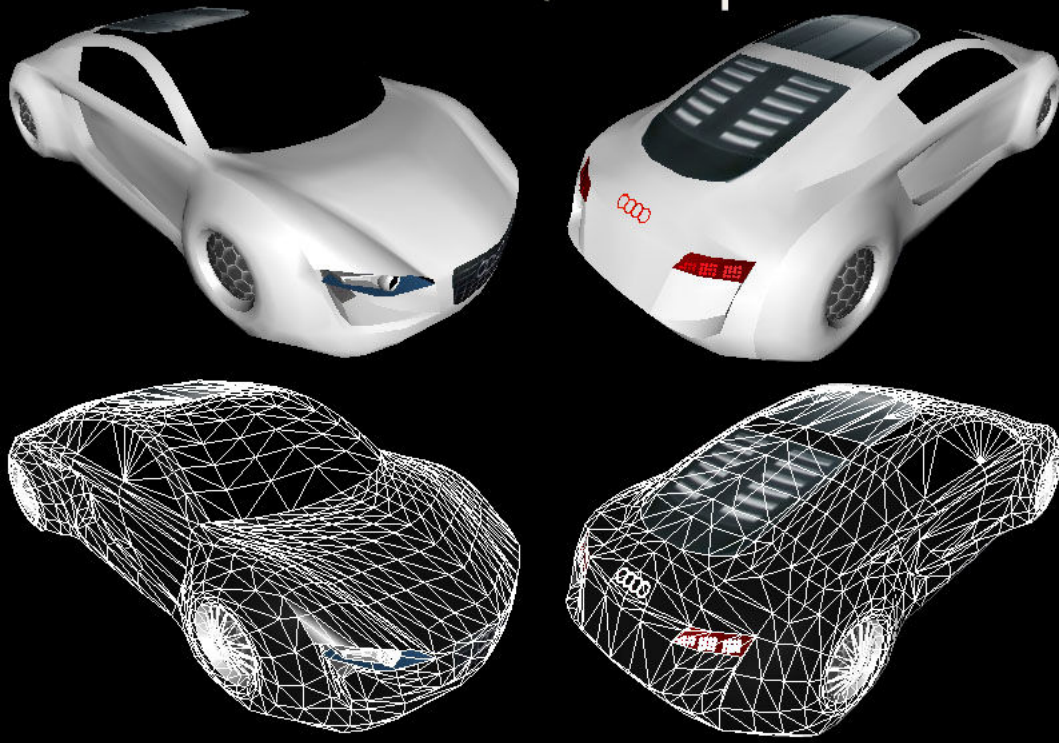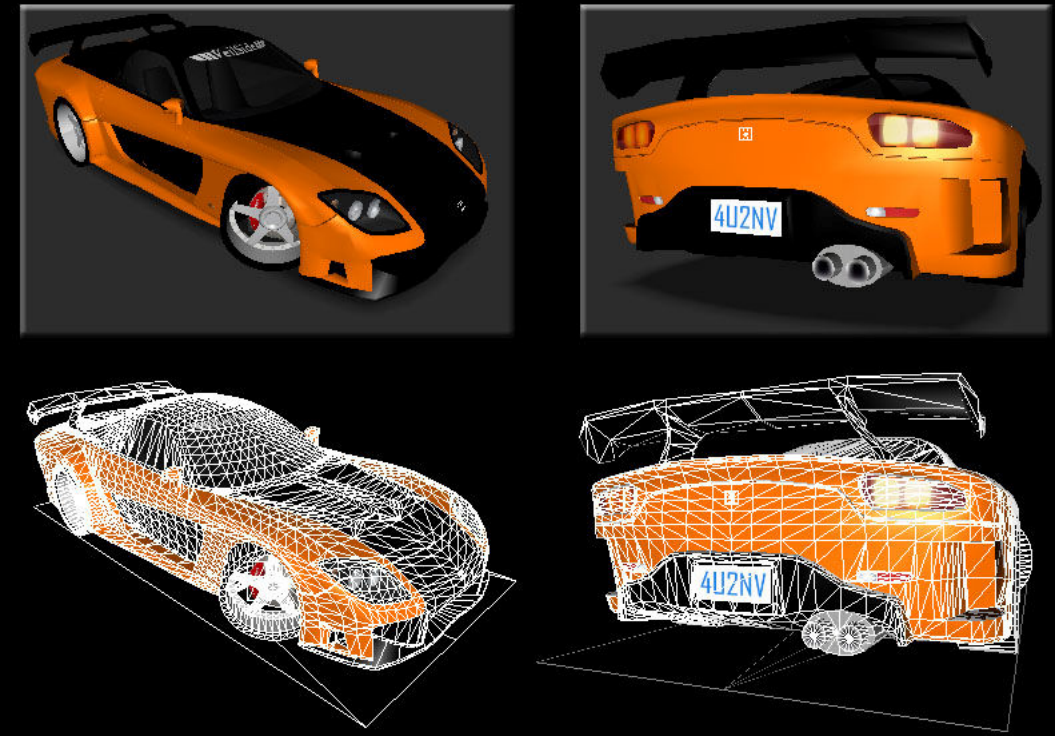
1. Cadillac CTS 2002
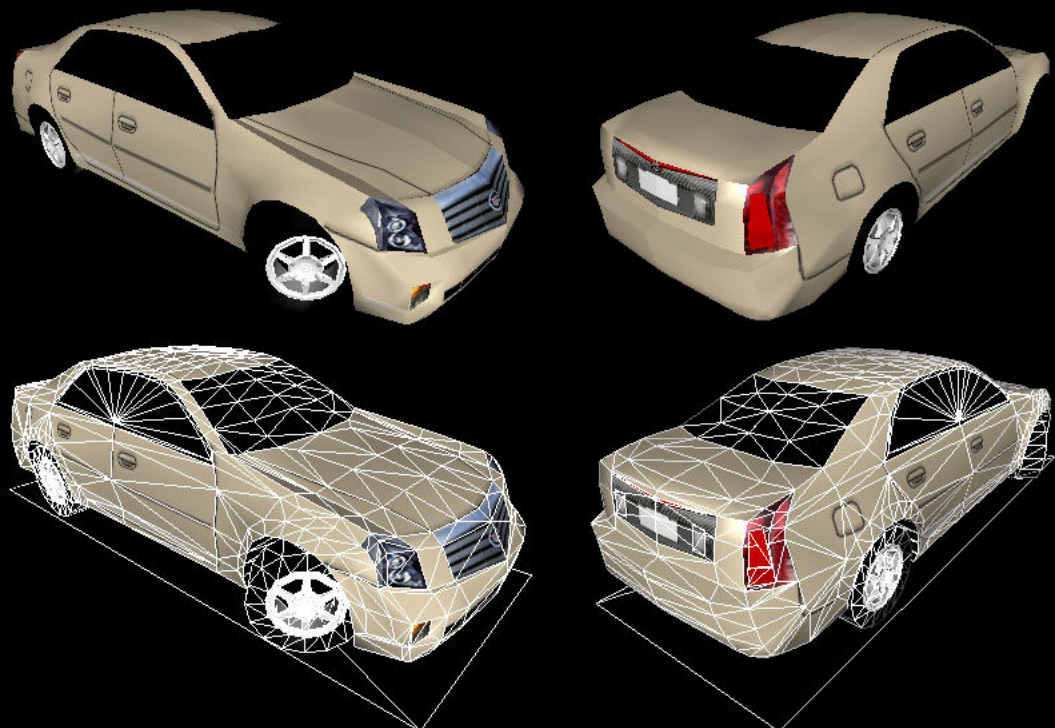
2. Mazda 3 2007
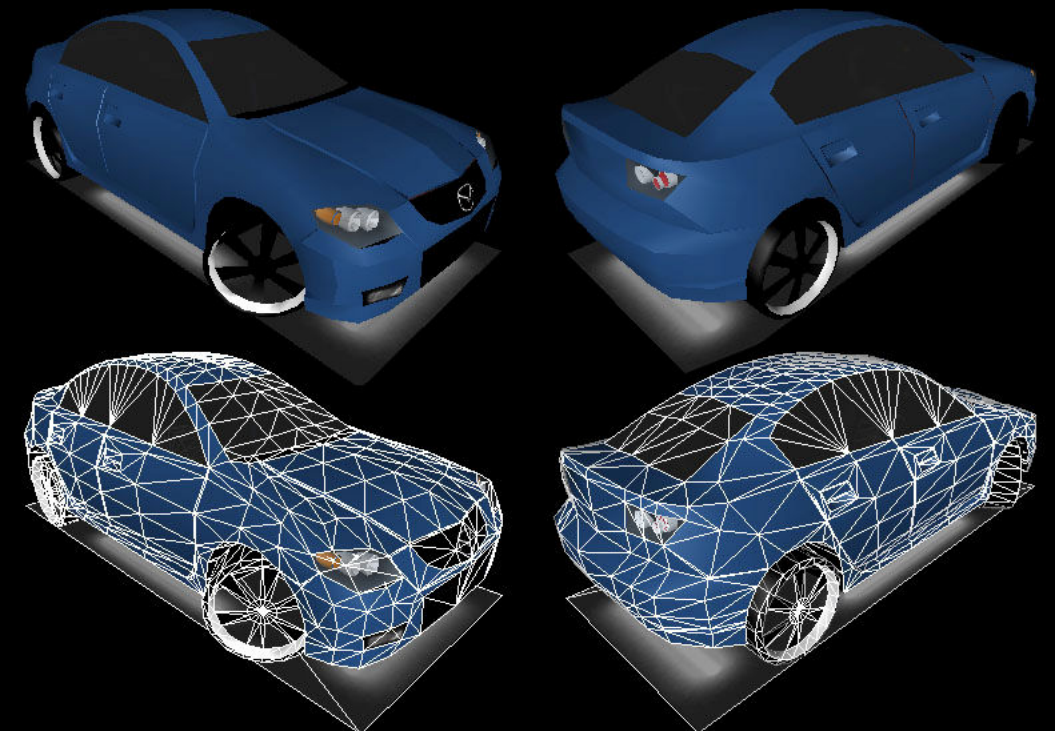
3. Audi RSQ Concept

4. Mazda RX-7

What did I do to improve my modeling? I studied wireframes. I visited other forums and sites (SMCars, MM2C, NFScars, GTA, Google...etc), collected a lot of pictures of the wireframes of other people's best works and stared at them all day. I looked for patterns and noted how the experts placed their polies to make certain features of their models. I suggest you do the same. From now on, if you see a good wireframe picture on the net, save it to your desktop and refer to it often. Then try to repeat the patterns on your own models. The more you practice, the more improvement you'll see in your modeling.

And if you ever run into problems, have any questions or want some help with anything, sign up on the MM2C Forums and post your needs. There are some really brilliant people there who can help out. It'll also help to liven up the place.

Also, if you think your work is good enough and is worth sharing with others, you can sign up at MMArchive or MM2X and host your car there.

Well, that's it for this tutorial. I hope you found it useful. Farewell and enjoy modeling!

NOTES:

 This tutorial was originally written over multiple posts on MM2C's "The Bodyshop" forum. Here is the link to it → http://forum.mm2c.com/viewtopic.php?t=14160

The images shown in this PDF version have lost quality and clarity due to shrinking to fit and converting to PDF from DOCX. For this reason, I have added the original pictures in the total package.