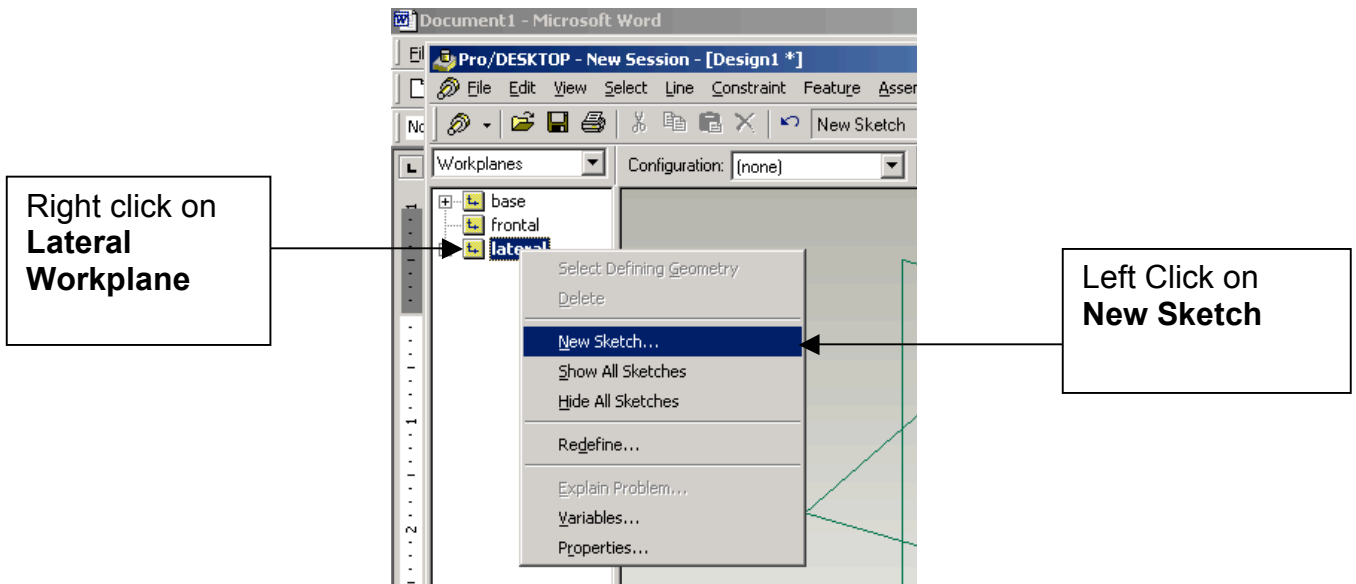
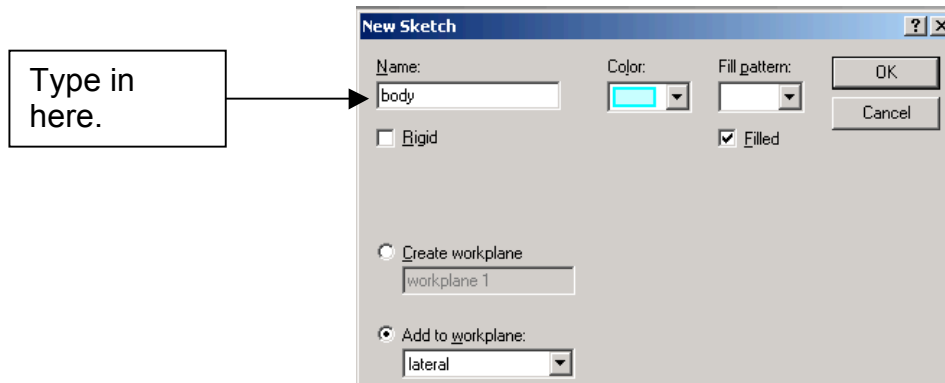


## Getting Started

1. Open up PTC Pro/Desktop by either double clicking the icon or through the Start button and in Programs.
2. Once Pro/Desktop is open select **File > New > Design**
3. Close the Pallet window that appears, and maximize the design window.
4. We need to tell the computer what unit of measurements we are going to use so.... Select **Tools > Options > Units** tab and select **Inches** in both pull down boxes.
5. We now need to tell the computer what *plane* we are going to draw in. In the **Workplane Browser** (the white section on the left hand side of the screen) right click on **Lateral** and select **New Sketch** with the left mouse button. Now the lateral Workplane should now be in red.



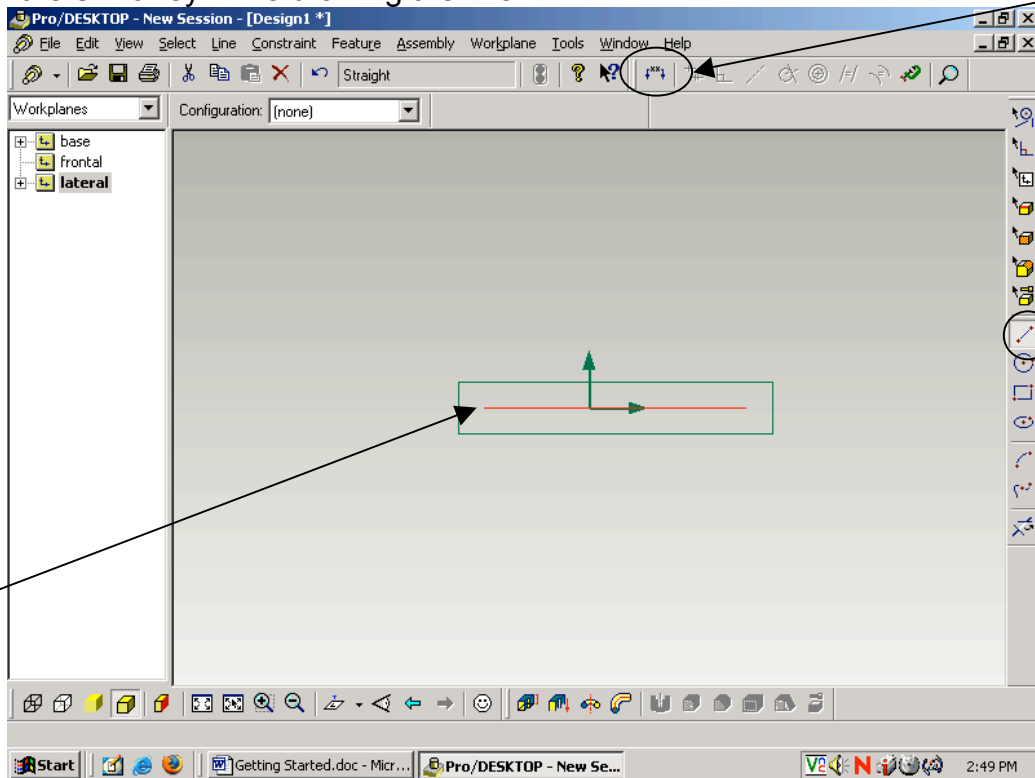
6. The **New Sketch** dialog box should appear. Pro/Desktop has you name each sketch you create. In the **New Sketch** dialog box type in **body** for the sketch name. Click **OK**.



## Drawing the Car Body

We are going to draw the outline of the car body and then *extrude* it, (in other words pull it apart) to make it three-dimensional.


1. We want to turn the screen so we can look the workplane we are drawing in (lateral). Hold the **shift** key down while pressing the **W** key once.
2. To draw a line select the **line tool** from the toolbar on the right side of the screen. Use it to draw a straight line through the green horizontal arrow in the middle of the screen. To make sure it's perfectly straight, hold down the **shift** key while drawing the line.



2. Your line should look similar to this

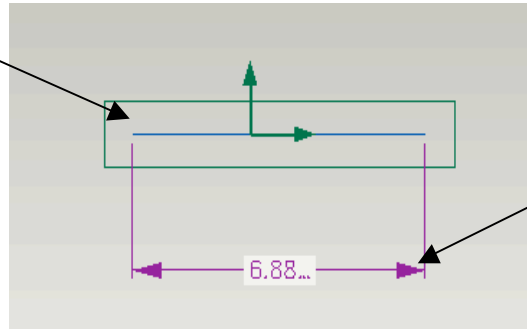
3. Sketch Dimension

2. Line tool

3. Remember your car may not be longer then 10 inches in length. To measure our line we will use the Sketch Dimension tool  found at the top of the screen. Once you select the **sketch dimension** tool, your pointer should change into a pencil.
4. With the pencil click and hold the line you just drew and move the mouse down towards the bottom of the screen. A measurement along with dimension lines should appear. When you release the left mouse button, the dimension is drawn.

Picture on next Page!!

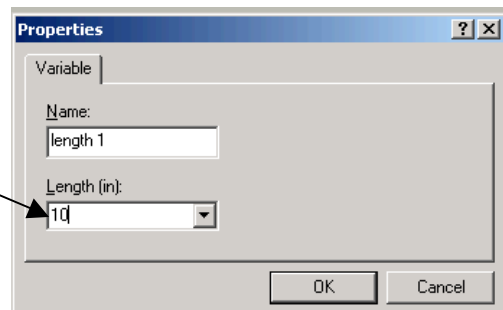
4. Select this line...



...then drag the dimension to this location.


5. Don't worry about the length, because we can now change to fit our needs! Hit escape and you will exit the sketch dimension command. (the pencil should change back to an arrow) Double click on the dimension and the properties dialog box should appear.

5. Change this number

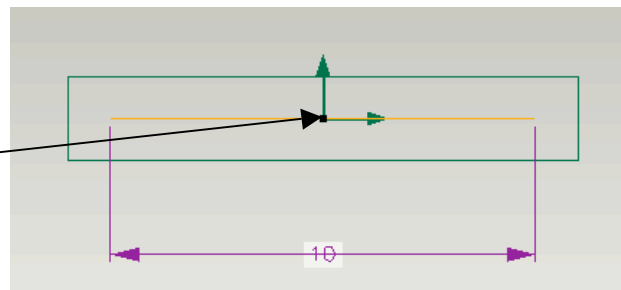


Change the length of the line to whatever the length of your car is, the line will automatically change to that measurement.

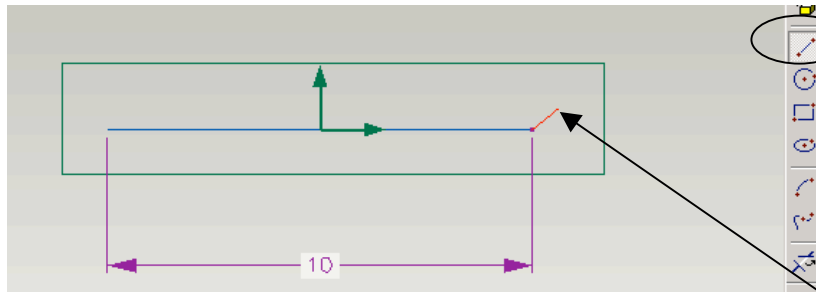
6. If you need to re-center the line on the origin point (where the two green arrows meet), follow these steps.

- A. Use the **select lines tool** from the right side of the screen.  Select your line, when you place the pointer over the line it should turn orange. Move the pointer back and forth over the line, when you reach the middle a large black square should appear, this is the midpoint of the line.
- B. Select and hold down the mouse button, you can now move the line wherever you want on the screen, drag it to the intersection of the two green arrows and drop it where they meet.

B. Drag the line from the midpoint, and drop it at the origin intersection.



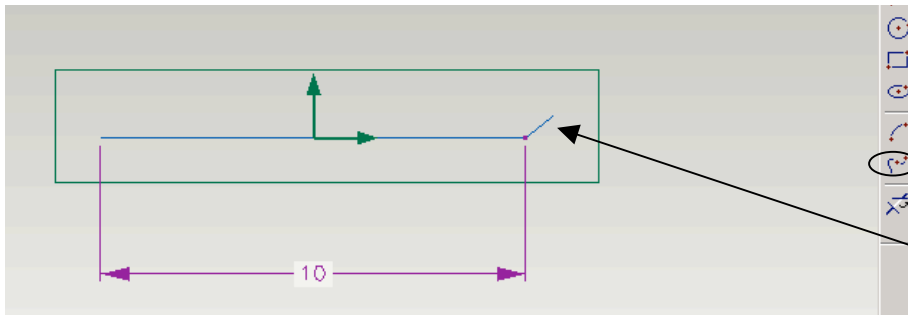
7. Use the **Straight Line** tool to draw a small “tail” on the right side of the line we have drawn.



7. **Straight Line** tool.

7. Create the “tail” here.

8. Now we will create the Profile of your car design. First select the **Spline** tool from the toolbar on the right hand side of the page. Starting at the endpoint of the “tail” we drew, you will draw the curved profile of your car design.

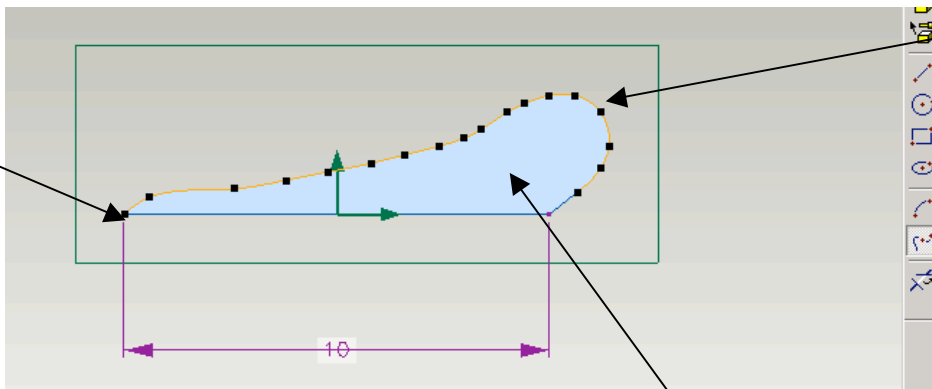


8. **Spline** tool

8. Start at the endpoint of the “tail”.

9. Draw the outline or profile of your car body in small increments to ensure accuracy. Be sure to end the profile at the front of the car, when completed the shape of your car should turn into a solid color.

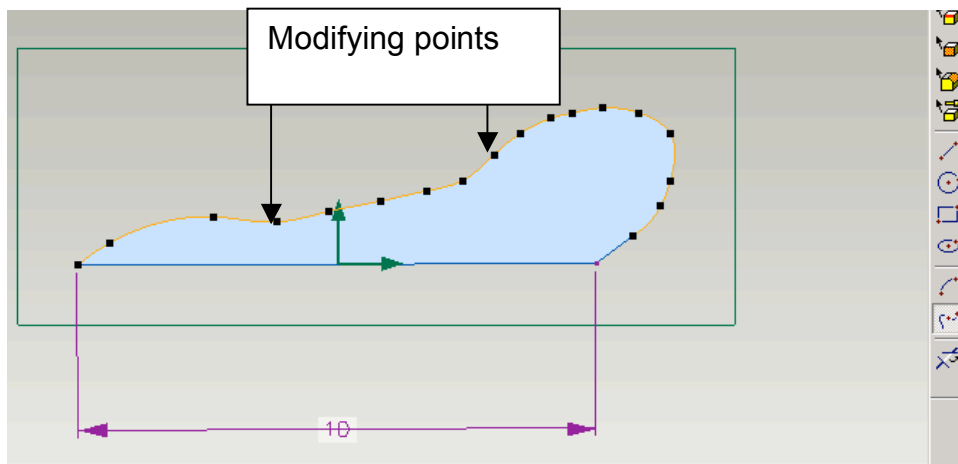
9. End here.



9. Draw the profile in small increments to keep the curves smooth.

Should be a solid color inside the profile when you are done.

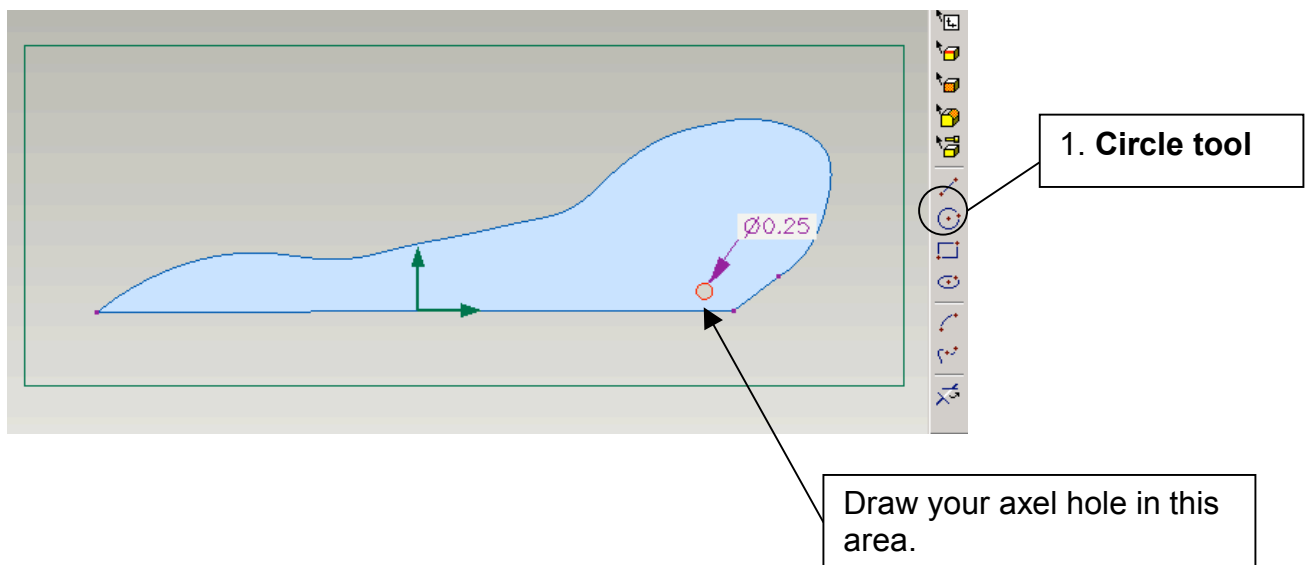
10. Not happy with your design? All the small black squares are modifying points, these can be selected and dragged to change the shape and appearance of your design. Can you see the changes I made?



### Making the Axel Holes

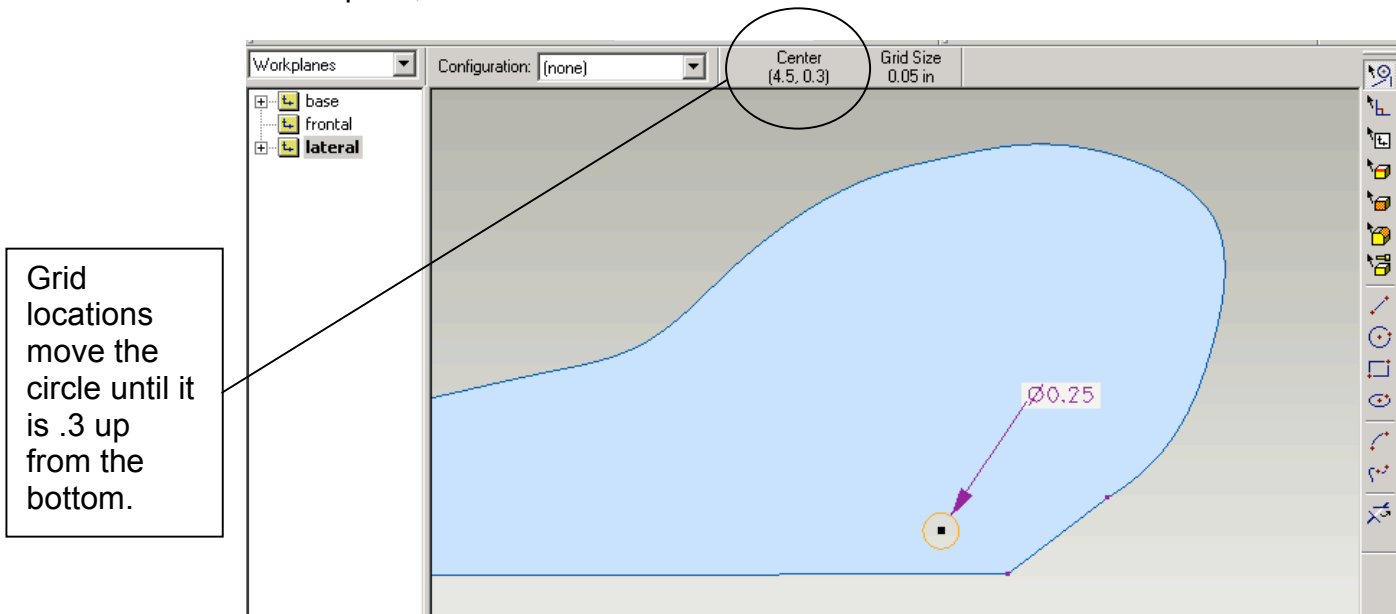
We are now going to draw the holes for our axels. To do this we are going to draw inside the profile, in the general location of where the axels should go.

1. Select the **circle** tool from the right side of the screen. Draw a small circle inside the car body towards the rear end of the car. Click and hold to begin, the further you drag the pointer out the larger the hole becomes. Once you let go of the mouse button the circle is drawn.
2. Next use the **sketch dimension** tool and select the circle to find the radius. Once you have the radius, change the radius of the circle the same way we did before.



Now we need to place the hole in the correct location on the body. We will do this by selecting and moving the hole; we are going to drag it from the center of the hole.

3. Click on the **Select lines** tools from the toolbar on the right side of the screen. Click on the hole we just made, now move the cursor towards the center of the circle until the cursor changes into four arrows in a cross shape. Click and hold down the left mouse button, you now have the circle, at the center point, free to move.



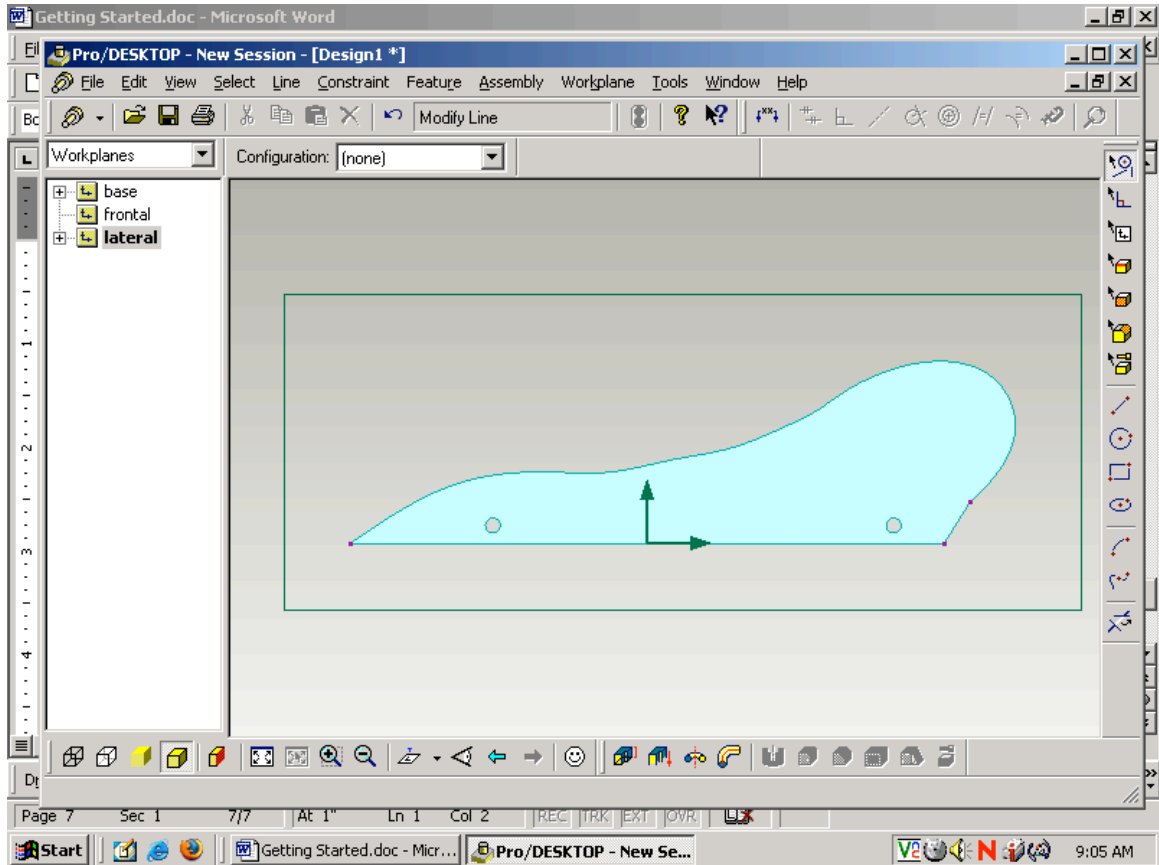
Laterally (left to right), it does not matter where the hole is located, its up to you. Vertically though, we want it placed .3 inches away from the bottom of the car. You can see the coordinate locations at the top of the screen.

4. Instead of taking the time to draw the second axel hole, let's just copy the one we already drew. Select the axel hole we just drew, it should turn red. Go to **Edit > Copy**, and then **Edit > Paste**. We just copied and passed another hole right on top of the original!

5. Now we need to move the hole towards the front of the body in a straight line. Make sure the select lines tool is selected from the top right tool bar. Move the cursor in towards the center of the circle until you see the cursor change to the **four-arrow icon**. (You may need to zoom in to do this, use the scroll wheel on the mouse to do so.) Once you see the icon click and hold down the mouse button, you can now freely move the copied axel hole.

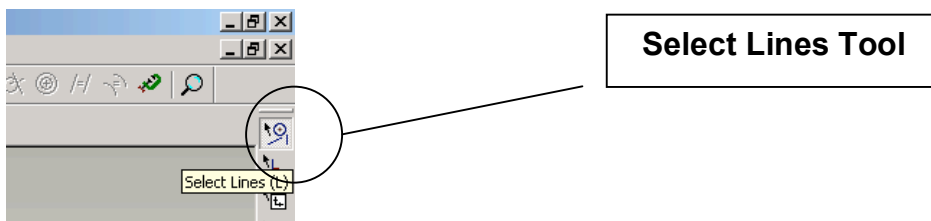
6. To make sure the copied hole is in line with the rear hole, hold down Shift while you have it selected with the mouse. This will allow you to move in a perfectly straight line. Place the hole wherever you want towards the front of the body.

Your drawing should now look similar to this:

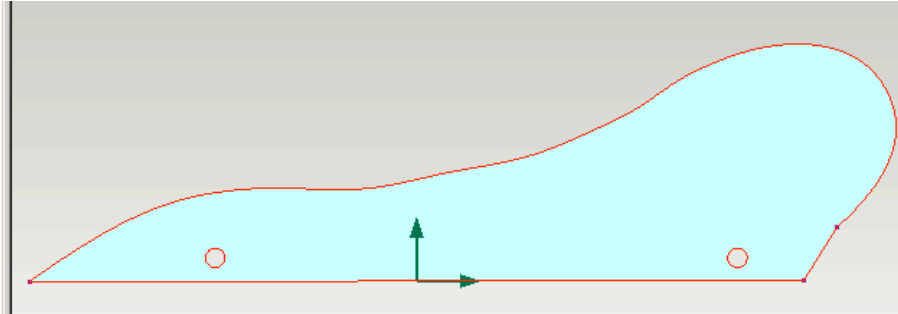


However, our drawing is still in 2-D and we need to make it three-dimensional. Here is how:

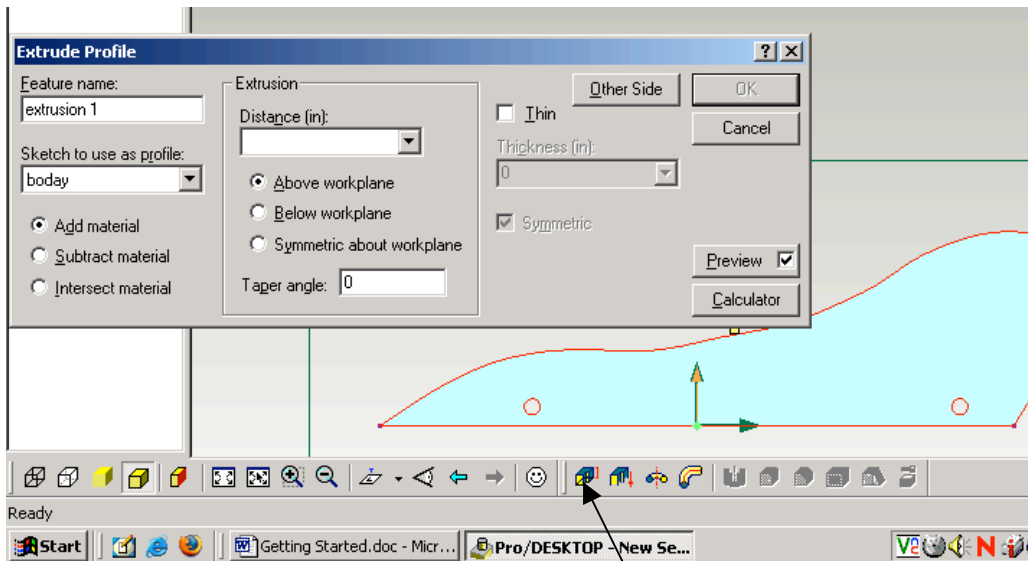
7. Click on the **Select Lines** tools from the top right of the screen.



Then click on **ALL** the lines including the axel holes, they should turn red meaning they were all selected.

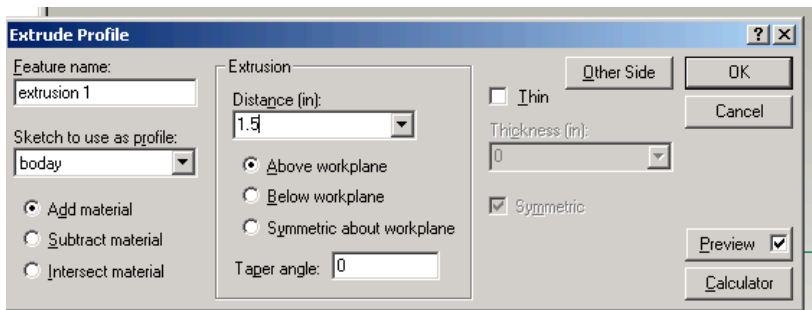


8. There are also tools on the bottom of the screen; there is where we will choose the **Extrude Profile** tool. Click on this tool and the Extrude profile dialog box will appear.

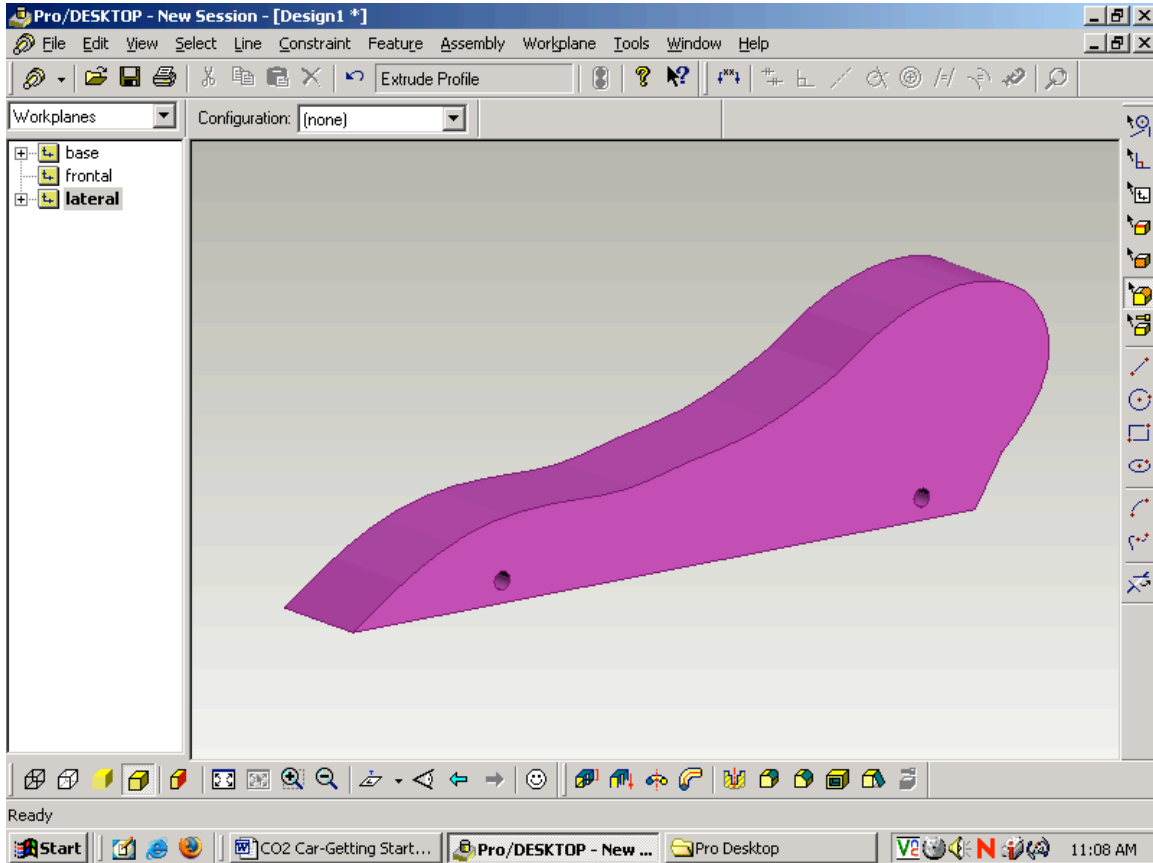


8. Extrude Profile

9. Make the selections in the dialog box so it looks like this:



Make sure these are selected: **Add Material, Above the workplane**, and the distance should be **1.5 inches**. Once that is all entered, the body should be a yellowish color. Click OK and the body will be extruded and your car body should change color.



Now go back and create the body of your CO2 car design, but with these guidelines:

- Car length must be between 6 and 10 inches.
- Axel holes will be 1/8 of an inch in diameter.
- Width of car must be 1 ½ inches.