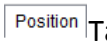
TO PLACE YOUR PICTURE INTO GEOGEBRA AND FIX IT TO THE BACKGROUND…

1. Find the picture you would like to use. Save it to your computer somewhere easy to find.
    - Crop it so that the bottom of the picture is where you would like the x-axis to go (you may not need to do this). You can use Paint or Microsoft Office 2010 (right click on the image, go down to "Open With" and select the one that you want to use).
    - Rotate the image so that it is easy to fit functions to the various curves within it. Usually, this is easier if the image is horizontal as opposed to vertical (I flipped my guitar image so that the guitar laid flat).
2. Open Geogebra and immediately save this file somewhere easy to find.
3. Place a new point where you would like the bottom left corner of your image to go using the tool under this button:  up at the top left corner on the tool bar. For most people, this will be the origin.
4. Under the menu that is second from the right (the button looks like this ), find the "Insert Image" command which has the button  . Click on the point you created in part 3. Then a menu should pop up where you will need to locate your image – find the image on your computer and select it.
5. The image should be on the screen now. Zoom in or out by pressing CTRL and "-" or "+" (or by selecting zoom in and zoom out from the last menu on the right) until the scale seems appropriate to your image. For example, with the guitar, I scaled it so that I could see 100 because I knew the guitar was about 70 cm long.
6. Now we need to fix the image at a certain size. Making sure that you have this arrow  selected on the top right, right click on your image and then click on "Object Properties." Go to the  Tab. You can fix the locations of Corner 2 (the bottom right) or Corner 4 (the top left). Just enter a point in the form of (#,#) and the picture will automatically scale to that point. Do this to scale your picture to the exact right size and then fix it.

Now, going back to the screen, notice if you move it left or right or zoom in and out, the picture scales and moves with the axes, which is exactly what we want.

FITTING A POLYNOMIAL TO A CURVE…

1. Let's say you have a nice curvy area that you want to fit a polynomial to. First you need to make points along the curve in key parts. Using the new point tool  up at the top left, click along the curve at the various parts you want to include. Note that it works best if you include maxima and minima.

2. Next, make a "list" out of these points so that we can fit a polynomial to them. In the Input Bar at the bottom of the screen, type something in this format:

   LISTNAME = {#,#,#,#,…,#}

   where # are the names of points and LISTNAME is the name of the list. For example, if you want to do the top of the guitar and include points B,G,F and K, type this:

   GUITARTOP = {B,G,F,K}

   It's good to name your lists things that you can remember and pick out later.

3. Now you can fit a function to this group of points. You can fit polynomial, exponential, logistic, logarithmic, power and sine curves – polynomials will probably work for mostly everything you want to do. In the Input Bar, type something in this format:

   FitPoly[LISTNAME,#]

   Where # is the degree of the polynomial. For example, if you want to fit a cubic function to the points lining the top of the guitar, type this:

   FitPoly[GUITARTOP,3]

   You can make adjustments after you have the curve on there. First, you can move the points around to get a better fit. Second, you can change the degree of the polynomial. Just find the new function you created in the list on the left side of the screen and double click. You will get a screen showing you how the function is defined. Just change the number to a new one and click apply to see the new result.

FITTING A LINE TO A STRAIGHT PART…

1. Let's say you have a nice straight part you want to fit a line to. Using the create a line command right next to the create a point command  , either select two existing points that you may have already created or just click two points along the line and a line will be created.
2. Find the new line you just created in the algebra list on the left. You will notice that it is defined a little funny, something that might like kind of like this: 1.01032x + 3.31765y = 19.2397. We need to turn this into a format we're more comfortable with. Right click on

the function and select "Equation y = mx + b" to turn it into an equation that is solved for y.

3. We're almost there – now in order to be able to use this in later steps we need to create a new function (instead of a geometric object) with the same equation. Right click on the new equation and select "Copy to Input Bar." You should have something like this:

   y = -0.30453x + 5.79919

   Now simply define a new function by changing the y into something like f(x), for example turning the above expression into

   k(x) = -0.30453x + 5.79919.

   Be really careful not to a letter that you have already used! It will mess everything up! Now we have a line function that we can use in later steps.

FINDING INTEGRALS AND ADDING THEM UP…

1. Now you need to start shading in your picture. To find a normal integral (the area between a curve and the x-axis) type something of this format:

   Integral [function, a ,b]

   where function is the name of the function you are using and a and b are the endpoints. For example, if you are looking for the area under the function p(x) between x = 2 and x = 5, put

   Integral [p(x), 2, 5]

   Note that this shades in the integral and shows a label.

2. To find the area between two different curves (and to shade that area in!), type something of this format:

   Integral [function1, function2, a, b]

   where function1 is the top function, function2 is the bottom one and a and b are the endpoints. For example, if you are looking for the area between the functions p(x) and q(x) between x = -1 and x = 7, write

   Integral [p(x), q(x), -1, 7]

3. To add up the total of all the integrals you made… Notice that the new integrals you made are all labeled, probably with lowercase letters. To add up the integrals, simply define a new object to be the sum of the integrals by typing

   total = # + # + … + #

   where each # sign is an integral name. For example, if you are adding integrals m,n,o and p, type

   total = m + n + o + p

FINISHING TOUCHES…

1. CHANGE COLORS: Right click on the integral object in the algebra view on the left. Select "Object Properties" and then go to the color tab to change the color.

2. HIDE UNWANTED OBJECTS: You can easily hide all the points and lines now that you have made your integrals with them by unchecking the buttons next to all the items in the algebraic view on the left hand side of the screen.

3. SHOW/HIDE PICTURE CHECKBOX: To have a checkbox that will make the picture appear and disappear, click on  this button in the same menu as the insert image button, which is called "Check Box to Show /Hide Objects".
    a. Click wherever you want to make the check box.
    b. In the Caption slot, type what you want the check box to say.
    c. Select "image1" or whatever you image is titled from the list and click Apply.

4. DISPLAY THE TOTAL: To display the total area you need to insert some text. Click on the Insert Text button 

in the same menu as the picture button. Type the following into the input bar to display the total:

    "Total Area = " + total + " cm²"

    Note that if you named your total differently, you will have a different name there.