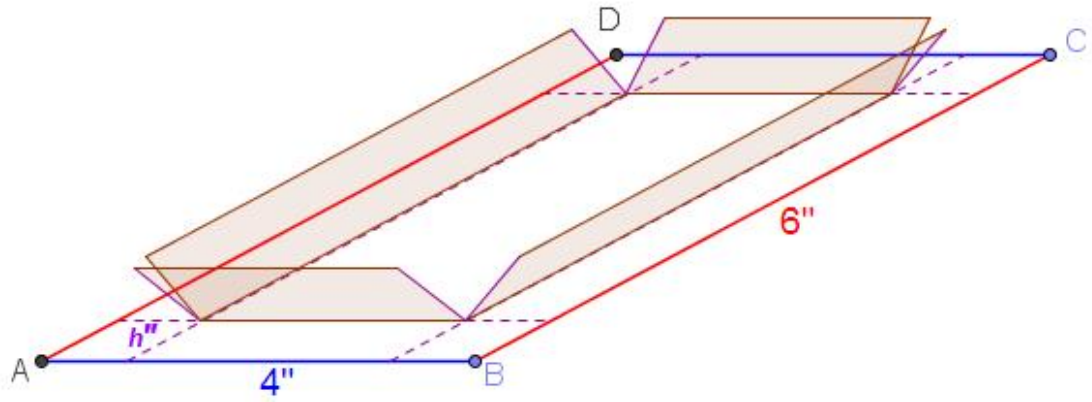
Box Folding Problem – Maximizing Volume of a Cubic Graphically

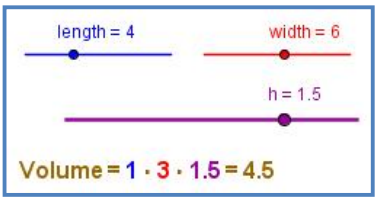
Statement of the Problem: A piece of cardboard is rectangular with length=4" and width=6". We cut out an *h*" square from each corner and fold up the side to form a box. What length should *h* be to maximize the volume of the box?



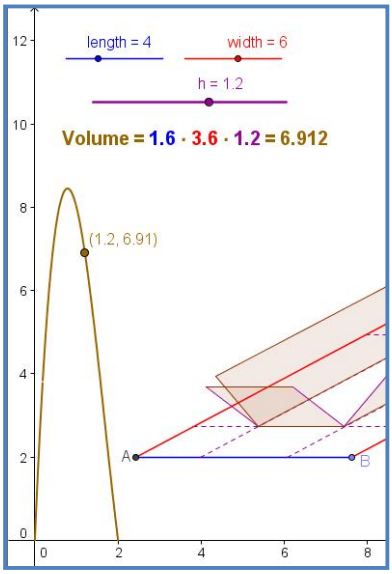
Open the Activity (Online or Download for School Zip or Download Offline Zip)

"Explain." means you should explain *in full sentences in your own words* what is happening.

1. Play with the Box Open/Close green slider - move it back and forth. Does the volume of the Box change? Explain.
2. Change the simulation to display the following screenshot (length =4'', width = 6'' and h=1.5''). We know that volume of a Box is length*width*height. We also know that 4*6*1.5=32 so why is the volume 4.5 in^3. Explain.



3. In the previous example: length =4'', width = 6'' and h=1.5''. Check again that the length =4'', width = 6'' and now move the slider h. Notice what happens to the yellow dot on the function. See picture. Notice that the two numbers by the dot on the yellow curve. What do these numbers mean? What does this yellow curve show? In the screenshot at right, the numbers are (1.2, 6.91) and the Volume=6.912. Is there a connection? Explain.



4. How can we use the yellow curve to find the largest volume of the Box? What do the coordinates at this point say to you? Explain
5. Explain how to find a function for the volume of a box made by cutting *h*" squares from each of the corners of a sheet of paper with dimensions 8"X16". Try to be as clear as you can and imagine you must explain it to a fellow student who is not that good at mathematics. Do not just write down the function. Now use the simulator to find the Box with the largest volume from this paper. What is h and what is V?