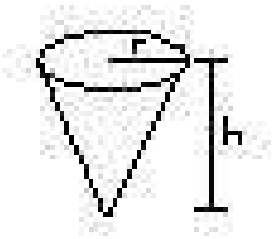
Example Consider a conical tank. Its radius at the top is 4 feet, and its 10 feet high. Its being filled with water at the rate of 2 cubic feet per minute. How fast is the water level rising when it is 5 feet high?
Here is a rough sketch of the tank



First note that we are given $r_{top} = 4$ and $h_{full} = 10$. Also $\frac{dV}{dt} = 2ft^3/min.$ We are asked to find the rate of change in the height of the water so we want to find $\frac{dh}{dt}$ when $h = 5$. Since we are given the derivative of the water's volume it is a good idea to use the Conics Volume= $\frac{1}{3}\pi r^2 h$ formula as the "connection" equation. One problem with it is that we have two variables r and h that are changing with time on the right hand side of the equation. So if we take the derivative we will have both $\frac{dh}{dt}$ and $\frac{dr}{dt}$ popping up and they are both unknown. We need to figure out either how to find $\frac{dr}{dt}$ or write r in terms of h before doing the differentiation so we have only one variable to deal with. I'll go with writing r as a function of h as the other option will require me to do this anyways.To achieve this we need to draw the two-dimensional cross-section of this tank. We will use the letters r and h to represent the variable radius and height of the water at any level. We can find the relationship between r and h from figure below using similar triangles