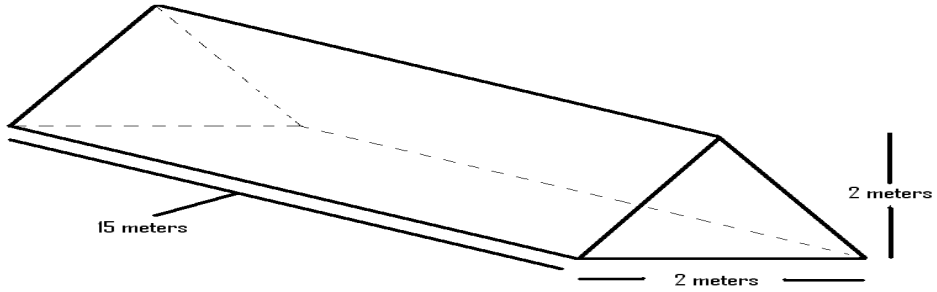
2. [7 points] Deep beneath Dennison Hall lies a large septic tank. It has the shape of a triangular prism with the dimensions depicted below.



Suppose that the tank described above is full of sewage and that this sewage has a density of $1000(1+e^{-2x})\ \frac{kg}{m^3}$, where x is the distance in meters above the base of the tank.

a. [5 points] Find a definite integral that computes the mass of the sewage in the tank.

Solution:
Slice dimensions: $2-x$ by 15 by Δx.
Hence

$$m = \int_0^2 \delta(x)(2-x)(15)dx = \int_0^2 1000(1+e^{-2x})(2-x)(15)dx$$

b. [2 points] Compute the value of the integral using your calculator. Do not forget to include the units.

Solution:

$$m = \int_0^2 1000(1+e^{-2x})(2-x)(15)dx = 41318.78\text{kg}$$