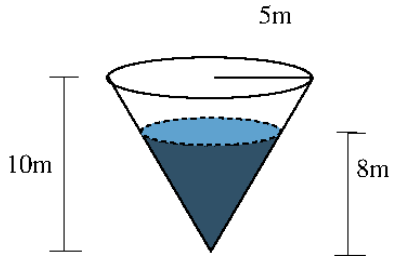
Section 6.4: Additional Problems

1. Suppose that 4J of work is needed to stretch a spring from its natural length of 25cm to a length of 37cm. How far beyond its natural length will a force of 30N keep the spring stretched.

2. Suppose a spring has a natural length of 3 ft and it takes 10 ft-lb to stretch it from 5 ft to 8ft.
   (a) How much work is required to stretch the spring from 4 ft to 7 ft?
   (b) How far beyond its natural length would a force of 3 lb keep the spring stretched?

3. A bucket that weighs 8 lb and a rope that weighs 3 lb/ft are used to draw water from a well that is 70 ft deep. The bucket is filled with 60 lb of water and is pulled up at a rate of 2 ft/s, but water leaks out of a hole in the bucket at a rate of 0.4 lb/s. Find the work done W in pulling the bucket to the top of the well.

4. A tank in the shape of a right circular cone of radius 5m and height 10m contains water in it to a depth of 8ft. How much work is done in pumping the water out over the top?



5. A Hemispherical tank has the shape shown below. The tank has a radius of 10 meters with a 2 meter spout at the rope of the tank. The tank is filled with water to a depth of 7 meters. The weight density of water is $\rho g = 9800$ N/m^3.

   Set up an integral that will compute the work required to pump all of the water out of the spout. Indicate on the picture where you are placing the axis and which direction is positive.