

## Example Test Questions – Physics 151

1. The Super-Kamiokande neutrino detector in Japan is a large transparent cylinder filled with ultra pure water. The height of the cylinder is 41.4m and the diameter of the cylinder is 39.3m. Calculate the mass of the water in the cylinder. The density of water is  $\rho = \frac{1g}{1cm^3}$ .
2. A car moving with constant acceleration covered the distance between two points 60.0m apart in 6.00s. Its velocity as it passed the second point was  $15.0m/s\hat{i}$ .
  - (a) What is the car's speed at the first point?
  - (b) What was the magnitude of the acceleration?
  - (c) At what prior distance from the first point was the car at rest?
  - (d) Graph  $x$  versus  $t$  and  $v$  versus  $t$  for the car, from the time it was at rest to the time its velocity was  $15.0m/s\hat{i}$ .
3. The position of a molecule undergoing diffusion is given by  $x = D\sqrt{t}$ 
  - (a) What are the units of  $D$ ?
  - (b) What is the velocity of the molecule?
  - (c) What is the acceleration of the molecule?
  - (d) Is the molecule speeding up or slowing down at  $t = 8s$ ? How can you tell?
4. A lamp hangs vertically from a cord in a descending elevator that slows down at  $2.4m/s^2$ 
  - (a) If the tension in the cord is  $89N$ , what is the lamp's mass?
  - (b) What is the cord's tension when the elevator ascends with an upward acceleration of  $2.4m/s^2$ ?