

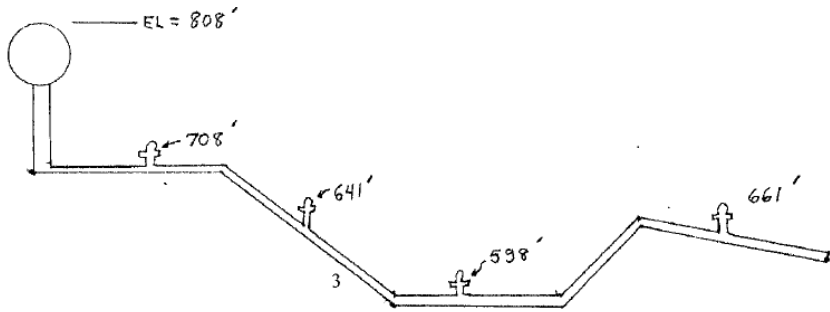
The objective of this laboratory unit is to illustrate the hydrostatic relationship between elevation and pressure and provide practice for the student in applying basic hydrostatic principles as well as re-emphasize fluid basics and fundamental concepts.

The following exercises are to be completed and submitted by the end of this period.

1. Find the following:

- A. Volume of a cube (in cubic feet and gallons) that is 15 ft. on each side?
  
  
  
  
  
- B. Number of gallons in 10,000 cu. ft?
  
  
  
  
  
- C. Number of cubic feet in 500,000 gal?
  
  
  
  
  
- D. Volume in gallons, cubic ft. and liters of a cylinder 8 ft. in diameter and 40 ft. high?
  
  
  
  
  
- E. Volume of water in gallons in a spherical elevated storage tank with a diameter of 20 ft.
  
  
  
  
  
- F. If the metal composing the spherical storage tank from Part E weighs 3 tons, how much total weight in pounds must the legs be able to support?
  
  
  
  
  
- G. What pressure in pounds per square foot will be exerted below a cubic foot of water?
  
  
  
  
  
- H. If water exists in a rectangular container to a height of 10 ft., what total force is being exerted on the bottom of the container if it measures 15 ft x 20 ft?

- At the indicated sea level elevations, determine the static pressure that would exist at each hydrant if the tank were full.



- Determine the theoretical height to which water may be lifted if the vacuum gauge reading is 15 inches of mercury.
- Four hundred and fifty gallons of water are placed in a cylindrical container whose diameter is 60 inches. What is the pressure exerted in pounds per sq. in. at the bottom of the tank?
- A column of water 96 feet high is exerting a back pressure on the interior surface of a clapper valve in a standpipe Siamese connection. The interior surface of the clapper has a diameter of  $2\frac{7}{8}$  inches. The exposed exterior surface of the clapper has a diameter of  $2\frac{1}{2}$  inches. What pressure, in pounds per sq. inch, would it be necessary to apply to the exterior surface to counteract the force created by the back pressure?

6. If an elevated storage tank is 78 feet high:
  - a. What ground level static pressure will be created by the tank if the tank is full and holds 40,000 gallons?
  
  
  
  
  
  
  
  - b. What ground level static pressure will be created by the tank if the is full and holds 400,000 gallons?
  
7. If an industrial facility is located 64 feet above the sea, what pressure must the pumps at sea level be able to generate in order to maintain a static pressure of m100 psi in the fire mains at the facility? Assume that the pumps are pumping sea water.
  
  
  
  
  
  
  
8. To what height, in a high rise office building standpipe, could a fire department pumper rated at 150 psi deliver water?
  
  
  
  
  
  
  
9. The pressure at the outlet of a hydrant has been recorded from a gauge which reads 125 psi. How high above the hydrant outlet is the water level in the storage tank supplying this hydrant? (It is assumed that no water is flowing.)
  
  
  
  
  
  
  
10. A water storage tank with a vertical height of 59 feet is filled to capacity. What is the pressure at the bottom of the tank?
  
  
  
  
  
  
  
11. What is the static pressure measured at a hydrant located 120 feet lower than the top of the tank from Problem 10 and connected to the tank by an 8" main?