

LESSON 6: PUMPING LIQUIDS

Objective: To compute the work required in moving a liquid

Pumping Liquids

$$W = \delta \int_0^y (\text{Area of Cross-section})(\text{Height})dy,$$

where δ is the density of the liquid.

The density of water is 62.4 lbs./cu. ft.

Examples

1. A cylindrical water tank 12 feet high with a radius of 8 feet is located on a tower so that the bottom of the tank is 20 feet above the level of the stream. How much work is done in filling the tank half full of water through a hole in the bottom, using water from the stream?
2. A tank in the shape of a right circular cone is full of water. If the height of the tank is 15 feet and the radius of its top is 5 feet, find the work done in pumping the water a) over the edge of the tank and b) to a height of 10 feet above the top of the tank.
3. The vertical end of a tank is shown. The tank is 10 feet long and full of water. The water is to be pumped to a height of 5 feet above the tank. Find the work done in emptying the tank.

