

MA 114 Worksheet # 13: Work

1. Conceptual Understanding:
 - (a) Define and describe work. What are its units? What is the difference between work and force?
 - (b) Determine the work done in lifting a 1 kg weight through a distance of 1 m near the surface of the earth, maintaining a constant velocity.
 - (c) How much work is done in lifting a 1 kg weight up 1 m at a constant velocity and then lowering it back 1 m at a constant velocity?
 - (d) Derive the formula for the volume of a sphere using cylindrical shells.
2. Determine the work done in lifting a 500 kg elevator 1000 m to the top floor of a building, maintaining a constant velocity. How much work is done lowering a 500 kg elevator 1000 m from the top floor of a building to the ground floor, maintaining a constant velocity? How much work is done making the round trip?
3. A force of 15 N is required to keep a spring stretched a length of 50 cm beyond its natural length. How much work is done in stretching the spring to a length of 1 m beyond its natural length?
4. A force of 50 N holds will stretch a spring from its natural length of 5 cm to 15 cm. How much work will be done in stretching the spring from 15 cm to 30 cm?
5. Consider a rectangular tank of water that is 5 meters tall and has a base of size 8×4 meters. It has a spout on its top surface. Calculate the work required to pump all of the water out of the tank. Dimensions are in meters, and the density of water is 1000 kg/m^3 .