

8.5: Applications to Physics: Work

Calculus II

Spring 2021

College of the Atlantic

1. How much work is required to lift a 20 kg object up 2 meters?
2. A three meter long rope is dangling over a cliff. The density of the rope is 0.08 kg/m.
 - (a) What is the mass of the rope?
 - (b) How much work is required to lift the rope so is it on the edge of the cliff?
3. Consider a cylindrical container with a height of 2 meters and a radius of 0.5 m. Suppose it is filled up with water. How much work would be required to pump the water out of the cylinder?
4. Repeat the above problem for the case where the cylinder is half full with water.
5. Suppose you have at your disposal an amount of energy equal to half of the energy you calculated in Problem 3. How much water could you pump out of the tank with this amount of energy?

A few useful facts:

- $g = 9.8 \text{ m/s}^2$
- Density of water: $\rho = 1000 \text{ kg/m}^3$