Innovation and Entrepreneurship

General Physics

Mechanical Energy Module – Homework Problems

01: Suppose you are able to apply 200 W of power to a human-powered pump. What volume of water will you be able to lift a vertical distance of 20 m in 4.0 hours if the pump is 80% efficient in converting your work into gravitational energy of the water?

02: If you supply 200 W of power to a human-powered pump for 4.0 hours, approximately how many Calories will you “burn”? Note that a food calories (Cal) is equal to 4184 Joules and also note that human muscle is about 25% efficient in converting food energy into useful work.

03: Use the web to find an approximate value for the power provided by sunlight falling on a square meter of surface area. Also find an approximate value for the efficiency of solar panels and use this to determine the required area of a solar panel if it is to provide 200 W of power.