

Name: \_\_\_\_\_ Date: \_\_\_\_\_

28. A certain rain cloud at an altitude of 1.75 km contains  $3.20 \times 10^7$  kg of water vapor. How long would it take a 2.70-kW pump to raise the same amount of water from the Earth's surface to the cloud's position?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

30. **Q.C** The electric motor of a model train accelerates the train from rest to  $0.620 \text{ m/s}$  in  $21.0 \text{ ms}$ . The total mass of the train is  $875 \text{ g}$ . (a) Find the minimum power delivered to the train by electrical transmission from the metal rails during the acceleration. (b) Why is it the minimum power?

Name: \_\_\_\_\_

Date: \_\_\_\_\_

33. An energy-efficient lightbulb, taking in 28.0 W of power, can produce the same level of brightness as a conventional lightbulb operating at power 100 W. The lifetime of the energy-efficient bulb is 10 000 h and its purchase price is \$4.50, whereas the conventional bulb has a lifetime of 750 h and costs \$0.42. Determine the total savings obtained by using one energy-efficient bulb over its lifetime as opposed to using conventional bulbs over the same time interval. Assume an energy cost of \$0.200 per kilowatt-hour.