7.39 A man with mass 70.0 kg sits on a platform suspended from a movable pulley, as shown in Fig. 7.29, and raises himself at constant speed by a rope passing over a fixed pulley. The platform and the pulleys have negligible mass. Assume that there are no friction losses. a) Find the force he must exert. b) Find the increase in the energy of the system when he raises himself 1.20 m. (Answer by calculating the increase in potential energy and also by computing the product of the force on the rope and the length of the rope passing through his hands.)

Answer:
(a) \( F = 229 \text{N} \)
(b) \( \Delta E = \Delta U_g = 823 \text{J} \)

7.47 A 2.0-kg piece of wood slides on the surface shown in Fig. 7.33. The curved sides are perfectly smooth, but the rough horizontal bottom is 30 m long and has a kinetic friction coefficient of 0.20 with the wood. The piece of wood starts from rest 4.0 m above the rough bottom.

(a) Where will this wood eventually come to rest? b) For the motion from the initial release until the piece of wood comes to rest, what is the total amount of work done by friction?

Answer:
(a) After moving 20 m of rough bottom
(b) Work_{\text{friction}} = -78.4 \text{J}

7.55 A system of two paint buckets connected by a lightweight rope is released from rest with the 12.0-kg bucket 2.00 m above the floor (Fig. 7.36). Use the principle of conservation of energy to find the speed with which this bucket strikes the floor. You can ignore friction and the inertia of the pulley.

Answer: 4.4 m/s