**Worksheet 4.2 Power and Efficiency**

1. How much work can a 5.00 hp motor do in 10.0 min? (1 hp = 750 Watts)
2. A 60.0 kg boy runs up a flight of stairs 3.32 m high in 2.60 s. What is his power output in watts?
3. How long would it take a 5.0 hp motor to lift a 500.0 kg safe up to a window 32.0 m above the ground?
4. A 45.0 kg student runs at a constant velocity up the incline shown. If the power output of the student is 1.50 x 103 W, how long does it take the student to run the 9.0 m along the incline?

9.0 m

6.0 m

1. A 20.0 kg object is lifted vertically at a constant velocity 2.50 m in 2.00 s. Calculate the power output of the student.
2. A 2.00 kg object is accelerated uniformly from rest to 3.00 m/s while moving 1.5 m across a level frictionless surface. Calculate the power output.
3. An 8.5 x 102 kg elevator is pulled up at a constant velocity of 1.00 m/s by a 10.0 kW motor. Calculate the efficiency of the motor.
4. A 5.0 kg object is accelerated uniformly from rest to 6.0 m/s while moving 2.0 m across a level surface. If the force of friction is 4.0 N, calculate the power output.
5. A 5.00 x 102 W electric motor lifts a 20.0 kg object 5.00 m in 3.50 s. What is the efficiency of the motor?
6. If a 1000. W motor has an efficiency of 82%, how long will it take to lift a 50.0 kg object to a height of 15.0 m.

Answers:

1. (2.25 x 106 J)
2. (751 W)
3. (42 s)
4. (1.8 s)
5. (245 W)
6. (9.0 W)
7. (83%)
8. (1.5 x 102 W)
9. (56%)
10. (8.96 sec)