PS Chapter6

1. How much work is done by the gravitational force when a 280-kg pile driver falls 2.80 m?

2. Estimate the work you do to mow a lawn 10 m by 20 m with a 50-cm wide mower. Assume you push with a force of about 15 N.

3. What is the dot product of
$$\vec{A} = 2.0x^2\hat{i} - 4.0x\hat{j} + 5.0\widehat{k}$$
   and
$$\vec{B} = 11.0\hat{i} + 2.5x\hat{j}?$$

4. How much work is required to stop an electron
$$(m = 9.11 \times 10^{-31} \text{ kg})$$
   which is moving with a speed of
$$1.40 \times 10^6 \text{ m/s}?$$

5. An 85-g arrow is fired from a bow whose string exerts an average force of 105 N on the arrow over a distance of 75 cm. What is the speed of the arrow as it leaves the bow?

6. A spring has a spring constant k of 820 N/m. How much must this spring be compressed to store 35.0 J of potential energy?

7. A 56.5-kg hiker starts at an elevation of 1270 m and climbs to the top of a 2660-m peak.
   (a) What is the hiker's change in potential energy?

(b) What is the minimum work required of the hiker?
(c) Can the actual work done be greater than this? Explain.

8. A novice skier, starting from rest, slides down a frictionless 13.0° incline whose vertical height is 125 m. How fast is she going when she reaches the bottom?

9. Two railroad cars, each of mass 56,000 kg, are traveling 95 km/h toward each other. They collide head-on and come to rest. How much thermal energy is produced in this collision?

10. How long will it take a 1750-W motor to lift a 335-kg piano to a sixth-story window 16.0 m above?