

6. ENERGY: *You Can't Get Ahead–*

Answers to conceptual exercises

5. Left hand does $2 \times 1.5 = 3$ joules of work, right hand does $4 \times 0.5 = 2$ joules of work. So the left hand does the most work, although the right hand exerts the largest force.
10. Gravitational, chemical, elastic, radiant, kinetic, thermal
18. (a) 1000 km high. (b) Increased. (c) At the lower altitude, 6000 km, even though the satellite's *energy* is larger at 12,000 km.
36. It is moving slowest at 500 m, and fastest at 600 m.
49. To answer this, perform a calculation similar to Exercise 47 for each appliance used in your home, getting the number of kW•h of electric energy consumed by each appliance during one month. Then add up all of the appliances.

Answers to problems

5. At twice the speed, you would slide 4 times as far. The reason: Your car has 4 times as much kinetic energy, so it will do 4 times as much work in coming to rest, so it must exert its sliding frictional force over 4 times as much distance (remember $W = Fd$) in coming to rest. Similarly, at half the speed you would have only 1/4 as much kinetic energy (because 1/2 squared is 1/4) and so you would slide only 1/4 as far.

7. SECOND LAW OF THERMODYNAMICS:

–and You Can't Even Break Even

Answers to conceptual exercises

8. Yes; an example is burning a match. No; the second law prohibits it.
22. No, because the pan of water is not an isolated system; it is in contact with the atmosphere, which removes thermal energy.
30. $30 \text{ people} \times 200 \text{ km} / 300 \text{ liters} = 20 \text{ passenger}\cdot\text{km} / \text{liter}$.
34. According to Figure 7.20, the overall efficiency is $900 / 2500$, or 36%. Thus 36 tons go to electricity, while 64 tons are wasted as exhaust thermal energy.

Answers to problems

14. $T = 70/P = 70 / 0.8 = 87$ years (US), $70 / 2.2 = 32$ years (Mexico), $70 / 4.2 = 17$ years (Kenya).

