

Solutions to Period 2 Exercises

E.1 Which energy conversion is involved in the process of photosynthesis?

- a) nuclear energy to thermal energy
- b) electrical energy to thermal energy
- c) radiant energy to chemical energy
- d) mechanical energy of motion to radiant energy
- e) chemical energy to electrical energy

E.1 = c

E.2 Which of the following devices is gaining gravitational potential energy?

- a) a train climbing a hill
- b) a train coming down a hill
- c) a boy riding a bicycle on level ground
- d) a boat falling over a waterfall
- e) a capacitor being charged

E.2 = a

E.3 Friction is a process by which energy of some other form is converted into

- a) visible radiant energy.
- b) nuclear energy.
- c) thermal energy.
- d) gravitational energy.
- e) chemical potential energy.

E.3 = c

E.4 Richard raises a block of metal to a height of 6 feet off the floor and releases it. The block falls to the floor and comes to rest. Considering both Richard and the block, the series of energy conversions that occur in this sequence of events are, respectively,

- a) thermal, mechanical, chemical, gravitational, and mechanical.
- b) chemical, mechanical, gravitational, mechanical, and thermal.
- c) mechanical, gravitational, chemical, thermal, and radiant.
- d) gravitational, thermal, chemical, mechanical, and gravitational.
- e) chemical, radiant, mechanical, gravitational, and thermal.

E.4 = b

- E.5** When you wind up a spring, you convert stored chemical energy in your muscles into mechanical energy of motion into
- a) strain potential energy of the spring.
 - b) nuclear energy of the spring.
 - c) gravitational potential energy of the spring.
 - d) chemical potential energy of the spring.
 - e) none of the above are correct.

E.5 = a

- E.6** Which statement regarding energy conversion processes is TRUE ?
- a) A clever person can design a machine that operates with no wasted energy.
 - b) Because of the thermal energy involved, the conversion of electrical energy into radiant energy produces more radiant energy than electrical energy used in the conversion process.
 - c) The efficiency of energy conversion processes is less than one.
 - d) The efficiency of an energy conversion process equals the useful energy out divided by the wasted energy.
 - e) None of the above statements is true.

E.6 = c

E.7 An energy conversion process requires two steps. In the first step, 1,000 joules of energy are required to produce 750 joules of useful energy out. In the second step, 1,000 joules of energy are required to produce 250 joules of useful energy out. What is the overall efficiency of the conversion process?

- a) 5%
- b) 19%
- c) 30%
- d) 50%
- e) 100%

$$\text{Step \#1: Eff} = \frac{\underline{750 \text{ joules}}}{\underline{1,000 \text{ joules}}} = 0.75$$

$$\text{Step \#2: Eff} = \frac{\underline{250 \text{ joules}}}{\underline{1,000 \text{ joules}}} = 0.25$$

$$\text{Overall Eff} = 0.75 \times 0.25 = 0.19 = \mathbf{19\%}$$

E.7 = b

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$$\mathbf{E.1 = c}$$

$$\mathbf{E.2 = a}$$

$$\mathbf{E.3 = c}$$

$$\mathbf{E.4 = b}$$

$$\mathbf{E.5 = a}$$

$$\mathbf{E.6 = c}$$

$$\mathbf{E.7 = b}$$