

## Sample Lesson B

### Transformation of energy

In previous lessons we have mentioned that new energy cannot be created. In addition, energy cannot be destroyed. These facts come together to form the **Law of Conservation of Energy**: energy cannot be created or destroyed. But if energy can't be created, then where does it come from? For that matter, where does the energy that we use go? In the course of being used, energy changes form. Sometimes energy can change form many times.

For our first example, let's consider you riding a bike. The energy in your body comes from the chemical energy in the food you eat. As you move your muscles, the chemical energy is converted to the kinetic energy of your muscles moving. You push down on the bike's pedals, which cause the bike to move, converting your kinetic energy to the bike's mechanical energy. Eventually, wanting the bike to slow down, you apply the brakes. As the brake pads press on the bike wheel, the wheel's kinetic energy is converted to thermal (heat) energy as the bike comes to a stop.



Another example of energy transformations would be the lighting of a light bulb. Let's start with the fossil fuels at the power plant. These contain chemical energy. As we have learned, this chemical energy is converted into mechanical energy by turning a turbine, which is then converted to electrical energy inside the generator. At your home, this electrical energy runs through the light bulb. As the electrical energy encounters the resistance of the light bulb's filament, the energy is converted into light and heat.



Changing potential energy into kinetic energy is another type of energy transformation. Consider a roller coaster sitting at the top of its highest hill. At the very top of the hill, the roller coaster has no kinetic energy because it isn't moving, but it has a great deal of potential energy because it is very high up in the air! As gravity pulls the roller coaster toward earth, the potential energy begins to convert into kinetic energy. The more potential energy the roller coaster releases, the more kinetic energy it gains. In other words, the further toward earth the coaster travels, the faster it goes. At the bottom of the hill, almost all of the potential energy has been converted into kinetic energy. If there is another hill at the bottom of the coaster, some of that kinetic energy will be used to start up the next hill, converting kinetic back into potential energy again.



1. In the first example (the bike), all of the energy conversions have been underlined for you. For example two (the light bulb), do the same – underline all the different forms of energy.

2. At the top of the hill, the roller coaster has \_\_\_\_\_ kinetic energy and \_\_\_\_\_ of potential energy. At the bottom of the hill, the potential energy has been \_\_\_\_\_ into kinetic energy.

3. State the Law of Conservation of Energy.

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4. List the three types of models.

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5. In a nuclear power plant, where does the energy to heat the water come from?

A) From protons and neutrons colliding with one another.

B) From electrons leaving the atom.

C) From the decay of the nucleus, breaking into pieces.

6. What type of energy involves all types of light, including x-rays and ultraviolet radiation? \_\_\_\_\_

7. Which group of invertebrates includes the clam, the slug and the octopus?

echinoderms

cnidarians

mollusks

8. How does a gymnosperm differ from an angiosperm?

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9. Compare and contrast mitosis and interphase.

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10. An estuary is typically found between what two water related ecosystems?

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