Questions

Question 1

Suppose you are building a cabin far away from electric power service, but you desire to have electricity available to energize light bulbs, a radio, a computer, and other useful devices. Determine at least three different ways you could generate electrical power to supply the electric power needs at this cabin.

file 00003

Question 2

Where does the electricity come from that powers your home, or your school, or the streetlights along roads, or the many business establishments in your city? You will find that there are many different sources and types of sources of electrical power. In each case, try to determine where the *ultimate* source of that energy is.

For example, in a hydroelectric dam, the electricity is generated when falling water spins a turbine, which turns an electromechanical generator. But what continually drives the water to its "uphill" location so that the process is continuous? What is the *ultimate* source of energy that is being harnessed by the dam?

file 00024

Question 3

What is the difference between DC and AC electricity? Identify some common sources of each type of electricity.

file 00028

Question 4

There is a fundamental Law in physics known as the Law of Energy Conservation. This law states that energy can neither be created nor destroyed, merely transformed from one form to another.

In regard to this Law, is it possible to make an electrical battery that lasts forever, and never becomes exhausted? Explain why or why not.

file 00224

Question 5

Where does the energy come from that causes a battery to be a source of electricity for powering electrical devices? Ultimately, what is the energy *source* of a battery?

file 00225

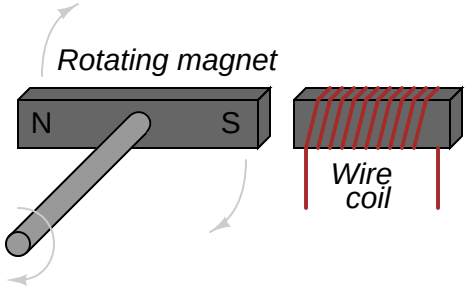
Question 6

Describe what a *fuel cell* is, and what the practical importance of such a device might be.

file 00226

Question 7

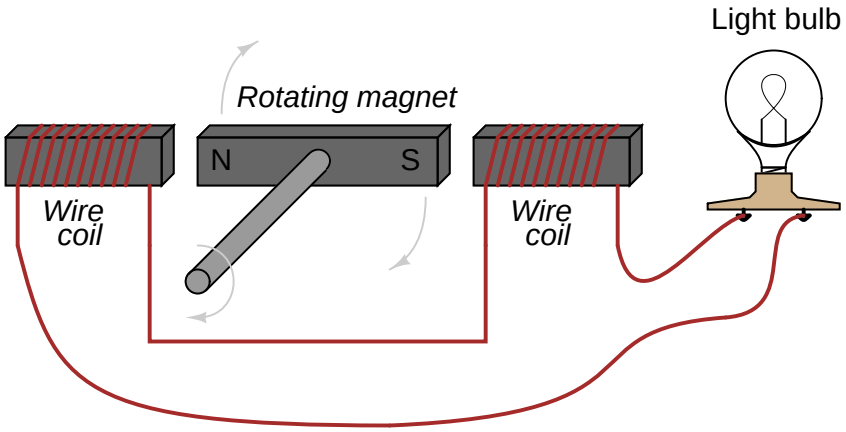
What will happen, electrically speaking, when the shaft of the machine is turned?



file 00227

Question 8

Suppose there was something wrong in this electrical system. When the shaft of the generator is turned, the light bulb does not light up:



What are some of the possible causes of this failure? Please be specific. Also, what could you do to either confirm or deny these specific possibilities?

file 00229

Question 9

The mathematical equivalence between *watts* and *horsepower* is approximately 746:1. Given this equivalency, how many watts of electrical energy may theoretically be produced by a generator, if turned by an engine rated at 50 horsepower?

file 00228

Question 10

Suppose a person decides to attach an electrical generator to their exercise bicycle, so as to do something useful with their "pedal power" while they exercise. The first time this person uses their bicycle generator, the electricity is used to power a single 60-watt light bulb. However, the next time this person uses their bicycle generator, a second 60-watt light bulb is connected to the generator, for a total load of 120 watts.

When pedaling with the additional load, the person notices the bicycle is much more difficult to pedal than before. It takes greater force on the pedals to maintain the same speed as before, when there was only a single 60-watt light bulb to power. What would you say to this person if they asked you, the electricity expert, to explain why the bicycle is more difficult to pedal with the additional light bulb connected?

file 00230