

SCIENCE 707

MOTION AND ITS MEASUREMENT

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ENERGY

Energy is the name given to the ability to work. Work and energy are measured in the same way. All work requires energy.

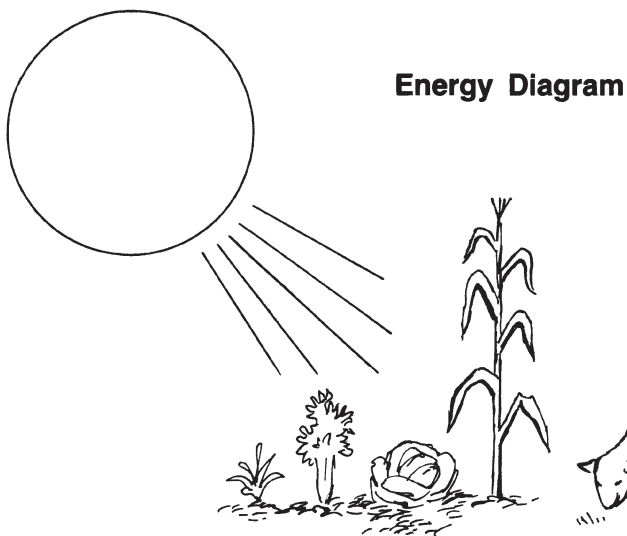
Remember, force is the push or pull on an object and power measures the rate at which the work is done.



Man in Rowboat

To understand the difference between energy, force, and power, imagine you see a man in a rowboat. *Energy* from the man's arm muscles moves the oars on the boat. The *force* of the oars moves the boat upstream. The rate of speed at which the boat travels determines its *power*.

All human life depends upon energy in the universe. The sun produces the greatest part of this earth's energy. The sun gives light which plants need to make food, which animals and man eat to get energy.



Here are some forms of energy you should know:

1. Solar energy—this energy comes from rays of sunlight. You already learned this is the earth's most important source of energy.
2. Atomic energy—this energy comes from the nucleus (center) of the atom. Remember, all things are made up of atoms. The atom's nucleus has a positive charge and the electrons around the nucleus have negative charges.
3. Mechanical energy—this is energy produced by machines. The water wheel is a form of mechanical energy.
4. Chemical energy—this energy is released when matter changes chemically. When wood, coal, or gas are burned, chemical energy is given off.
5. Electrical energy—this is the energy of electrical charges of electrons. When many electrons gather together, for example, on a cloud, then there is a high minus charge. When this static electricity charge is strong enough, electrons jump off the cloud and make the huge spark we call lightning. When electrons pass along a wire from one atom to the next, we say an electrical current is flowing.



Answer these questions.

- 2.17 Define energy. _____
- 2.18 Energy is measured in the same way as _____. .
- 2.19 What is the most important source of earth's energy? _____
- Δ2.20 What if your body had no energy? Explain what you think would be the result.



Complete these activities.

List the five forms of energy and explain how or where each is produced.

- 2.21 _____
- 2.22 _____
- 2.23 _____
- 2.24 _____
- 2.25 _____
- What does the Bible say? Read Matthew 28:18-20 and answer these questions.
- Δ2.26 In your own words, what is the command in verse 19? _____

- 2.27 Would obeying this command require much or little energy? _____
- 2.28 Who has "all power?" _____
- 2.29 Is His power available to us? _____ What words in verse 20 answer this question? _____

NEWTON'S LAWS OF MOTION

Sir Isaac Newton is responsible for the development of three laws of motion and the Universal Law of Gravitation. These laws help explain why objects fall to the earth. They also explain how heavenly bodies stay in their orbits. In the following exercise you are to

summarize Newton's third Law of Motion and the Law of Gravitation. Follow the four steps to make your summary. One of Newton's laws has already been summarized as an example. Summarize the third Law of Motion and the Law of Gravitation in the same manner.



Follow these directions and answer these questions. Put a check mark in the box when each step is completed.

- ☐ 1. Read the four steps that you are to follow in preparing your summary.
 - Step 1: Write a complete sentence that summarizes the main idea of the law.
 - Step 2: Define any words that are necessary for the summary.
 - Step 3: Write four or five sentences in your own words that summarize the law.
 - Step 4: Give examples to illustrate the law.
- ☐ 2. Read the example of Newton's law that has been prepared for you following the four steps.

A summary of the first law

- 1. Sir Isaac Newton's First Law on Motion: An object at rest remains at rest or continues to move in a straight line unless acted upon by some outside force.
- 2. **Inertia** is defined as *the tendency of an object to remain at rest or to continue in motion with constant speed in a straight line.*
- 3. Newton's First Law of Motion is sometimes called the Law of Inertia. All matter possesses inertia. The amount of inertia an object has depends on its mass (the amount of matter of the object). The more mass the object has, the greater is the inertia. It requires a lot of energy to start something moving, but once it is moving, it tends to continue on its course.
- 4. Examples of inertia: A basketball at rest tends to remain at rest until you apply a force. When you start the ball rolling, it will continue to roll until it hits the side of the court, or bounces against something to slow it down. When an automobile stops suddenly, the people are thrown forward. This continued movement is due to inertia which makes the riders in the vehicle continue to move. Because of inertia, seat belts should be worn in cars.

2.30



Go to the library and look up Newton's Third Law of Motion and the Law of Gravitation. Prepare a separate paper for each law. Summarize them using the four steps like the example given for the First Law of Motion.