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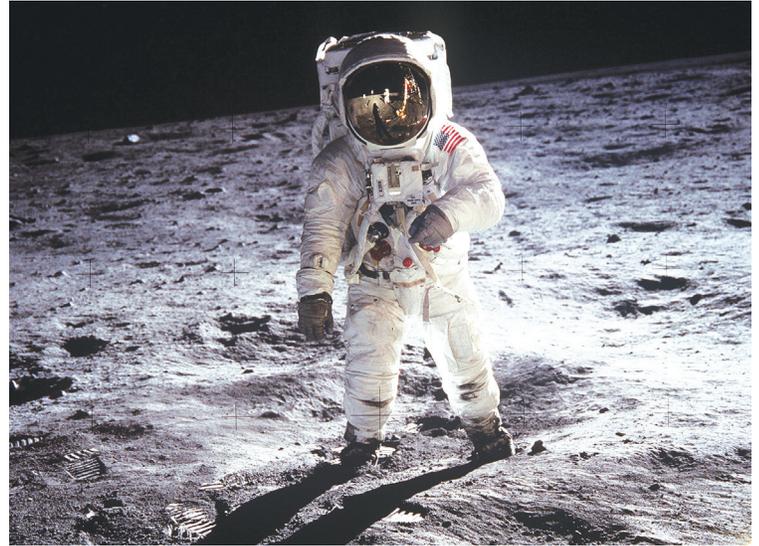


Activity One



Write a Short Report about Gravity of the Moon

In this lesson, you learned that the Moon's gravity doesn't pull nearly as hard as Earth's gravity. We also learned that mass is not quite the same thing as weight. Mass is how much stuff you are made of. Weight is how hard gravity pulls on your mass. As long as we stay on Earth, we can pretend that mass and weight are the same thing without getting mixed up.



But what if you went to the Moon? You would be made of just as much stuff, so you would have the same mass. But how much would you weigh?

For this activity, you will learn about gravity on the Moon. Read about trips that people took to the moon. Find out what experiments they did there to show that the Moon has less gravity. Also, read about gravity on the space station or on spaceships going to the Moon and back. Try to find the answers to these questions:

1. How much weaker is the Moon's gravity than Earth's gravity?
2. How much would you weigh on the Moon?
3. How high could you throw a ball on the Moon?
4. How high could you jump on the Moon?
5. When there is no gravity it is called weightlessness. Where are people weightless?
6. What is that like? For example, how are eating and drinking different?



Activity Two



Energy from the Sun to Electrical Energy

You learned that almost all the energy we use came from the Sun. Most of the energy we use we get from coal, oil and natural gas (a gas from underground). These fuels have a lot of energy in them. They are easy to find and easy to use.

In this activity, you will visit a place where people are getting energy from the Sun in new ways. Here are places you could visit:

- 1.** Visit a place with solar cells. Solar cells soak up sunlight and change it into electrical energy. There are no other steps—light energy goes right into electrical energy. There are some very big places, called solar farms. They are usually in the desert. You can find smaller versions closer to home. See if any of your neighbors have solar cells on their roofs, or solar lights in their yard. Some calculators are powered by tiny solar cells aslo.
- 2.** Visit a wind farm. These are found in windy places. You will see hills covered with windmills. These are also called “wind turbines.” When the wind spins the blades of the windmill, it changes this energy of motion into electrical energy. People have been getting energy from windmills for many years. You might want to find pictures of the old kind to see how they are different from ones you see today. Here is what the Sun has to do with it: The Sun heats some parts of the Earth more than others. Air rises from the hotter parts and this pulls in air from the cooler parts. This causes wind.
- 3.** “Hydroelectric” means “electricity from water.” Hydroelectric dams have been around for a long time. Water backs up behind a dam and a big lake forms. When the water runs out of the dam it spins a machine like the one in the wind turbines. This makes electricity. So stored energy is changed to energy of motion. This then changes to electrical energy. Here is what the Sun has to do with it: When the Sun warms water, it evaporates. Evaporating is when water turns into vapor (a gas) and rises into the air. When there is enough water vapor in the air, a cloud forms. Then it rains and water runs downhill into the dam. So it is the energy of the Sun that lifts the water from below the dam up into the dam.



Activity Three

Three Kinds of Levers



There are three kinds of levers. They are called class 1, class 2, and class 3. There are three words you need to know about levers: load, fulcrum, and effort. Load is the thing you are lifting. Fulcrum is the thing under the lever that it moves up and down on. Effort is where you push or pull.

Get a board and a block and make all three classes of levers. Class 1 is like a hammer pulling a nail. Class 2 is like lifting the handles of a wheelbarrow. Class 3 is like pounding a nail with a hammer or swinging a baseball bat. For class 3, one of your hands is the effort and the other is the fulcrum. Try to find other examples of each class.



Try lifting a weight with all three classes. How does effort change from class to class? How does the direction of the push or pull change?

What happens if you put the fulcrum close to the effort for a class 1 lever? How does the effort change? If you push down fast, how does the load move?



This is the kind of lever used many years ago by an army attacking a castle. The lever was part of a machine called a "catapult." Catapults were used to throw stones over the castle wall. Here is a picture of a catapult:

Take your lever and fulcrum outside. Take something small and soft to throw with the catapult. (You don't want to hurt anyone.) This will be your load. Put the fulcrum close to one end. Put the small, soft thing on the other end. Hit the end close to the fulcrum with your fist or a hammer.

- What happens to the load?
- How much effort did you need?
- What was the speed of the load?
- How far did it go?



Activity Four

How to Make a Magnet

A magnet is made up of lots of little magnets that you can't see. The magnet has magnetic force because all the little magnets are pointing the same way. A piece of iron also has little magnets in it. It doesn't act like a magnet because the little magnets are pointing in all directions. If you bring a piece of iron close to a magnet, the little magnets in the iron turn around and line up. When you take the iron away, they go back to being mixed up again. In this activity, you will turn a piece of iron into a magnet that stays magnetic.

What you will do is take a piece of iron and line it up with the north and south poles of the Earth. Then, whack one end of the piece of iron with a hammer. This will line up the little magnets in the iron. Here is what you will need:

- An iron rod about as big around as your finger and about two feet long. Be sure it is iron and not steel. A metal working shop could sell you one cheap. You might also find one at a hardware store.
- A compass. (A compass is a tool with a needle in it that always points toward the North Pole of Earth. This is because the needle is a little magnet and Earth is really a big magnet.)
- A hammer.
- A few feet of string.

This is what you do:

1. Use the compass to find the direction North.
2. Tie the string around the middle of the iron rod. Slide the string back and forth until you find the place where the rod balances.
3. Turn the rod around until one end is pointing north.
4. Hold the rod up by the string. Whack one end of the rod with the hammer a few times. This lines up the little magnets in the rod.
5. Find out if you made a magnet. If you turned the rod into a magnet, it will be able to pick up small iron things. Here is another test: Hold the bar up by the string so that it is not pointing North. If you made a magnet, one end of the magnet will swing around to point North.



Do you think this would work better if the iron rod were warm? Why?



Activity Five



Growing Crystals

You read about crystals in this book. You can grow crystals from things you find around the house or in a store. These are the materials you can use to grow crystals:

- table salt
- white sugar
- Borax

You will also need:



- Three clean, wide shallow bowls.
- Distilled water (You can also get this at the store. It is just very pure water.).
- A clean container to mix the water and crystals in.

This is what you do:

1. Warm the distilled water a little (not hot).
2. Start with salt. Add about a cup of warm water to a container. Start adding salt while stirring. The salt will disappear. Keep adding salt until it doesn't all disappear.
3. Let the salt settle to the bottom.
4. Carefully pour the liquid off the top into one of the bowls. It doesn't need to be very deep.
5. Carefully set the bowl where it won't be disturbed.
6. Repeat steps 2 to 5 with the sugar, then with the Borax.
7. Wait. If no crystals show up in the bowls, try adding one small grain of the material you started with.

You should have grown some crystals. They should be much larger than the small grains you started with. Look at the crystals closely. Are they all the same shape? Describe the shapes. A magnifying glass will help.



Activity Six



Build a Compound Machine

You have seen pictures of compound machines in the last section of this book. Here is one you can build. It will combine an inclined plane and a pulley. This is what you will need:

- a board long enough to use for a ramp
- something to prop up one end
- about two feet of string
- a wooden block
- a spring scale
- a screw eye



This is what you do:

1. Prop up one end of the board to make an inclined plane.
2. Screw the screw eye into the middle of one side of the block. (Putting soap on the point end of the screw eye will make it go in easier.)
3. Hook the hook of the scale into the screw eye. Pull the block up the inclined plane. The scale will tell you how much force was needed. Write the number down.
4. Put the block back at the bottom of the inclined plane.
5. Tie one end of the string to something at the top of the inclined plane.
6. Pass the other end of the string through the screw eye and bring it back toward the top of the inclined plane.
7. Tie a loop in the free end of the string. Put the hook on the scale into the loop.
8. Pull on the scale to make the block slide up the inclined plane. Write down how much force it takes.

You did the same amount of work with a simple machine and a compound machine. How much force was needed for each machine? If there was a difference, how can you explain it?