Simple Machines

Lesson #1: Introduction to Five Simple Machines

Time Frame: 1 session of 30 minutes

Learning Standards:

Physical Science: Observable Properties of Objects

Technology: Identify tools and simple machines used for a specific purpose, e.g. ramp, wheel, pulley, lever.

Skills of Inquiry:

Tell about why and what would happen if?
Name and use simple equipment and tools
Recognize that under some conditions, objects can be balanced
Discuss observations with others

Student will be able to:

Recognize 5 simple machines and how they work

Activity:

Gather students together on the floor. Present five simple machines, and how they work – the wedge, inclined plane, lever, screw and pulley. Discuss how each of these items works and give examples of how they are used in everyday life and how they have been used in history.

Talk about how each of these tools helps us by magnifying force when applied to an object. Examples are using a pulley to bring a basket of goodies up to the treehouse, using a wedge on the end of an axe to chop wood, using an inclined plane to push something up a hill, using a lever to move a heavy rock, and using a screw to keep the lid of a jar tight. A historical example is how the Egyptians moved blocks of stone to the pyramids.

Have students move to tables and try using the simple machines. Then have kids use colored markers to draw and label each of the simple machines in action on the attached worksheet.

Closure:

Ask students to name all five simple machines and give an example of how they work.

Assessment: Participation in class discussion and activities (worksheet)

Resources and Materials: Examples of all the simple machines, worksheets, markers.

Simple Machines

Lesson #2: Simple Machines – Axels and Pinwheels

Time Frame: 1 session of 30 minutes

Learning Standards:

Physical Science: Observable Properties of Objects

Technology: Identify tools and simple machines used for a specific purpose, e.g. ramp, wheel, pulley, lever.

Skills of Inquiry:

Tell about why and what would happen if?
Name and use simple equipment and tools
Recognize that under some conditions, objects can be balanced
Discuss observations with others

Student will be able to:

Build a simple machine with axel and pinwheel.

Activity:

Gather students together on the floor. Remind them of what we covered in the introduction to simple machines. Review the five simple machines and how the work. Introduce the axel. Talk about how you might use a crank to raise up something heavy. And show them an example of the axel we will make today, and the pinwheel. Pinwheels are really simple windmills and can be used to convert wind power into energy.

Have students move to tables. First build the axels. Give each child a plastic cup that has holes punched across from each other. Insert a straw with bendable end through the holes. Tie string to the non-bending end with washers tied to the end. Bend up the flexible straw end and use as a crank. Turn the straw in a circle and watch the string wind up and raise the washers.

Second give each kid the pinwheel diagram, scissors, string, pencils, plastic tubes to hold pencils and washers. Form the pinwheel according to the instructions and put

on the pencil. Keep in place with a bit of clay on either side. Slip plastic tubes around pencils and attach string to end with washers attached to allow the weight to pull down as a crank and turn the pinwheel. See diagrams.

Closure:

Ask students to describe how axels and windmills work.

Assessment: Participation in class discussion and activities (worksheet)

Resources and Materials: One plastic cup per child pre punched with holes across from one another. String, flexible straws and several washers per child. Diagram showing axel assembly. Second section, laminated pinwheel directions, scissors, plastic tubes, pencils, string, modeling clay and washers.

UNIT 7

EXPERIMENT 2: WIND POWER!

Windmills have been around since about the seventh century A.D. in ancient Persia. Today, the Netherlands is famous for its windmills. So is the state of California. California has thousands of wind turbines, machines that convert wind power into electricity. These giant machines line windy mountain passes. How can you make a powerful wind machine even more powerful?

YOU WILL NEED

- 2 feet of string or thread
- washers
- tape
- clay
- plastic tube
- Wind Power Pinwheel handout

BRAIN DRAIN

Where can you find a combination of simple machines? Take a look at your bike. It combines several simple machines into one compound machine. For example, a bike has wheels and axles so it can roll and levers for brakes. What other simple machines can you think of that are part of a bike?

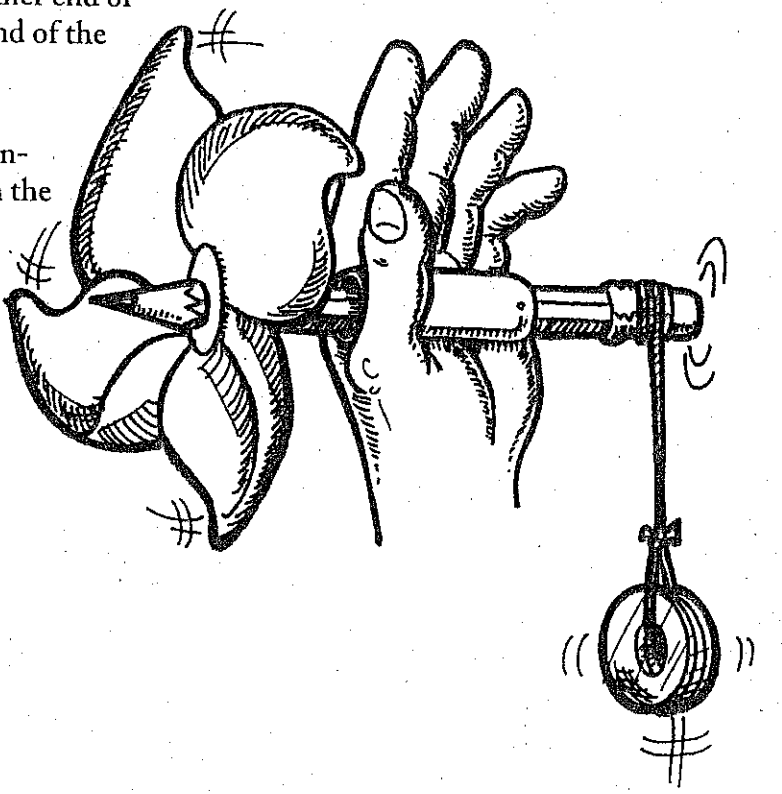
WHAT TO DO

1. Tie a few washers to the string. Tape the other end of the string to the end of the pencil.

2. Build the pinwheel as shown on the handout.

3. Hold the pinwheel by the plastic tube so the pencil can turn freely.

4. Blow!



WHAT DID YOU FIND?

How does your pinwheel work? Would it work better if the pinwheel part were bigger or smaller in diameter? Why?

UNIT 7

EXPERIMENT 1: SUPER-CRANKS

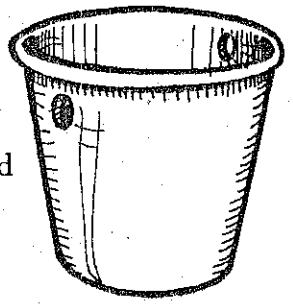
A crank is an excellent example of a wheel and axle. But where's the wheel? Believe it or not, the handle of the crank is the wheel! That's because it moves in a circle. The rest of the crank is the axle. It moves in a smaller circle.

YOU WILL NEED

- paper cup
- ballpoint pen
- flexible drinking straw
- 12 inches of string
- washer
- tape

WHAT TO DO

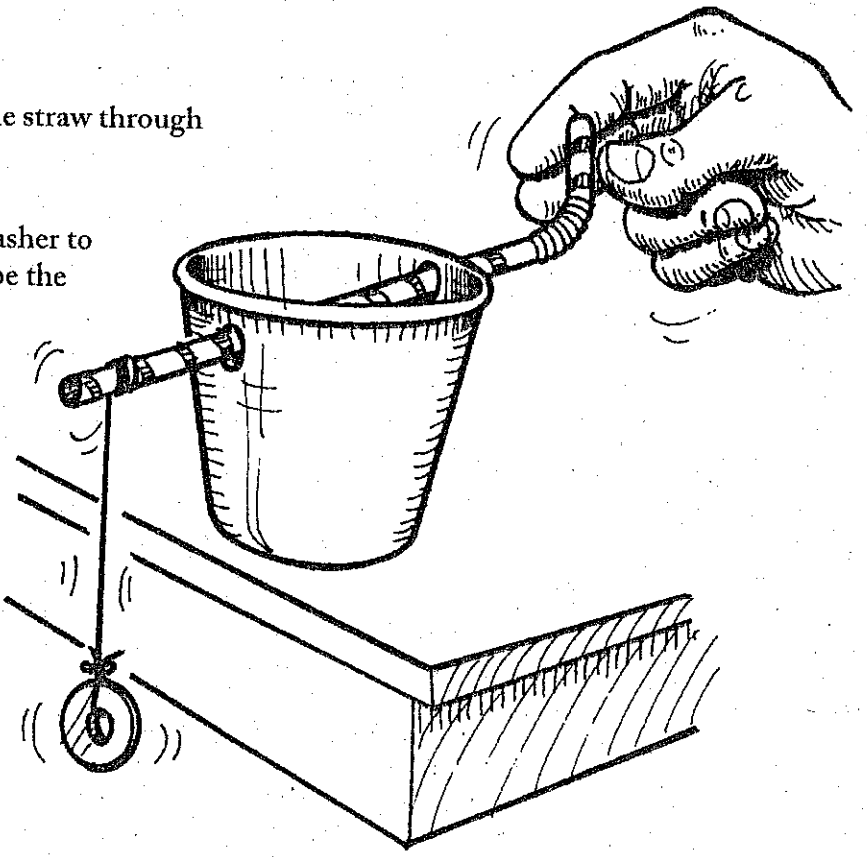
1. Use a ballpoint pen to punch two holes at the top of a cup as shown. The holes should be exactly across from each other.



2. Place the straw through both holes.

3. Tie a washer to the string. Tape the other end of the string to the straight end of the straw.

4. Bend the flexible end of the straw up. This is the wheel of your wheel and axle. It moves in a circle.



5. Slowly turn the straw in a circle. What happens to the rest of the straw? To the string and washer?

WHAT DID YOU FIND?

When you make one turn with the wheel, how many times does the axle turn? Which moves farther, your fingers or the washer?

Name _____

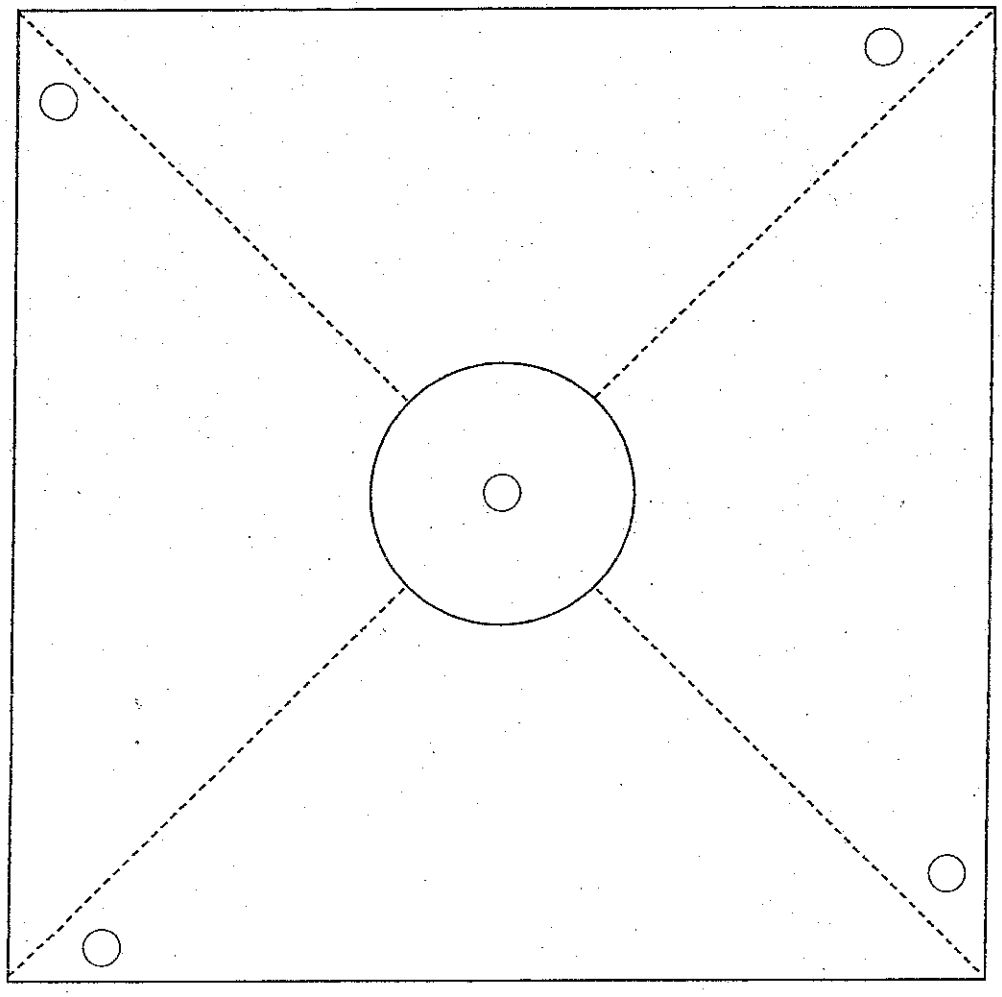
UNIT 7

WHEEL AND AXLE: CIRCLE POWER

WIND POWER PINWHEELS

WHAT TO DO

- Cut out the square. If possible, laminate the square.
- Cut from each corner to the big circle in the center along the dashed lines. Don't cut inside this circle!
- Use a hole punch to punch a hole in each corner and in the middle.
- Bend the four corners with holes to the center so that all the holes line up.
- Put a long pencil through the holes. Move the pinwheel so that it is near the end of the axle.
- Put a small piece of clay on either side of the pinwheel to hold it in place.
- Slide the long end of the pencil through the plastic tube for holding.



Simple Machines

Lesson #3: Alexander Graham Bell and the Telephone

Time Frame: 1 session of 30 minutes

Learning Standards:

Physical Science: Observable Properties of Objects
Technology: Identify tools and simple machines used for a specific purpose, e.g. ramp, wheel, pulley, lever.

Skills of Inquiry:

Tell about why and what would happen if?
Name and use simple equipment and tools
Discuss observations with others

Student will be able to:

Build their own simple telephone to magnify sound.

Activity:

Gather students together on the floor. Remind them that we have been talking about simple machines and how they help us. Remind them that we talked last week about how scientists and inventors develop machines to solve certain problems.

Introduce Alexander Graham Bell to them. Bell lived in the late 1800s and was born to a mother who was hard of hearing. He became very interested in hearing and became a teacher of deaf people. He founded a school for the deaf in 1872, and in 1876 he developed the telephone, a device that helped sound travel over wires. He continued to be interested in how sound travels and four years later developed a device that allowed sound to travel on light. He was always interested in inventing things, and continued to invent machines even late into his life.

Have children move to the tables and make their own telephones out of two paper cups and a string between them. Poke small holes in the bottom of each cup, thread the string through and tie it to a paper clip on the inside of the cup. Then do the

same for the second cup. Make some with long strings (4-5 feet) and some with shorter strings (2-3 feet) and compare how the sound travels. Have students test their telephones when the wire is taut and when the wire is slack to see how it works. If it's nice out, take them outside. If not, experiment with them in the classroom.

Closure:

Ask students to talk about how the telephones work.

Assessment: Participation in class discussion and activities

Resources and Materials: Scissors, string, two paper cups per child, paper clips.