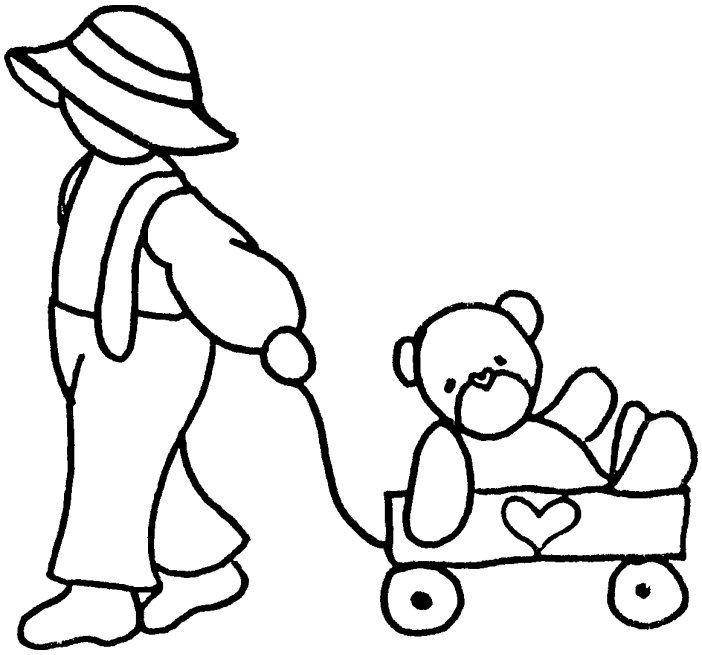
Applied Science

Our Technological World

FIRST GRADE

TECHNOLOGY



3 WEEKS
LESSON PLANS AND
ACTIVITIES

APPLIED SCIENCE
OVERVIEW OF FIRST

SCIENCE AND MATH

WEEK 1.
PRE: *Discovering the importance of observation.*
LAB: *Comparing different magnifiers.*
POST: *Observing through a hand lens.*
WEEK 2.
PRE: *Measuring objects.*
LAB: *Weighing and measuring students.*
POST: *Investigating the use of a balance.*
WEEK 3.
PRE: *Investigating human senses.*
LAB: *Discovering the sense of sight and touch.*
POST: *Exploring the senses of taste, smell and hearing.*

PHYSICS

WEEK 4.
PRE: *Discovering how light moves.*
LAB: *Distinguishing refraction and reflection.*
POST: *Comparing different type of equipment that uses lenses.*
WEEK 5.
PRE: *Exploring motion.*
LAB: *Investigating how objects move.*
POST: *Comparing the human body to a machine.*

TECHNOLOGY

WEEK 6.
PRE: *Exploring how machines work.*
LAB: *Comparing simple machines in the kitchen.*
POST: *Investigating how simple machines are used in our society.*
WEEK 7.
PRE: *Exploring pulleys, wedges and levers.*
LAB: *Comparing and contrasting different tools.*
POST: *Exploring inventions.*

BUILT ENVIRONMENT

WEEK 8.
PRE: *Discovering the major types of garbage.*
LAB: *Collecting and measuring trash.*
POST: *Exploring how humans affect their environment.*

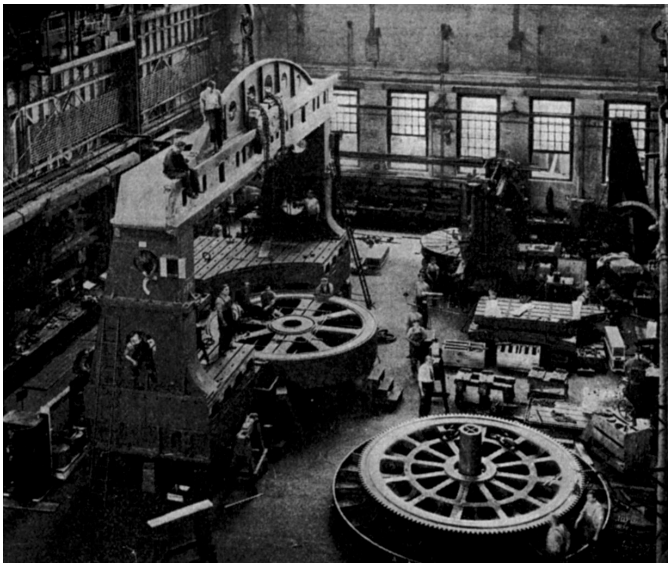
APPLIED SCIENCE - TECHNOLOGY (1A)

PRE LAB

Students use a worksheet to explore machines.

OBJECTIVES:

1. Exploring how machines work.
2. Investigating machines in our society.



VOCABULARY:

carry
dig
lift
machine
pull
push

MATERIALS:

worksheet

BACKGROUND:

Students should learn that science and math help technology develop through the ages. We often forget the reasons behind the ease and comfort of our present society. Sure we all have TV's, radios, phonographs, electric hair dryers, and other comforts, but do we really understand what actually makes them work!

Although gears, wheels, pulleys, and other machines are simple in design, they were needed before humans could reason into higher levels of technology. The mechanics and physics of these simple devices were not realized when they were discovered, the machines just worked. In order to fulfill basic everyday needs, early humans sought ways to satisfy them. Thus using bone, wood, and stone they fashioned simple tools for digging, killing, and scraping. When early humans wanted to move items or get items they wanted, they would use reason to "invent' these devices.

PROCEDURE:

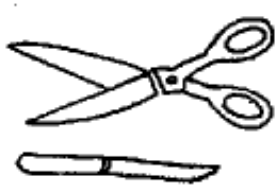
1. Discuss with students that the human body is a well designed machine. Many mechanical machines help humans do work more easily. Define machines as objects that make our work easier. Show examples of machines and tell how each one help humans lift, carry, push, pull, dig, carry, cut, turn or stir.

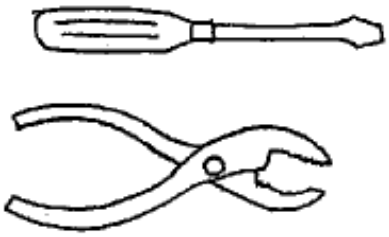
2. Read the words with the students at the bottom of the enclosed worksheet. Have

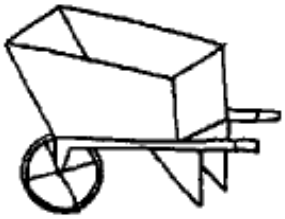
them find a word that describes how each machine helps us. Copy it onto the blank below the picture. Note: some machines may help in more than one way, for example, a tow truck may not only help carry people but lift and pull a car. A pair of pliers may help turn a nut or pull out a nail. If students can support their word choice, it is right.

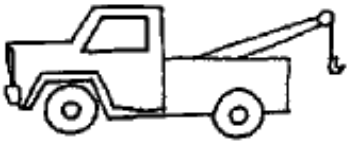
3. Go over the worksheet. Ask what words students used for each machine. Discuss their choices and suggest others. Ask them to give examples of machines that carry, lift, push, pull, dig, cut, turn, or stir. If time permits, make up a couple of riddles that use these words. For example, "I do not eat, but I help you carry food in a grocery store. You must push me". What am I? (A grocery cart.)

APPLIED SCIENCE - TECHNOLOGY (1A) PRE









Lift	Push	Pull	Dig
Carry	Cut	Turn	Stir

APPLIED SCIENCE -TECHNOLOGY (1A)

LAB

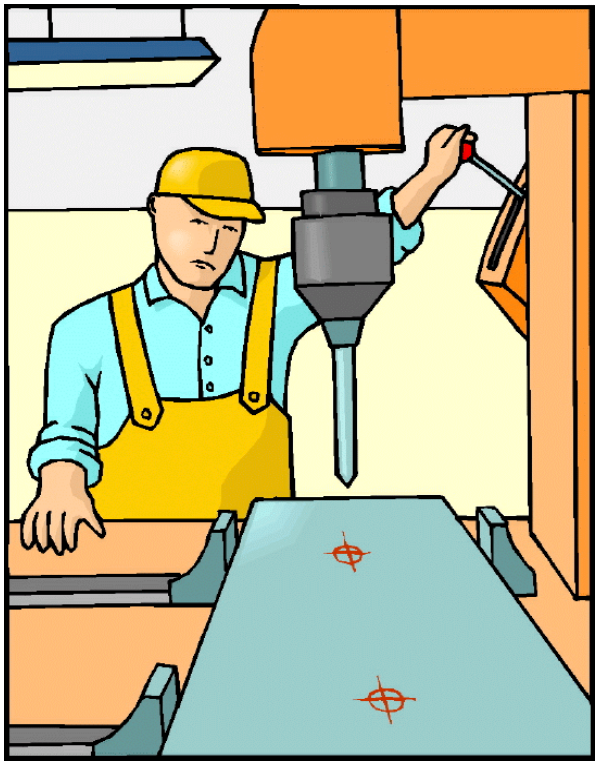
Students determine the simple machines that are used in tools.

OBJECTIVES:

1. Exploring simple machines and tools.
2. Comparing different tools in the kitchen.

VOCABULARY:

gears
machine
screws
tool
wheel and axle



MATERIALS:

cork screw
can opener
ice cream scoop
pizza cutter
egg beater
rolling pin
fruit twister
scissor
corn skewer

BACKGROUND:

Simple machines are a part of the physics discipline of "mechanics." Simple machines change the direction of an applied force, change the strength of a force necessary to do a job, or does both. Simple machines can also be used to apply a force to a place that cannot otherwise be reached or applies force in ways that cannot be done without machines.

The definition for "tool" overlaps that of "machine". According to Webster's dictionary, a tool is something held in the hand and used for cutting, hitting or digging, with things such as knives, saws, hammers or shovels. Tools can also be the working part of a power machine, for example, a drill bit. In other words, an item that is called a machine based on what it does, can be described as a tool based on how it is used. Students will be studying kitchen tools.

There are three basic elements of simple machines including the wheel and axle, the lever, and the inclined plane. All simple machines that will be discussed are a

combination of these basic elements.

PROCEDURE:

1. Explain the principle of a *lever.* A lever is basically a simple machine consisting of a rigid body pivoted on a fixed fulcrum. Before beginning this exercise, it is necessary to explain the terms "rigid body" and "fulcrum". The most familiar lever is the see-saw. The rigid body is where the student sits, and the fulcrum is the base that supports the rigid body. Ask them if a see-saw could work if the fulcrum was closer to one person than the other. It won't because it would not be in the center, unless the children using it were of different weights. Illustrate other levers such as scissors or a nut cracker. Point out that levers help make it easier to lift, move, or break heavy or large objects.

2. Talk about how *gears* are used to change the speed of turning and to go around corners. Demonstrate with an eggbeater. If you have a bike, show how the gears change the speed of turning. Discuss how the 2 large front gears on the pedal combine with the 5 gears on the back wheel of a 10-speed to make it easier to go up hills (again, point out the wheel and axle-the pedal crank). Your materials will depend upon your classroom set up.

3. Discuss *screws.* This is one case where the force being applied travels very far to make the insertion of a screw easier. Everyone knows what screws are but most children think that shop screws are the only kind.

4. *Wheel and axles* work by using the motion of a wheel to move objects with less friction.

5. The following helps explain what to do with the materials.

(A) A scissor illustrates a lever. The point at which the scissor opens and closes is the fulcrum.

(B) An ice cream scooper, can opener and eggbeater illustrate gears. Point out the gears and let the students turn the tools. You may want students to actually scoop some ice cream!

(C) A cork screw and fruit twister illustrate a screw. If you have oranges, students can "screw" the fruit twister for some juice.

(D) A rolling pin, pizza cutter and corn skewers illustrate wheel and axle. To illustrate the corn skewers, put them in an apple (or other fruit) so students can see how you can easily turn the fruit.

APPLIED SCIENCE - TECHNOLOGY (1A)

CHOOSE THE FOLLOWING: LEVER, SCREW, GEAR, WHEEL & AXLE

ITEM	SIMPLE MACHINE
CORK SCREW	
CAN OPENER	
ICE CREAM SCOOP	
PIZZA CUTTER	
EGG BEATER	
ROLLING PIN	
FRUIT TWISTER	
SCISSOR	
CORN SKEWER	

APPLIED SCIENCE - TECHNOLOGY (1A)

POST LAB

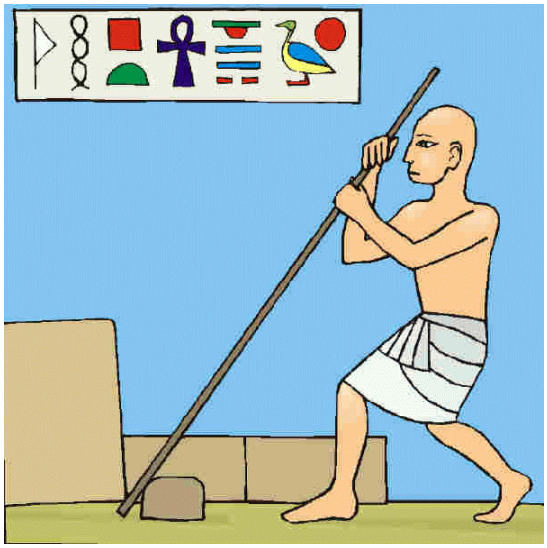
Students identify simple machines in their environment.

OBJECTIVES:

1. Exploring machines.
2. Investigating how simple machines are used in our society.

VOCABULARY:

inclined plane
lever
pulley
screw
wedge
wheel



MATERIALS:

classroom

BACKGROUND:

Although gears, wheels, pulleys, and other machines are simple in design, they were needed before humans could reason into higher levels of technology. The mechanics and physics of these simple devices were not realized when they were discovered, the machines just worked. In order to fulfill basic everyday needs, early humans sought ways to satisfy them. Thus using bone, wood, and stone they fashioned simple tools for digging, killing, and scraping. When early humans wanted to move items or get items they wanted, they would use reason to "invent' these devices.

The principles of simple machines have been used throughout the centuries from moving large blocks to build the Pyramids in Egypt to using tractors today. Young students sometimes are not aware of simple machines, even though they use them every day. Educators must make students aware of how simple machines are used in our lives.

PROCEDURE:

1. The following are questions to start class discussions on simple machines.

What are simple machines? (Something that people have created to do work. The simplest machines range from crowbars to eggbeaters).

Could we live without machines? (No. Something as simple as a cart requires wheels to

move. Ask students how their clothes are cleaned, what do we use to cook food, and how do they get to school on rainy days. They should conclude that it would be very hard to live without machines).

2. Have students look around the classroom and identify simple machines. Make sure to include pencil sharpeners, carts, push pins, scissors and any other machine.

3. Discuss with students that simple machines are all around us. Make sure the students understand how simple machines have been used in everyday life, from cavemen to modern humans.

4. As a follow-up activity, students can find examples of simple machines in the classroom and in their homes. Some types of machines may be difficult to break down into one of the six types and this may lead to a good class discussion. Even if no "right" answer emerges, the students will realize that machines are all around them. Many simple looking items are going to be combinations of the basic types. Possible examples:

1. Pulleys: Venetian blinds, cranes
2. Levers: see-saws, electric switches, crowbars, oars, jacks, wheelbarrows, shovels, scissors, pliers, and nutcrackers (all are pairs of levers)
3. Inclined planes: stairs, ramps and mountain roads
4. Wedges: axe blades, chisels, wood splinters, blades of knives, scissors, nails, pins and needles
5. Wheels and axles: doorknobs, anything with a crank and wheel
6. Screws: vise, screws and jack screws
7. Gears: egg beaters, clocks

APPLIED SCIENCE - TECHNOLOGY (1B)

PRE LAB

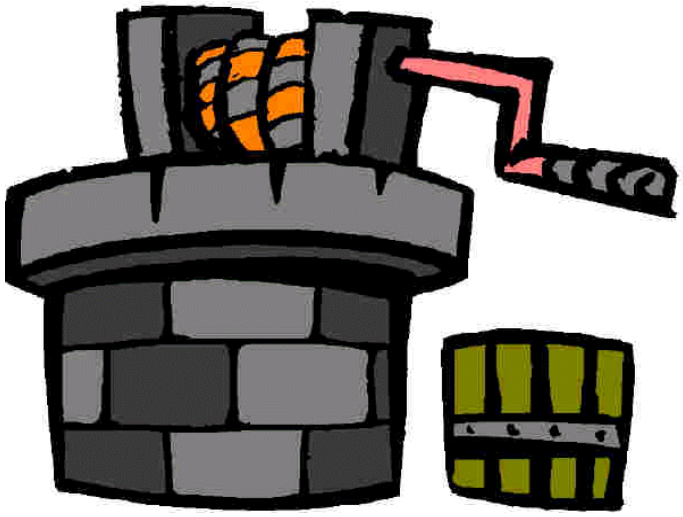
Students see demonstrations of pulleys, wedges, and levers.

OBJECTIVES:

1. Exploring pulleys, wedges and levers.
2. Comparing the uses of machines.

VOCABULARY:

lever
pulley
ramp
wedge



MATERIALS:

boards
fulcrum (half logs work fine)
levers
pulleys
rope
wedges
worksheet

BACKGROUND:

An inclined plane allows energy to be transferred over a longer distance, so you usually need less energy to accomplish the task. A ramp is an inclined plane and a wedge is a double incline plane. A ramp helps move items to a higher level without as much work. A wedge helps get in between something.

A lever helps lift things easily. It is used with a fulcrum that can be moved to help the lever be more efficient. Your arm is a lever, with the elbow and shoulder as a fulcrum. A see saw is also a lever. If you move the fulcrum, you can pick up heavy objects.

A wheel and axle help to move heavy objects. A pulley has two or more wheel and axles. If the size and position are arranged correctly, you can move heavy objects easily.

PROCEDURE:

1. Describe a ramp, wedge, lever, and pulley. Use the worksheet to illustrate pulleys, wedges, levers, and ramps. An overhead of the worksheet helps go over the components of each of the simple machines. A ramp is a inclined plane. A wedge is two incline planes. A lever has two components, a fulcrum and a plane. The fulcrum can help

direct energy to make the lever work more efficiently. A pulley is two wheel and axles to make movement assist in producing more work efficiently.

2. Depending on your equipment, demonstrate the following with your students assistance.

PULLEY: Try lifting a bucket of rocks or blocks without using a pulley. Then using a pulley, demonstrate how easy it is to lift the bucket.

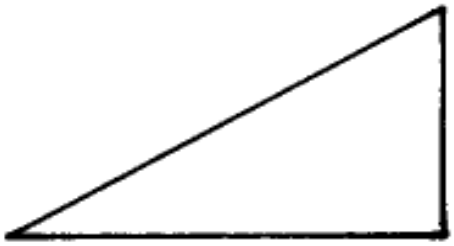
RAMP: Pose the following questions: To drive a truck up a mountain, how must the road be made? Can a truck go up stairs? No, it needs a ramp.

LEVERS: Using a board and a fulcrum (half log) see if the students can figure out how to lift you. Don't give them too many clues, hopefully they will know to move the fulcrum closer to you.

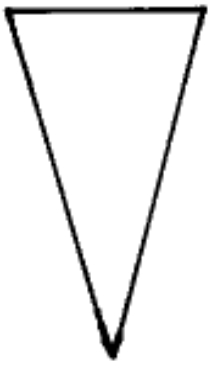
WEDGE: Ask the students how to cut wood. If you have an axe, show them how it is shaped in the form of a wedge. However, warn students that the axe can be dangerous because the energy from the person who is using the axe is concentrated on the tip of the wedge.

APPLIED SCIENCE - TECHNOLOGY (1B) PRE

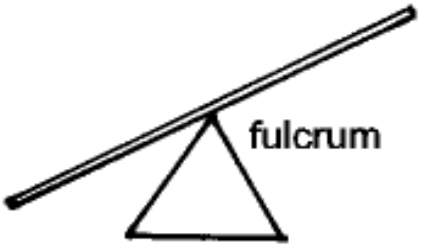
RAMPS, WEDGES, LEVERS, AND PULLEYS



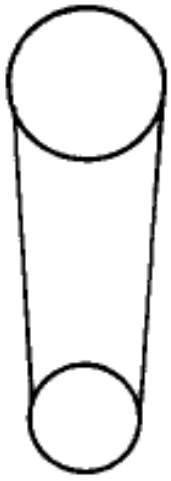
ramp



wedge



lever



pulley

APPLIED SCIENCE - TECHNOLOGY (1B)

LAB

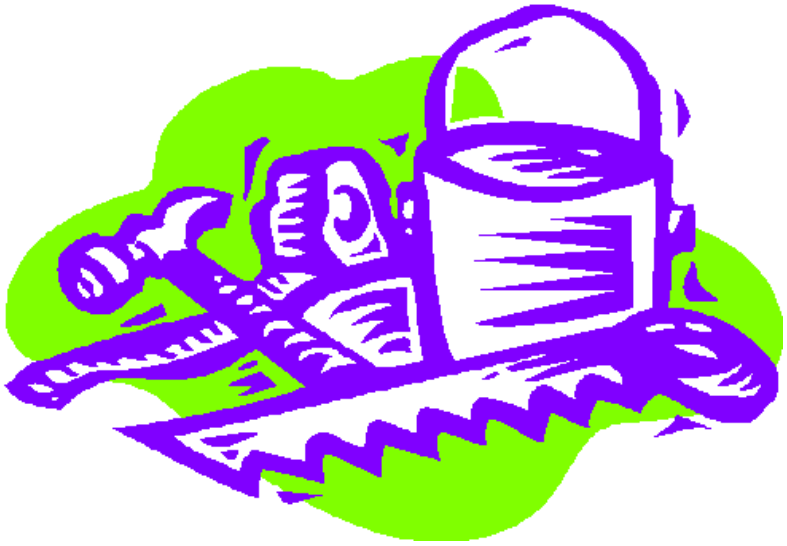
Students identify simple machines from household tools.

OBJECTIVES:

1. Exploring and contrasting different tools.
2. Investigating how tools work.

VOCABULARY:

axle
gear
lever
pulley
screw
wedge
wheel



MATERIALS:

hammer
screw
screw driver
nail
bolts
washers
toy car, plane, helicopter
pulley

BACKGROUND:

A machine can transform motion into energy. Humans use machines to help transform this energy to help save time and to accomplish tasks that humans cannot do on their own. For example, using a wheel barrel will help a human carry heavier items then without it. The wheel barrel uses the principle of a wheel and axle and lever.

Modern machines are very complex, but they still use a combination of the three basic elements which include the wheel and axle, the lever, and the inclined plane. All simple machines are combinations. For example a screw is a wedge and a modified incline plane. A gear is a wheel and axle and lever.

PROCEDURE:

1. This lab is similar to Technology (1A) except the machines are more

complicated. The emphasis in this lab is for students to recognize that machines are composed of many parts.

2. Students will have fun just playing with the items, but they should also find one simple machine in each of the items. If available, add additional items to the lab, because the more examples students see, the more familiar they will become with simple machines.

3. Before the lab, review the vocabulary and when ready, have students rotate to each of the items.

4. Students may be able to find more than one simple in some of the items; especially students who understand how simple machines work.

5. The tools you should include are a hammer (lever, wedge), screw (screw), nail (wedge), screw driver (wedge, lever), bolts (screws), and washers (wheel).

6. Toy cars, planes, helicopters and robot can be several simple machines. All can be a wheel and axle, or gears. If you have questions about the student's answers, have them justify why they decided on that particular machine.

7. The pulley is (as it's name implies) a pulley. It is used to help lift heavy objects easily. Students may also see a wheel and axle.

APPLIED SCIENCE - TECHNOLOGY (1B)

PROBLEM: Can I find simple machines?
Use the following words: wheel and axle, gear, pulley, lever, screw, wedge.

ITEM	SIMPLE MACHINE
HAMMER	
SCREW	
NAIL	
SCREW DRIVER	
PULLEY	
BOLTS	
TOY CAR (1)	
TOY CAR (2)	
AIRPLANE	
ROBOT	
HELICOPTER	

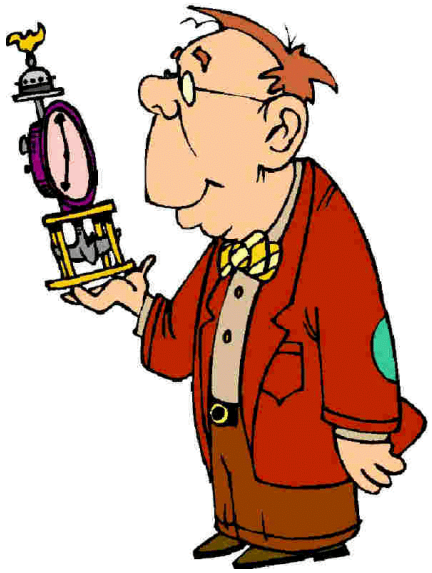
APPLIED SCIENCE - TECHNOLOGY (1B)

POST LAB

Students use a worksheet to design a “new” invention.

OBJECTIVES:

1. Exploring inventions.
2. Designing a new invention.



VOCABULARY:

invention
inventor
society

MATERIALS:

worksheet

BACKGROUND:

Students are well aware of certain objects in their lives such as bicycles, zippers, roller skates, and elevators. They cannot even imagine a world without them and will be amazed to learn these items have not been with us for very long. They were invented, just like most objects we use today.

Every day, humans invent things when they find a need. Sometimes that need is funny; roller skates for instance. In 1760, Joseph Merlin from Belgium was invited to a costume ball. He wanted to play his violin as he rolled around so he put 2 wheels on his shoes and entered the party. Unfortunately, he didn't know how to stop and smashed into a glass mirror. Roller skates were born!

It was only in 1893 that the zipper was created by Whitcomb Judson, who was tired of buttons. It didn't work very well because it always seemed to open up, but it was a beginning.

In 1817, Baron Sauerbronn invented the "dandy horse" which had 2 wheels and a steering device but no pedals. The pedals were not added until 1855; and by 1890, tires, brakes, and handle bars made the bicycle complete.

Elevators were first conceived by King Louis XV in France in 1743. But it wasn't until 1854 that Elisha Otis made an elevator a practical machine.

PROCEDURE:

1. There are many other objects that have interesting histories. After relating the stories above, emphasize that this technological world has evolved through time. Humans,

working together, have invented a technological world that is still evolving. Your students are part of the evolution.

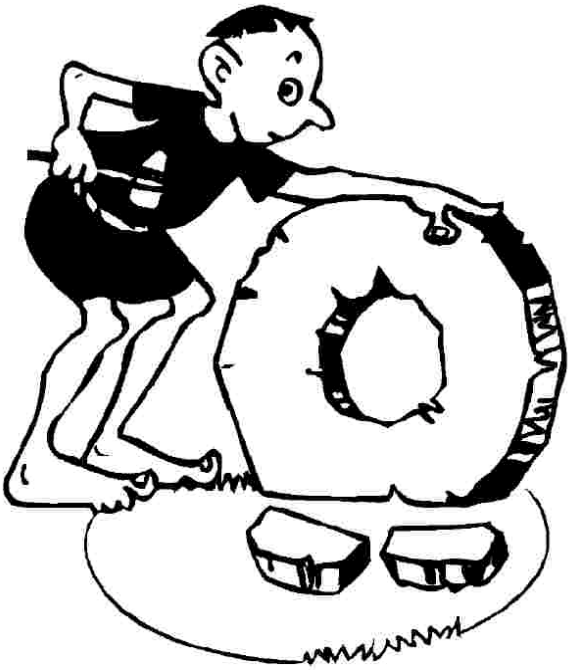
2. Use the worksheet to get students to think about how things were invented. You do not need to know how they were invented, but just so students start the inquiry process.

3. Have students draw a “new” invention. Make sure you have them start thinking, like, a robot that cleans your room or a garbage can that eats garbage. Remind them to invent things that might be useful in their household, or maybe just an easier way to make a item work. Roller blades with automatic holders, so you never fall, would be nice!

I wonder how a

_____

was invented.



What would you like to invent? Draw it.