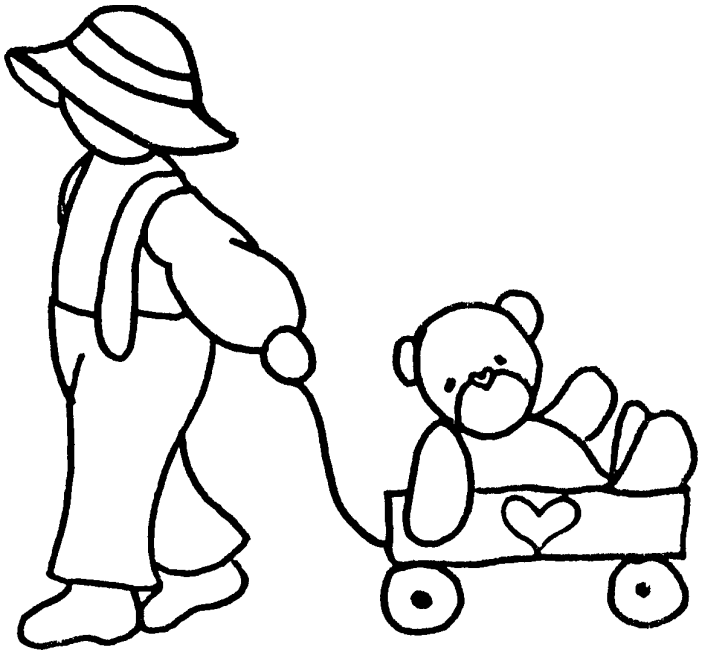
Applied Science

Our Technological World

FIRST GRADE

PHYSICS



3 WEEKS
LESSON PLANS AND
ACTIVITIES

APPLIED SCIENCE
OVERVIEW OF FIRST GRADE

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.*

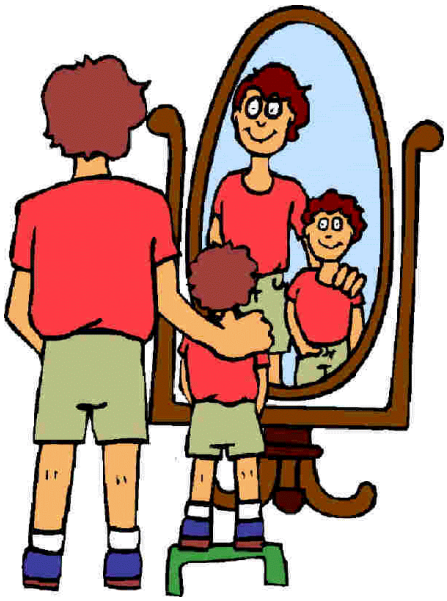
APPLIED SCIENCE - PHYSICS (1A)

PRE LAB

Students compare reflect and refract using worksheet.

OBJECTIVES:

1. Comparing reflect and refract.
2. Discovering how light moves.



VOCABULARY:

lens
microscope
reflect
refract

MATERIALS:

worksheet
crayons
glass of water
spoon

BACKGROUND:

Physics helps us explain the world around us. There are many things we see happening in the world that we can't explain. This unit focuses students to investigate properties of light. They will not understand the physics of light, but will begin the process of becoming familiar with some of the bizarre things light can and cannot do.

Light can be controlled by lenses, prisms, and mirrors. Light moves. Lenses are important in our everyday life. Many people wake up putting on eyeglasses or contacts. People who take pictures use lenses in the cameras. Lenses are in magnifiers, lighthouses, microscopes, telescopes, binoculars and projectors. Nature has found a natural way to create a lens system in most organisms (eyes) so they can see. The word lens comes from the Latin word "lentil," (a bean used in soup that is biconvex.)

Prisms direct light through an object and can also cause light to change direction. A mirror allows light to "bounce" from the surface of the mirror. We see ourselves in the mirror because light reflects or bounces from the mirror and the image is captured by lenses in our eyes.

Light when it travels through different substances can refract or change direction. It appears to our eyes as if the object is bending, but it is only “light” playing tricks with our eyes.

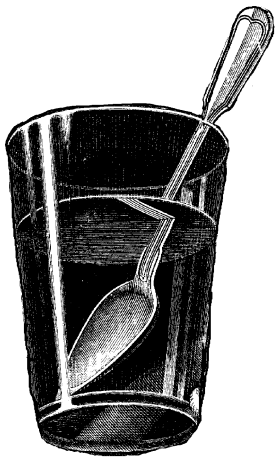
Many people do not realize that light is actually a real phenomenon. It moves, it changes directions, and it is part of a branch of physics called the electromagnetic wave

spectrum.

PROCEDURE:

1. Bring in some lentils for students to see where the word “lens” comes from. Many students (unless from Mediterranean area) are not familiar with lentils as a food source.

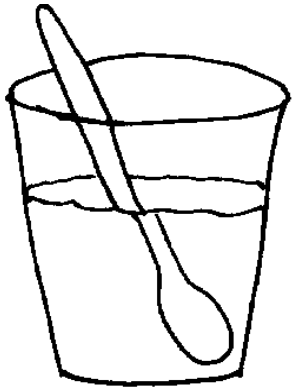
2. Put a spoon in a glass of water is about 1/3 full. Let the students view the spoon through the side. The light makes it refract. Students should be familiar with looking at a mirror or their image in a lake, which is a “reflection.”



3. The worksheet goes over the words "reflect" and "refract." Reflect is light actually deflecting backward or bouncing. Refract is light passing through a substance and changing its course of direction. The worksheet pictures identify the terms reflect or refract. Instruct students to color each picture and trace over the word. A spoon in water when viewed from the side looks bent. This is refraction. A mirror reflects an image. Water will also reflect an image. Light through a lens is refracted.

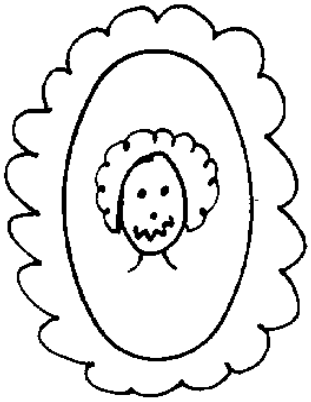
APPLIED SCIENCE - PHYSICS (1A)

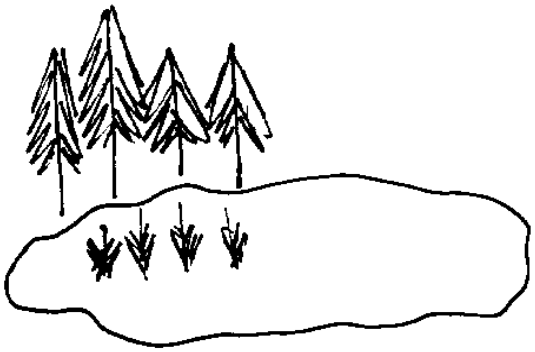
PRE



spoon in water
refract

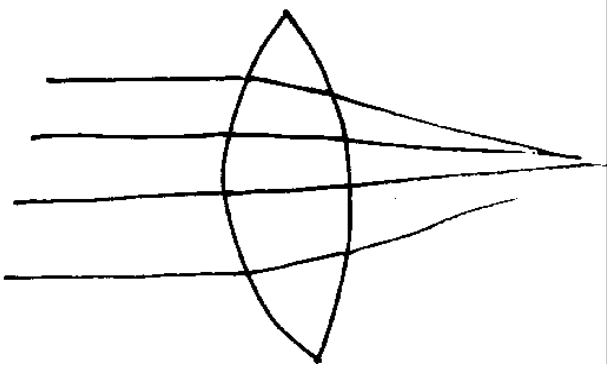
mirror
reflect





water in lake
reflect

through lens
refract



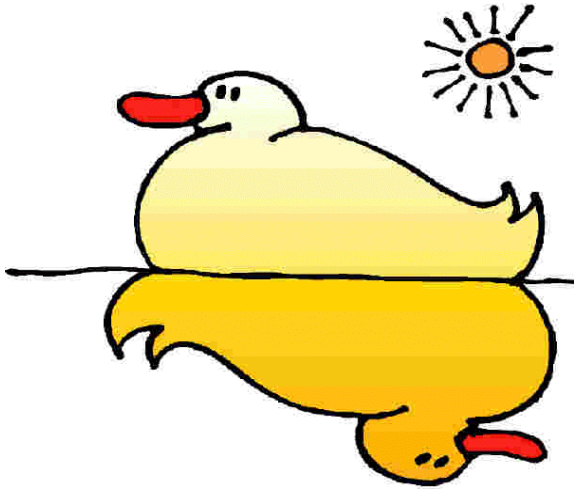
APPLIED SCIENCE - PHYSICS 1A

LAB

Students look at different items and determine if they reflect or refract light.

OBJECTIVES:

1. Comparing reflect and refract.
2. Discovering how light moves.



VOCABULARY:

lens
reflect
refract

MATERIALS:

mirror
prism
lens
glass of water or other objects that light can go through
flashlights
Swift GH Microscope

BACKGROUND:

The world is full of images for children. A reflection in a mirror or window can scare them; a penny in a pool may look closer than it really is. Light has always played with our sense of sight. Children can learn how these images are different from the real thing. Children need to discover that they can change the way light moves. As children play with optic toys, they begin to see that light can play tricks with their eyes.

Young children need to experience different examples of reflect and refract to recognize them easily. Reflect is easier to understand than refract. Reflection is just a "bouncing" back of an image, while refraction is a change of direction of an image. A prism, for example refracts or bends light to create a rainbow.

However, with just a little guidance, students can look at light and identify whether it refracts or reflects.

PROCEDURE:

In this lab, students will "play" with light. Students will view several examples of reflection and refraction and will try to discover how light moves.

1. Display different types of objects that reflect and refract. Common objects include mirrors (reflect); glass of water with spoon in it (refract); foil (reflect); oil in a glass bottle (refract); prism (refract); glass (refract); lens (refract); or any shiny surface (reflect).

2. Instruct students to shine light through the different objects and have them record on their lab sheet whether the light is refracted or reflected. Instruct them to write in the object and then the word “reflect” or “refract.”

3. Students should look at the Swift GH and then look through the optic tube. The light is refracting through the tube. Ask the students how they can get more light through the objective. Give them the word “mirror” as a clue. The mirror can help concentrate light through “reflection” and then help to illuminate an object better. The Swift GH uses reflected light. The light bounces up from the object through the lens in the objective. The light then is refracted through a series of lenses. Then you see the image through the eyepiece.

APPLIED SCIENCE - PHYSICS 1A

LAB

PROBLEM: How can you determine if light reflects or refracts?

PREDICTION: _____

_____

PROCEDURE: At each station, decide whether light reflects or refracts. Draw how you think the light travels.

DRAW HOW LIGHT TRAVELS	REFLECTS OR REFRACTS

CONCLUSION:

_____

_____

_____

_____

APPLIED SCIENCE - PHYSICS (1A)

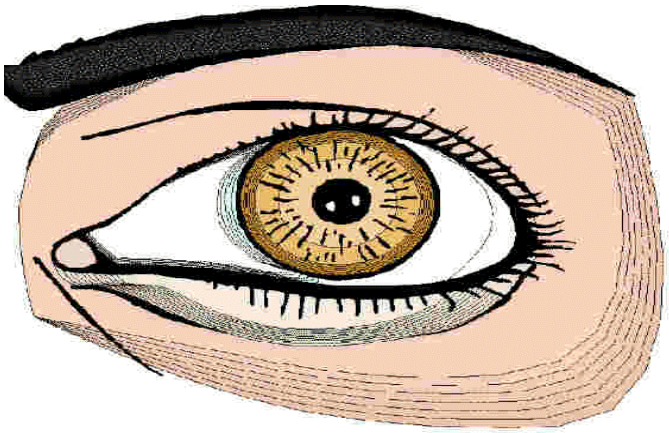
POST LAB

Students discover how lenses are used.

OBJECTIVES:

1. Comparing different types of equipment that uses lenses.
2. Observing the position of lenses in equipment.

VOCABULARY:



binocular
camera
eyeglasses
hand lens
microscope
telescope

MATERIALS:

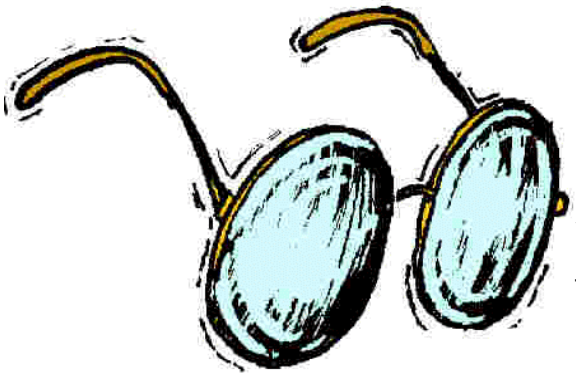
worksheet

BACKGROUND:

Lenses are used in our society in many ways. They are usually hidden, but the power to move and concentrate light is very useful and necessary in our society. The most important lens to humans is the one in each of our eyes. Without it we could not see.

Lenses have the ability to concentrate or diffuse light, while changing the path of how light travels. Lenses not only can move light, but all other components of the electromagnetic wave spectrum. Lenses are powerful in our society.

PROCEDURE:



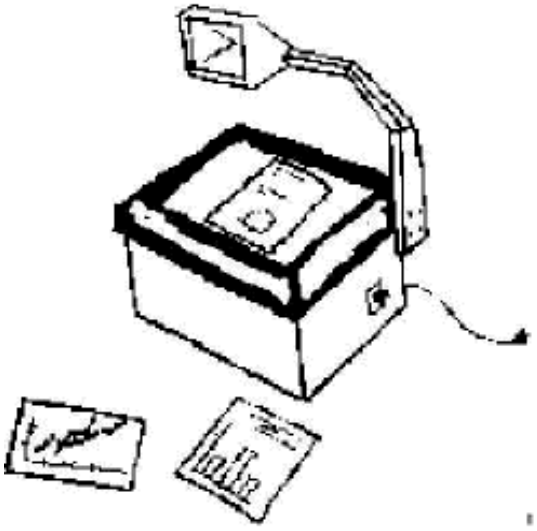
During lab students have seen how light can move things. In this section students look at different items and see if they can locate where lenses may be located.

1. Use a pair of glasses and ask students where are the lenses? The glass (or plastic) are just lenses. They are what are called convex-concave, which means that one side bulges out a little and the other side is scooped inward. These lenses can help correct our eye's lenses, to

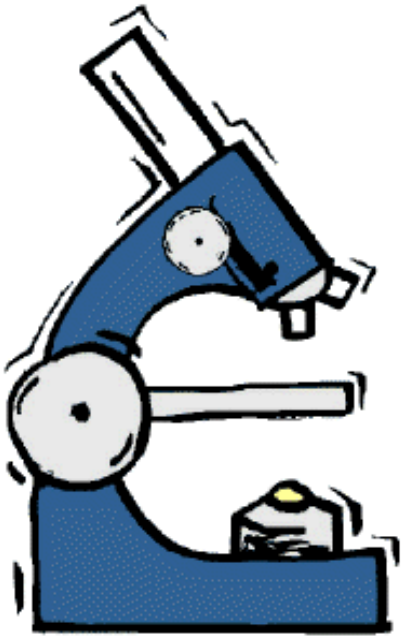
improve our vision. Bring other items into the class like a camera or binocular. A camera captures an image on film through a series of lenses. A binocular has several lenses inside that make a far object appear closer.

2. Give students the worksheet and see if they can determine where the lenses are. In the overhead projector each of the glasses, act as lenses to concentrate light and then project the image. The hand lenses is actually a biconvex lenses. In the microscope and telescope, there are a series of lenses our the outside and inside.

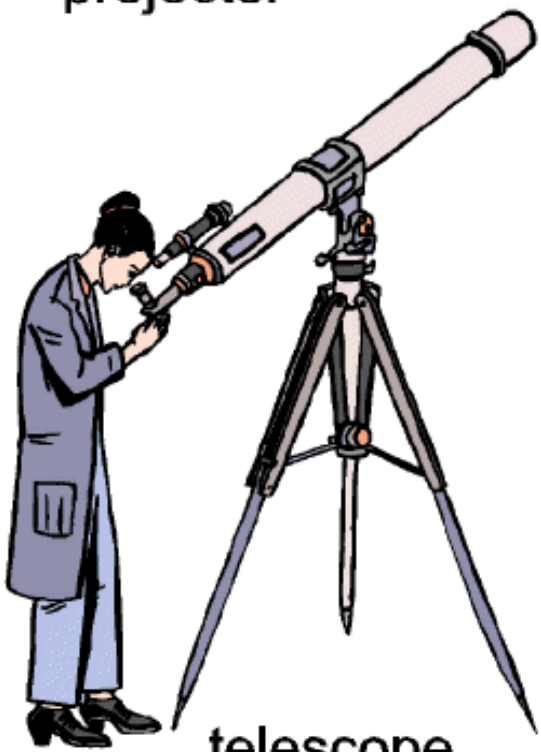
CIRCLE WHERE YOU THINK THERE ARE LENSES IN THE FOLLOWING EQUIPMENT?



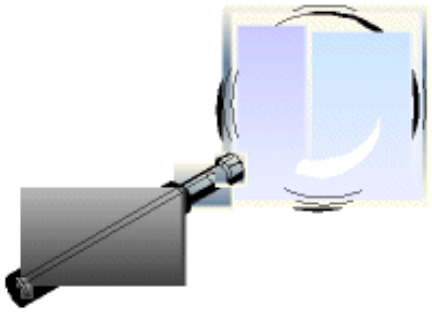
projector



microscope



telescope



magnifying glass

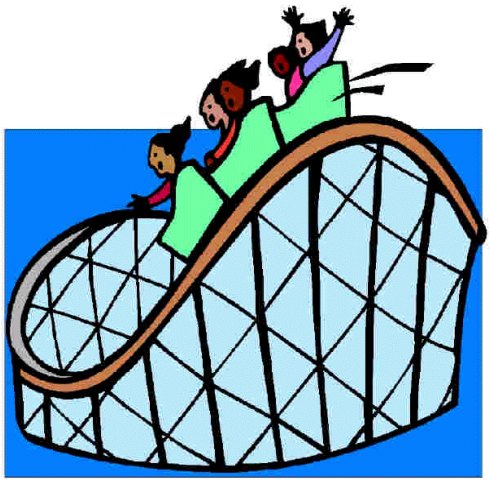
APPLIED SCIENCE - PHYSICS (1B)

PRE LAB

Students use a worksheet to observe motion.

OBJECTIVES:

1. Exploring motion.
2. Discovering what moves in the universe.



VOCABULARY:

energy
motion
move

MATERIALS:

worksheet

BACKGROUND:

There is movement throughout the Universe. Grand scale movement was created by the origin of the Universe. Movement, however, can also be on a small scale. This includes the motion on the Earth, such as walking or riding a bike.

Explore what the science of movement is all about. All things move, whether felt or not. Even if we stand still, the Earth is moving, and we are moving with it. People, animals, and machines move in different ways.

Machines have been developed to capture motion. We use machines to drive, to fly, or to do gardening. Motion is used to create exciting rides at amusement parks. We are a world that depends on movement.

PROCEDURE:

1. Discuss how movement can be accomplished in various ways. Humans move (walk) by the use of leg muscles. Without muscles, people could not walk. Many animals have muscles in 4 legs. Some organism use other mechanisms to move, such as swimming in water, and there are organisms like plants and fungi that do not move.

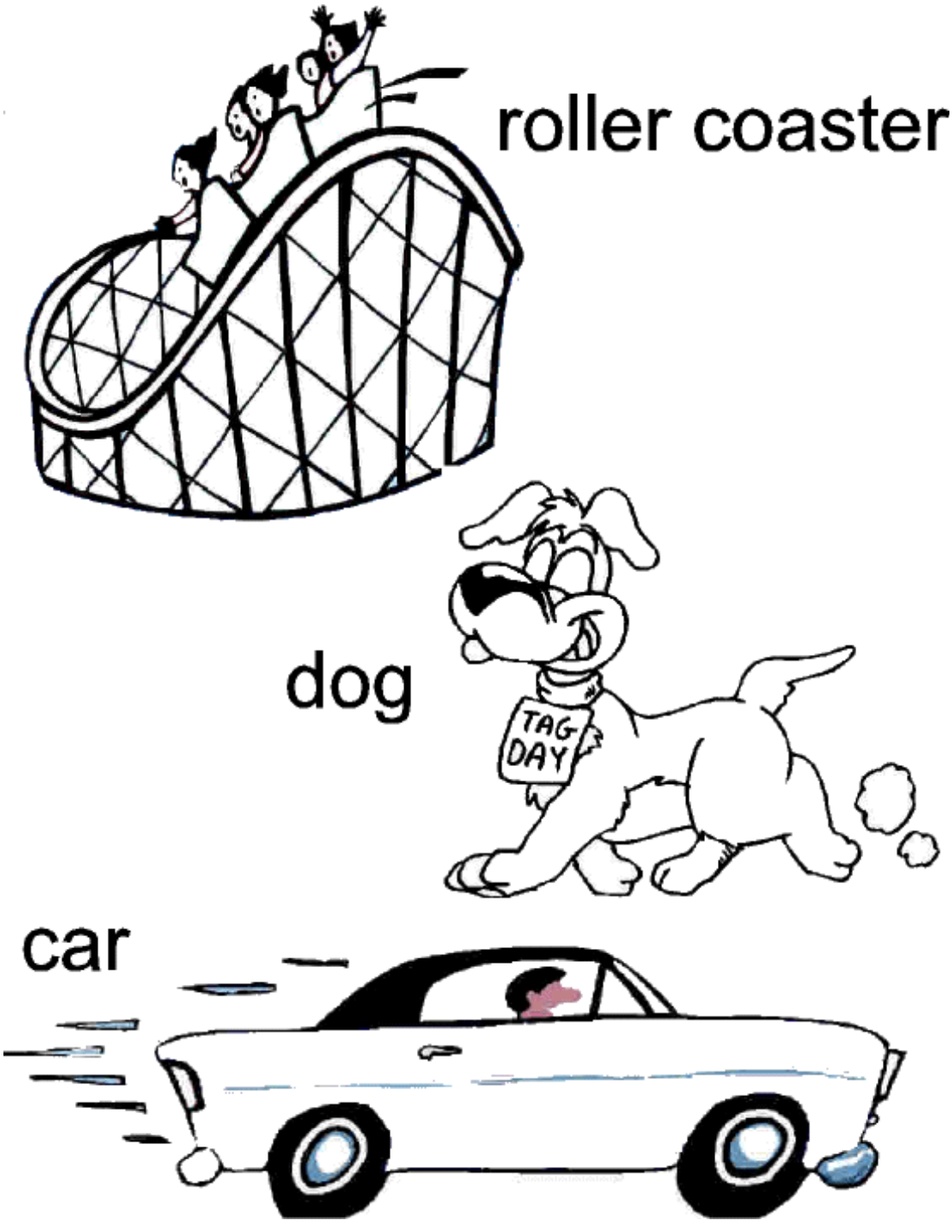
2. Machines rely on wheels to move. It is very difficult to move a heavy box. However, when you put wheels on it, moves easily. Motion can be viewed as the change of position of a body within a reference system. You may be standing still, yet the Earth is rotating on its axis, so you really are moving!

3. Ask students to find objects that move on Earth. Hopefully they will mention

cars, scooters, and other objects. Movement is caused by direct mechanical force (scooters or bicycles) or by reactions of substances that drive machines to work (cars or trains). Movement is all around us!.

4. Give students the coloring exercise on the type of motion of some animals and machines. Students will learn in later grades, that motion and gravity are fundamental forces throughout the Universe.

MOTION MACHINES!



APPLIED SCIENCE - PHYSICS (1B)

LAB

Students use toys to investigate motion.

OBJECTIVES:

1. Exploring movement.
2. Investigating how objects move.

VOCABULARY:

acceleration
energy
friction
movement

MATERIALS:

worksheet
guac ball
newton yo-yo
space ball
stuffed ball
rubber ball
orbiter
balloons
or other appropriate toys

BACKGROUND:

The modern use of the term motion was created by the Italian scientist Galileo Galilei (1564-1642). Galileo investigated the motion of a freely falling object. He concluded that all objects (unless influenced by obstacles such as air pressure) travel at the same acceleration. Galileo dropped objects to see if they hit the bottom at the same time. Sir Isaac Newton (1642-1727) formulated the following three laws of motion. The first law states that particles continue in a state of rest or motion with constant speed in a straight line unless changed by an outside force. The second law states the change of motion is equal to the mass of that object and how fast it is accelerating. The third law states that for every action there is an opposite and equal reaction.

Do not expect your children to understand all these laws of motion. Students should learn how to observe different motion and to ask questions about those motions. The world they live in moves from one place to another. If you can guide their mind to think about what they see, you have started their exploration of motion.

PROCEDURE:

The following are activities with the items in the module. Instruct students to record their motion observations on the lab sheet through art or discuss the motion after they complete their activity. Parent help is recommended in order to divide students into small groups. (You may substitute or add other toys that illustrate different types of motion.)

1. Balloons - Have the students blow up the balloons and release the balloon. Ask them to describe the motion. The balloon "races" backwards. The air is being released one way and the balloon reacts and moves in the opposite direction.

2. Two balls - Use the two balls in the package. Have students put their hands above their head with one ball in each hand. Release the balls at the same time. Students should observe that the balls hit the ground at the same time.

3. Newton's Yo-yo - Have the students make the balls hit. Notice that the first ball stops when it hits the second ball. Notice on the second hit that the balls going in opposite directions meet at the top and at the bottom. This demonstrates that for every action there is an opposite but equal reaction.

4. Guac ball - Have the students try and throw it in a straight line. It will not go in a straight line because another force (the sand at one end) will prevent its straight path.

5. Space ball - Have the students put different forces on the ball and see what happens. The more force a student exerts on the ball the faster it will go. It will also go higher.

6. Orbiter - Have students attempt to make this spin. You must turn the orbiter, then move the ends in and out to see a pulsating motion.

APPLIED SCIENCE - PHYSICS (1B)

GO TO EACH OF THE STATIONS AND DRAW WHAT HAPPENS WHEN YOU "PLAY" WITH EACH TOY.

ITEM	DRAW (OR DESCRIBE)WHAT HAPPENS
1. Balloon	
2. Balls	
3. Newton’s Yo-Yo	
4. Guac Ball	
5. Space Ball	
6. Orbiter	

APPLIED SCIENCE - PHYSICS (1B)

POST LAB

Students use their body to experiment with motion.

OBJECTIVES:

1. Exploring the human machine.
2. Comparing the human body to a machine.

VOCABULARY:

joints
machine
movement
muscles
skeleton

MATERIALS:

student's body

BACKGROUND:

The human body is a well-developed machine that moves efficiently. Ask students how a human moves. The bones and muscles together make the body move. Both are needed to make the body walk, run, jump, or preform any other motion that the body is capable of. If our bones were all one piece, we could not move. The human body has joints that help movement.

Muscles move the limbs and other parts of the body in the directions allowed by the ligaments. In the case of movement at the knee joint, one major muscle is on the front and several muscles are on the back of the joint. There are similar arrangements of muscles around the ankles and many other areas of the body. Bodies are literally a bag of bones that muscles can change into different figures. All muscles differ from each part of the body.

Motion is all around us. The human body has developed the forces that act on it, making a human machine that moves effectively and efficiently. Machines are made to help humans function better.

PROCEDURE:

1. Instruct students to touch and move the joints in their body. Instruct students to do the following:

a. Lift their foot about 15 cm off the ground. Have students rotate their foot.

b. Twist their head from left to right.

c. Bend their knees.

d. Hold their hand in front with palm up. Extend the thumb toward their pinky then move their thumb straight up.

e. Support themselves by leaning on a hand against a table then lift their foot about 20 cm above the ground. Move the foot so that it makes a small circle in the air.

2. Students have now used their joints. Humans have many large and small joints. Emphasize that they could not make graceful movements without joints - they would look like robots.

3. Have students feel their muscles by instructing them to do the following:

a. Firmly flex the forearm. Determine the location on the arm at which a muscle gets tense and enlarges. This is called the bicep muscles.

b. Examine the lower legs while rising up on the toes.

c. Clench the teeth together and locate the tense muscles on the face.

d. Turn the head to the far left or right. Note where the muscle becomes visible.