Gulfport School District
Science Instructional Strategies

Check Grade Level K___ 1___ 2___ 3_X_ 4___ 5___ 6___ 7___ 8___ 9___ 10___ 11___ 12___

Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.
Objective: _a_ Investigate to conclude that the weight of an object is always the sum of its parts, regardless of how it is assembled (e.g. Lego creation/separate blocks, bucket/cups of sand, roll/stacks of pennies, bag/individual potatoes, etc.) DOK 2

Vocabulary: weight, mass, gram, estimate, balance

Teaching Strategy(ies):

1. Explain to the students that weight is the measurement of the mass of an object.
2. The students will order objects from the heaviest to the lightest visually and record their estimation.
3. The students will estimate the weight of each object.
4. The students can work in small groups and weigh the items.
5. Record the weight (mass) in grams.

Materials: Examples of items that can be used: golf balls, marbles, ping pong balls, tennis ball, wooded blocks, clay ball, balance, and gram weights

Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.
Objective: _a_ Investigate to conclude that the weight of an object is always the sum of its parts, regardless of how it is assembled (e.g. Lego creation/separate blocks, bucket/cups of sand, roll/stacks of pennies, bag/individual potatoes, etc.) DOK 2

Vocabulary: weight, mass, gram, estimate, balance

Teaching Strategy(ies):

1. Explain to the students that weight is the measurement of the mass of an object.
2. Students will place six of each item from the previous exercise to be weighed.
3. Students will estimate the weight of six objects.
4. The students can work in small groups to weigh the six objects.
5. Record the weight (mass) of the group of objects.
6. Discuss- The weight is the sum of the parts.
   Example: 1 ball = 5 grams Group= 5+5+5+5+5+5

Materials: Examples of items that can be used: golf balls, marbles, ping pong balls, tennis ball, wooden blocks, clay ball, balance, and gram weights (6 of each item).

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Competency: __2__ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

Objective: __b__ Explore and identify physical changes of matter, including melting, freezing, boiling, evaporation, and condensation. DOK 2

Vocabulary: solid, liquid, gas, melting, freezing, boiling, evaporation, condensation

Teaching Strategy(ies):

1. Website: http://jc-schools.net/PPTs-science.html look for the matter section for Water: The 3 States of Matter
2. Show the PowerPoint.
3. Begin the activity by asking students where and when they see ice in nature. Ask them to explain the conditions that create ice in nature. [There must be water and there must be cold.]
4. Inform students that they are going to look at what happens when water freezes. Give each group of students two cups with equal amounts of water in them. Ask them what they think will happen if one of the cups of water is left in the freezer overnight. Have each group put their names on masking tape and then use the masking tape to mark the water levels in their cups. Cover the cups with plastic wrap to prevent any evaporation.
5. The next day distribute to each group their cup of ice and their cup of water. Discuss changes in the water when it became ice. If students do not mention the height variable, direct them to notice the level of ice in comparison to where the tape marked the level of water. Have them measure the height of the ice and mark it with another piece of masking tape.
6. Invite the students to compare the contents of the two cups. Ask students for words that describe the water and the ice. Make one list for water and one list for ice. Encourage the students with questions like:
    a. Which feels colder, the water or the ice?
    b. Can you hold the ice in your hand? What about the water?
    c. Can you pour the water? What about the ice?
    d. What sound do they make when you pour them out?
    e. Can you see through the water? . . . . the ice/

    Have them record the comparisons in their science journal using the sheet *Water to Ice*.
7. Compare and contrast the lists of physical characteristics.
8. Let the ice in the cups melt. Have students look at the height of the water. They should see that it is the same level they marked before they froze it. Ask them what they think will happen to the height if they put it back in the freezer. Record their predictions on the board.
9. Freeze the water and have students again observe the height of the ice in the cups.

Materials: plastic cups, water, masking tape, ruler, plastic wrap, containers of water, science journal, Video: *Magic School Bus Water*

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

Objective: _b_ Explore and identify physical changes of matter, including melting, freezing, boiling, evaporation, and condensation. DOK 2

Vocabulary: solid, liquid, gas, melting, freezing, boiling, evaporation, condensation

Teaching Strategy(ies):

1. Take the students out on the playground after a rain to observe the puddles. Have the students use chalk to trace around the puddles. Watch the puddles for a period of time. Have the students draw a "before" view of the puddle in their science journal.
2. Have the students measure the diameter of the puddle. Many puddles will not be symmetrical, so have students determine how they are going to measure them and include their methods in their illustrations in their science journal.
3. Periodically check the puddles to see how much evaporation has occurred. When you feel that it is substantial enough to make an impact on the students, invite them back outside to illustrate and measure their puddles in their science journal. Once again, have the students measure and draw an "after" view of the puddle.
4. Have the students write an explanation of what they think happened to the water in the puddles.
5. Have the students wash their hands but not dry them. Have them time how long it takes for their hands to dry. Ask them to explain what things might cause their hands to dry up more rapidly . . . . more slowly.
6. Discuss how the disappearance of water from their hands is like the water in the puddle.
7. Fill two identical containers with the same amount of water; put lids on both jars. Place them in the balance and make sure it is equalized. Remove the lid from one jar and put it in the balance pan. Some of the mass will remain the same. Leave the water and jars intact and observe over a period of several days.
8. Watch what happens to the balance and the water level in the jars. Discuss with the students why the balance is tipping. Have the students draw and write in their science journal about what they see happening using the *Covered and Uncovered* recording sheet.
9. Ask the students to apply the disappearance of water from the jars to the experience with the puddles.

Materials: balance, two identical jars with lids, water, chalk, cloth or paper towel, stopwatch, ruler, science journal, Video: Magic School Bus Water

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.
***Objective*:** _b_Explore and identify physical changes of matter, including melting, freezing, boiling, evaporation, and condensation. DOK 2

Vocabulary: solid, liquid, gas, melting, freezing, boiling, evaporation, condensation

Teaching Strategy(ies):

1. Ask the students what they know about rain. How does it get to Earth? Where do the clouds come from? How does water get into the clouds? As a pre-assessment have the students draw a picture explaining rain.
2. Ask the students if they agree or disagree with this statement: Water is in the air at all times. Spend some time discussing why they believe the way they do. Tell them that they are going to do an activity that may help them understand that water is in the air.
3. Place three small jars in the window. In one jar, put an ice cube, in the second and third jar, put equal amounts of water but close the third jar with a lid. Have the students make observations over the next few days. They should notice that the ice melts to water then disappears {evaporates}, the water in jar two evaporates, and the water in jar three remains. Discuss and record their ideas in their science journal using *The Three Jars* sheet. Be sure to keep reinforcing the idea that the water evaporates – it goes somewhere.
4. Give each group of students a small can of ice water to observe. Have them feel the outside of the can when the water is first poured. It should be dry. After a few minutes there will be condensation on the outside that they can see and feel. Ask them where they think the water came from. [the air] if students believe the water came through the can, repeat the experience and add food coloring to the water. The water on the outside will not be colored; it condenses from the surrounding air, which is warmer. Have the students wipe the outside of the can with a white paper towel and they will see that it has no color. You can also remind the students that they will often see water on the outside of their milk cartons at lunch. Ask them where they think that water came from.
5. Entice the students with the question: Do you think we can make rain in a jar? Allow time for discussion.
6. Tell them that you have a recipe for making rain in a jar. Pour about five centimeters of very warm water into the jar. Place the lid upside down over the mouth of the jar. Allow it to sit for a few minutes. Then place ice cubes in the lid. Darken the room and shine a light through the jar. {Use a flashlight or use the light from the overhead projector.}
7. Ask students to describe what they see happening in the jar and why they think that this is happening. They should be able to see wisps of clouds forming and moving upward. “Raindrops will form on the lid and fall back to the water.” Ask students if they know how this activity relates to nature making rain. If necessary, use a diagram of the water cycle to explain how the Sun heats the Earth, making water evaporate into the air. High above us the air is much cooler and the water condenses into clouds and falls back to Earth as rain or snow. Allow students to use their own words to restate the cycle.
8. Ask students to look at the pictures they drew at the beginning of the lesson. Have them write in their science journal whether or not they now agree or disagree with what they drew to show where rain comes from and explain why.

Materials: Three identical jars, one lid, water, food coloring, ice, science journal, Video: Magic School Bus Water

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

***Objective*: _c_** Investigate and describe forces affecting motion in simple machines (lever, wheel and axle, block and tackle, inclined plane, and screw) DOK 2

Vocabulary: simple machine, ramp, gear, lever, wheel and axle, block and tackle, inclined plane, and screw

Teaching Strategy(ies):

Prior to starting this unit, the teacher will need to gather the following materials or materials representative of the six groups of simple machines.

Inclined Plane	**Pulley**	**Wedge**
slide	drapes	knives
various ramps	flagpoles	forks
screw		scissors
Wheel and Axle	**Lever**	**Gear Wheels**
doorknobs	hammer	hand drill
toy cars	bottle opener	hand mixer
fishing pole	pliers	bicycle

Prior to starting this unit, the teacher will need to create a set of "Task Cards" for each machine similar to those below. This list is not inclusive of all simple machines that can be used.

Inclined Plane 1. Roll the toy car down the ramp.	**Wedge** 1. Open the pair of scissors. 2. Cut the piece of paper.	**Lever** 1. Hammer the nail into the block of wood. 2. Use the hammer to pull out the nail.
Pulley 1. Use the cords to close the drapes. 2. Now open the drapes	**Wheel and Axle** 1. Open the door using the knob. 2. Close the door with the knob.	**Gear Wheels** 1. Turn the handle of the drill so the point goes into the block of wood. 2. Pull the drill out of the wood.

1. Divide the class into six groups.
2. At each station the students will:
   a) Record the name of the object on the record sheet.
   b) Perform the job on the task card.
   c) Record the job each object does on the record sheet.
3. Record the data from the class on a class chart. When recording the information on each machine, discuss how and why each simple machine works {during discussion students will fill in information on student worksheet.}
4. Ask students to identify as many simple machines as they can in the classroom. List them on the board. Ask them to identify the type of simple machine that they found most often and which type was the most difficult to find.
5. Have the students identify ways in which simple machines make tasks in life easier.

Materials: several of each type of simple machine: lever, wheel and axle, block and tackle, inclined plane, and screw

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

***Objective*: _d_** Differentiate between potential and kinetic energy and recognize their conversions.

- Potential to kinetic (e.g., winding a clock/clock begins ticking)
- Kinetic to potential (e.g., roller coaster moving downward/upward to the top of the hill)

DOK 2

Vocabulary: **kinetic and potential energy**

Teaching Strategy(ies):

Website: www.eia/doe.gov/kids/energyfacts/science/formsofenergy.html
www.teachersdomain.org/resource/hem06.sci.phys.maf.rollercoaster
demonstrates two types of energy produced by a rollercoaster
SOL 4.2 Kinetic vs. potential energy – words in context paragraph

1. Students identify the type of energy that is demonstrated in the picture.
2. This is an introduction to the potential and kinetic energy.

Materials: activity sheet

Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

***Objective*: _d_** Differentiate between potential and kinetic energy and recognize their conversions.

- Potential to kinetic (e.g., winding a clock/clock begins ticking)
- Kinetic to potential (e.g., roller coaster moving downward/upward to the top of the hill)

DOK 2

Vocabulary: kinetic and potential energy

Teaching Strategy(ies):

1. Tell the students that they are going to help The Mummy build a roller coaster to entertain the Atom's Family. Explain that they will be helping The Mummy identify kinetic and potential energy by helping build a rollercoaster.
2. Place two chairs back to back about three feet apart.
3. Tape the ends of your track to the backs of the chairs so that the center hangs down to the floor like the letter U. Use masking tape to secure the bottom of the track to the floor.
4. Place your marble on one end of the track and let it roll down. How many times did the marble travel back and forth before it stopped in the middle? This activity illustrates potential and kinetic energy. Where was the marble when it had the greatest potential energy? Where was it when it had the most kinetic energy?

Materials: two chairs, masking tape, yard sticks, 3 shooter marbles, 8 foot strip of vinyl ceiling molding

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

***Objective*:** _d_ Differentiate between potential and kinetic energy and recognize their conversions.

- Potential to kinetic (e.g., winding a clock/clock begins ticking)
- Kinetic to potential (e.g., roller coaster moving downward/upward to the top of the hill)

DOK 2

Vocabulary: kinetic and potential energy

Teaching Strategy(ies):

1. Explain to the students that they will be conducting an experiment today showing how potential energy can be changed into potential energy and back to kinetic energy.
2. Have students tape the clear plastic tubing to the wall forming a series of loops that go up and down. Make sure that the beginning of the tubing is at the highest point on the wall.
3. Have one student place the ball bearing inside the tubing at the highest point and release it.
4. If the ball bearing does not come out the other end, adjust the loops until it does. You may have to lower the height of some of the loops or you may have to decrease the number of loops you have.
5. Using a stopwatch, time how long it takes for the ball bearing to complete its roller coaster ride.
6. Experiment with your roller coaster by changing its design including a reverse loop.
7. Ask the students, “At what point does the ball bearing have the most potential energy?”
8. Have the students write about the conclusions they can draw from your observations and results, as well as drawing their design in their science journal.

Materials: masking tape, 12 foot clear plastic tubing, flat wall surface, small ball bearing, stopwatch

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.
Objective: _e_ Explain how light waves travel (e.g., in a straight line until they strike an object, through transparent and translucent objects, from reflecting and refracting surfaces, at the surface of opaque objects). DOK 1

Vocabulary: transparent, translucent, opaque, reflecting, refracting

Teaching Strategy(ies):

1. Ask the students to think of all of the sources of light that they can. Record their answers on a circle map shaped like the sun or a giant light bulb. [Sources may include lamp, overhead projector, match, candle, flashlight, nightlight, campfire, moon, glowing coals, television, fluorescent lighting, streetlights, and the sun.] (NOTE: Nuclear energy does not come from the sun.)
2. Explain that all of these sources of light get their energy from the sun. Electricity is made from the burning of energy stored by plants long ago. Even hydroelectric power is available because the water cycle is powered by the sun. The moon is actually reflected sunlight, so it is not a true producer of light.
3. Ask students if they know how light behaves. Discuss how some objects (i.e. windows) let light through very easily. Other objects (i.e. books) block all light. Then there are other objects (i.e. wax paper) that allow some light to pass through.
4. Distribute the record sheet *Just Passing Through* and the objects you wish the students to test.
5. In their groups, students will examine the collection of items one at a time.
6. Students will predict whether the object allows light through, blocks some light, or blocks all light and use a red crayon to mark an X in that box. The students will test each item by holding up a light source, preferably a flashlight. Once they have determined their answer, they will use a blue crayon to mark an X in that box.

Materials: light source and a collection of items to test such as a glass jar, a sheet of white paper, a piece of plastic (transparency film), cardboard, aluminum foil, wax paper, tissue paper, glass of water, mirror, cloth, book, hand lens

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

Objective: _f_ Differentiate the movement of vibrations in waves (e.g., sound and seismic waves), and cite examples to explain the vibrations move through different materials at different speeds. DOK 1

Vocabulary: **sound, waves, vibration, pitch, molecule**

Teaching Strategy(ies):

NOTE: Prior to beginning this activity, fill a plastic bag with water and seal it tightly. Also, collect a coffee can, paper bag, glass jar and shoebox with newspaper. They must be large enough to put the clock inside.

1. Wind a clock. Have the students close their eyes and listen to the clock ticking.
2. Have students raise their hands if they can hear the clock ticking. Ask, "What is the sound traveling through?"
3. Explain that the air is a gas. Sound is produced by vibrations of the clock disturbing the air.
4. Have the students press their ear against a wooden surface {table top, desk, wooden floor} and place the clock on the table top some distance from the student's ears. Ask, "Can you hear the sound?" "Is the sound louder or softer than when you heard it through the air?" [louder because the path between molecules is shorter]
5. Have a student hold the water-filled bag to his/her ear. Hold the clock against the other side of the bag. Ask the student, "Can you hear the clock ticking?" [yes]
6. Put the clock inside of the following: a metal can, a paper bag, a glass jar, and a shoebox stuffed with newspaper. Have the students tell when the sound is the loudest and when it is the softest. Which containers did the clock make vibrate the best?
7. Try having the students press their ear against a metal surface. "Does sound travel through metal?" [yes]
8. Have students write in their science journal about their observations about sound.

Materials: wind-up clock, zipper-type plastic bag, water, table top, empty metal coffee can, paper bag, glass jar, shoebox, old newspaper, science journal

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.

***Objective*: _f_** Differentiate the movement of vibrations in waves (e.g., sound and seismic waves), and cite examples to explain the vibrations move through different materials at different speeds. DOK 1

Vocabulary: **sound, waves, vibration, pitch, molecule**

Teaching Strategy(ies):

1. In introducing this activity, ask the students how they can make string conduct sound. Record these ideas on the board.
2. Allow students time to explore their ideas and to share their results with the class.
3. Tell them that they are going to use string to make a paper cup telephone that will conduct sounds.
4. Distribute the supplies.
5. Have the students make a small hole in the center of the bottom of each cup with a pencil.
6. Tie one end of the string to a paper clip and thread the other end through the inside of the cup and out the hole. The paper clip will prevent the string from being pulled out of the cup.
7. Thread the end of the string down through the hole in the bottom of the second cup. Reaching into the cup pull the end of the string far enough to attach the other paper clip.
8. Inform the students that this completes their paper cup telephones. Their next task is to discover how to operate them.
9. After a period of investigation time, students should come to the realization that one student talks into one cup while the other student holds the other cup over his/her ear.
10. If necessary, explain that when one person speaks into the cup, the sound travels in waves along the string and makes the other cup vibrate too. This is how sound travels between the cups.
11. To explore the tautness of the string variable, have the students let the string go slack. What happens to the sound? [becomes fainter with reduced tension]

Materials: paper cups, 6 meters string, sharp pencil, 2 paper clips

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Competency: _2_ Explain concepts related to objects and materials, position and motion of objects, and properties of magnetism.
***Objective*:** _g_ Cite evidence to explain why heating or cooling may change the properties of materials (e.g., boiling an egg, evaporating water, chilling gelatin, making ice cream, etc.) DOK 2

Vocabulary: **boiling, evaporating**

Teaching Strategy(ies):
NOTE: It is best to do this activity outdoors.

1. Set up the supplies needed for this activity at a big table. Have the students walk along the table and pick up their supplies as they go along. Prepare the sandwich-sized bags with juice in them ahead of time. Make sure that they are zipped tight.
2. Give each student a gallon size Ziploc bag.
3. Have the student place their small bag of juice inside the gallon bag.
4. Fill the gallon-sized bag ¾ full of ice.
5. Throw in a handful of rock salt.
6. Zip up the bag . . . . shake, shake, SHAKE!

Materials: gallon Ziploc bags (1 per child), sandwich Ziploc bags, Hawaiian Punch, straws, rock salt, lots of ice