

Windmills

Second Grade

Activity: 1

Time: 1 Class Period

General Description

Students will work in groups to design and build a model of a working windmill.

Objectives

Students will explain how windmills demonstrate the use of energy.

Students will identify the components of a windmill.

Arizona State Standards

SC02 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry

SC02 S1C2 PO4 Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper)

SC02 S2C2 PO1 Identify components of familiar systems (e.g., organs of the digestive system, bicycle)

SC02 S2C2 PO2 Identify the following characteristics of a system:

- consists of multiple parts or subsystems
- parts work interdependently

SC02 S3C2 PO1 Analyze how various technologies impact aspects of people's lives (e.g., entertainment, medicine, transportation, communication)

SC02 S3C2 PO2 Describe important technological contributions made by people, past and present:

- automobile – Henry Ford
- airplane – Wilbur and Orville Wright
- telephone – Alexander G. Bell

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

R02 S3C2 PO1 Follow a set of written multi-step directions

Teacher Background

Wind is a less expensive and unlimited source of power. As long ago as the 12th century, people have used it to pump water and grind grain. Today it is being used to generate electricity. Windmills for generating electricity have a propeller-type wheel with two or three blades which whirl rapidly. The drive shaft operates an electric generator.

Materials (per student)

Pencils or straws

Tacks

Activity Card 2-1

Paper cups and plates

Tape

Procedure/Exploration

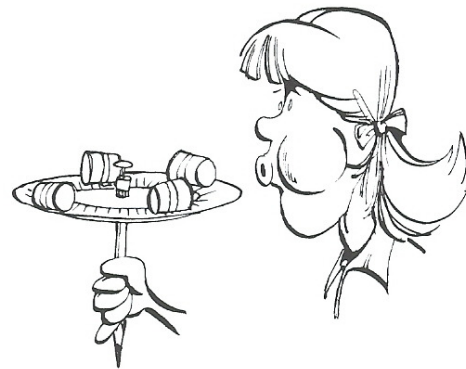
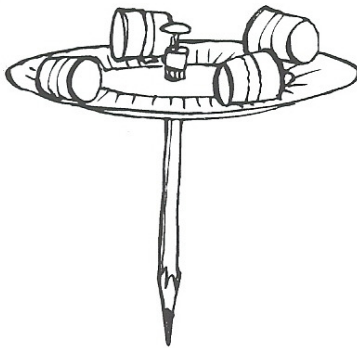
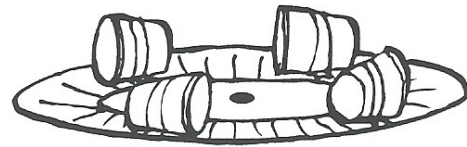
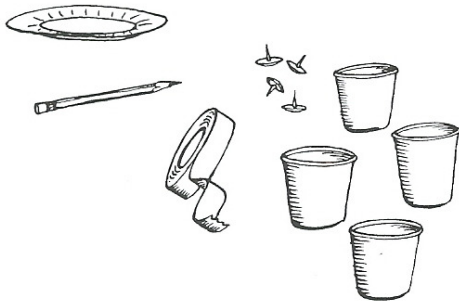
1. Collect books or pictures of windmills.
2. Divide the students into groups. Have available materials for each group to make windmill plates - one paper plate, four paper cups, tacks, pencils, tape.
3. Provide paper for recording and designing.
4. Provide copies of Activity Card 2-1.
5. Have the children construct a windmill plate by using the either the example on Activity Card 2-1 or design their own windmill.
6. Have them test the windmills. If they've designed their own, which design works best?
7. Explain to the students that work is done when a force moves an object. Question: How can we make our windmill move?
8. Energy is needed to do work. Question: What is the source of energy needed to move the windmill?
9. Who needs the wind to help them do their job? (Farmer - to pump water, weatherman, airplane pilot, child - to fly a kite, etc.)
10. The students will record the results and explain the changes they would make to cause their windmill to work better.

Windmills

Second Grade
Activity: 1
Activity Card: 2-1

Student's Name:

Date:



***“Why does this
wheel move?
From where does
the energy come?”***

APS Power Posse™

General Description

Students will demonstrate a strategy of conservation by using a lollipop.

Objectives

Students will demonstrate knowledge of conservation and conservation strategies.

Arizona State Standards

SC02 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry

SC02 S1C2 PO4 Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper)

SC02 S3C2 PO1 Analyze how various technologies impact aspects of people's lives (e.g., entertainment, medicine, transportation, communication). Students can relate the need for conservation to the different types of technology/energy we use everyday

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

R02 S3C2 PO1 Follow a set of written multi-step directions

Teacher Background

Explain to students that they can help conserve resources in many different ways. Ask them what they think the word conservation means. Help the student understand that by using energy wisely they are actually conserving energy and resources. Conservation is defined as the way we can make things last for a longer period of time.

Materials (per student)

Lollipop

Paper to record information

Journal to record findings and ideas

Procedure/Exploration

1. Give each student a lollipop.
2. Ask them to record strategies of how they are going to make their lollipop last the longest or the shortest period of time.
3. Students will put their strategies into place.
4. The students will record their findings.
5. Ask the students to think about the lollipop as a limited resource; for example what if the lollipop was water, or gasoline, or heating oil: How can we transfer the experience with the lollipop?

How Does Energy Get to Us?

Second Grade

Activity: 3

Time: 1 Class Period

General Description

Students will work in groups to determine different ways energy reaches our homes.

Objectives

Students will illustrate their understanding of energy distribution by creating a poster of water distribution and electricity distribution.

Arizona State Standards

SC02 S2C2 PO1 Identify components of familiar systems (e.g., organs of the digestive system)

SC02 S2C2 PO2 Identify the following characteristics of a system:

- consists of multiple parts or subsystems
- parts work interdependently

SC02 S3C2 PO1 Analyze how various technologies impact aspects of people's lives (e.g., entertainment, medicine, transportation, communication)

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

W02 S3C3 PO1 Write a variety of functional text (e.g., classroom rules, letters, experiments, recipes, notes/messages, labels, directions, posters, graphs/tables)

R02 S3C2 PO1 Follow a set of written multi-step directions

Teacher Background

Help students identify, in your area, whether a single power company provides natural gas, electricity and water, or whether these are provided by separate companies. Gather pamphlets, books, etc. on energy sources students can use in researching and discussing forms of energy and other resources they use everyday.

Materials

Resources (APS, local city governments, etc. may provide these resources to the students)

Poster paper

Colored pencils/crayons

Procedure/Exploration

1. Have a class discussion on the different types of energy and services that the students use daily in their homes and at school.
2. Questions: What forms of energy do we use? Where does it come from? How do they get electricity/ water/gas to our homes?

3. Students will divide into groups to research how energy/water/natural gas gets from the source/production location to their home.
4. Each group should record their findings on a poster representing the electricity/water/natural gas distribution from the source to their home or school.

Race to Water

Second Grade

Activity: 4

Time 1: Class Period

General Description

Students will place ice cubes on different colors of paper in a sunny place. They will predict which color helps the ice win the melting race.

Students will explore the concept that a solid can change and become a liquid.

Objectives

Students will investigate how color affects the rate ice melts.

Students will identify two states of matter; solid and liquid, and their characteristics.

Arizona State Standards

SC02 S1C1 PO1 Formulate relevant questions about the properties of objects, organisms, and events in the environment

SC02 S1C1 PO2 Predict the results of an investigation (e.g., in animal life cycles, phases of matter, the water cycle)

SC02 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry

SC02 S1C2 PO4 Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper)

SC02 S5C1 PO2 Classify materials as solids, liquids, or gases

SC02 S5C1 PO3 Demonstrate that water can exist as a:

- gas – vapor
- liquid – water
- solid – ice

SC02 S5C1 PO4 Demonstrate that solids have a definite shape and that liquid and gases take the shape of their containers

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

R02 S3C2 PO1 Follow a set of written multi-step directions

M02 S2C2 PO2 Make a simple pictograph or tally chart with appropriate labels from organized data

M02 S2C2 PO3 Interpret pictographs using terms such as most, least, equal, more than, less than, and greatest

M02 S2C2 PO4 Answer questions about a pictograph using terms such as most, least, equal, more than, less than, and greater than

Teacher Background

It is very important to have the ice cubes as uniform as possible. A good extension of this lesson would be to measure the ice cube with the use of a balance or scale.

Materials

Ice cubes

Several pieces of colored paper (red, black, white, yellow, blue, green)

Stop watches

Activity Card 2-4

Procedure/Exploration

1. Students will divide into groups.
2. Students will predict which color helps the ice win the melting race. Record their predictions in their science journal.
3. Place the cubes on the different colored pieces of paper and put them in a sunny place.
4. Record the time it takes for each ice cube to melt using Activity Card 2-4.
5. Make observations about what the ice looks like as it is melting
6. Make a table of the how long it took each of the ice cubes to melt.
7. Students will record and evaluate the results.
8. Graph the results in order to share with the class.
9. Have the students look at their results and answer the following questions: Which color caused the ice to melt the fastest? How does this experiment relate to the color choices we make when wearing clothes?
10. Relate the two forms of water, solid and liquid to other matter that can take both forms, solids and liquids (e.g., popsicles, ice cream, orange juice concentrate)

Race to Water

Second Grade

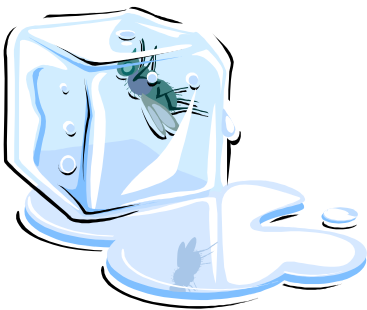
Activity: 4

Activity Card: 2-4

Student's Name:

Date:

| | Black | White | Red | Green | Blue |
|--------|-------|-------|-----|-------|------|
| First | | | | | |
| Second | | | | | |
| Third | | | | | |
| Fourth | | | | | |
| Fifth | | | | | |



"Which melted first, which melted last?"

Be an Eagle Eye

Second Grade

Activity: 5

Time: 1 Class Period

General Description

Students will use their “Eagle Eye” to spot energy and water waste.

Objectives

Students will become aware of energy/ water being wasted and will develop strategies to conserve those natural resources and share those strategies with others.

Arizona State Standards

SC02 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry

SC02 S1C2 PO4 Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper)

SC02 S1C2 PO3 Use simple tools such as rulers, thermometers, magnifiers, and balances to collect data (U.S. customary units)

SC02 S1C4 PO1 Communicate the results and conclusions of an investigation (e.g., verbal, drawn, or written)

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

R02 S3C2 PO1 Follow a set of written multi-step directions

M02 S2C2 PO1 Formulate questions to collect data in contextual situations

M02 S2C2 PO2 Make a simple pictograph or tally chart with appropriate labels from organized data

Teacher Background

Discuss with students the excellent vision of an eagle. Brainstorm with students what energy is and examples of wasted energy. Discuss with students that fact that water is a limited resource and where they might see waste. Ask students why they think it might be important to save energy/water and how it is beneficial to them. For example if their parents save money on their energy bills there is more money for other things or if we don't conserve water we might not have enough to drink.

Materials

Picture of an eagle

Papers cut in the shape of large eagle feathers

Optional Activity Cards 2-5a, 2-5b, 2-5c, 2-5d, 2-5e, 2-5f

Procedure/Exploration

1. The class will discuss eagle vision.
2. Brainstorm energy/water sources and examples of waste.
3. Discuss why saving energy/water is important and how it can impact their lives.
4. Take a walk around campus and have the students use their “eagle eyes”.
5. Model for students what it means to use their eagle eyes to find wasted energy/water.
6. As the students travel the campus they will record on the eagle feathers the energy/water they saw being wasted.
7. When they return to class have the students write on the other side of the feather how they could save the energy/water they saw wasted.

Optional

You might want to invite an expert into the classroom to talk to the students. Invite your school maintenance team talk to the students.

Lights out

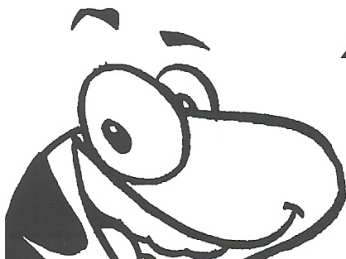
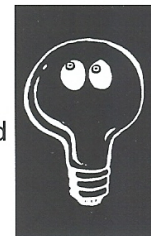
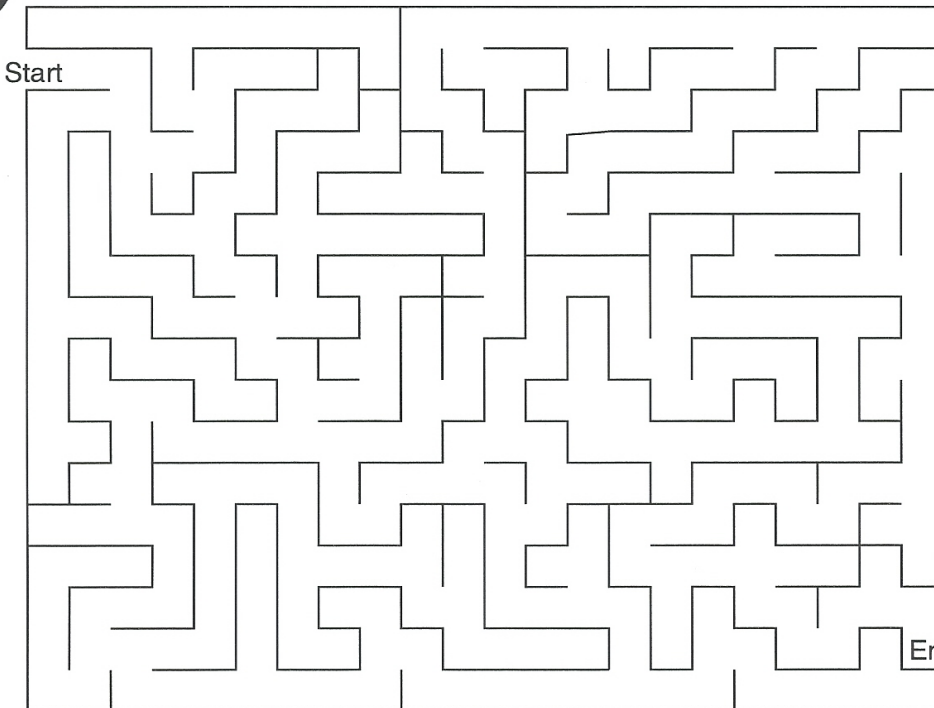
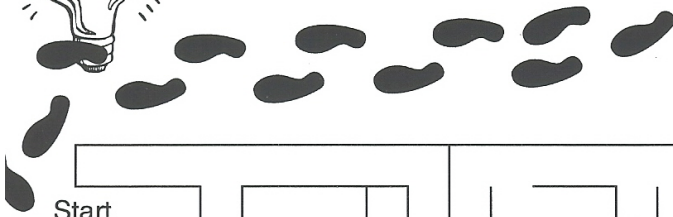
Second Grade

Activity: 5

Activity Card: 2-5a

Student's Name:

Date:



***"Be an energy saver!
Find the way to
turn off the light."***

APS Power Posse™

Resource Saver

Second Grade

Activity: 5

Activity card: 2-5b

1. Energy Saver game materials: one game board (see other side), four markers, one number cube.
2. This game could be used as a center activity or a free-time activity.
3. The children should roll the cube to see who goes first, and then roll the cube and move the proper number of spaces on the board.
4. Mounting the game on heavy paper and laminating it will help keep it for future use.

Resource Saver

Second Grade

Activity: 5

Activity Card: 2-5c

Student's Name: _____

Date: _____

| | | | | | |
|---|--|---|--|--------|--|
| Start | | | | Finish | |
| You read a book. No TV Good for you!!! Go ahead 1 space | You took a shower instead of a bath. Go ahead 2 spaces | | You left a light on in your room. Back 3 spaces | | |
| | | You helped Mom put up shade screens. Go across the bridge. | You left hot water dripping in sink. Go back 1 space. | | |
| | | | | | |
| You left the TV on when you went out to play. Go back to Start! | | | Your family saved gas by making only one trip to the store this week. Go ahead 2 spaces. | | You left the refrigerator door open. Go back 5 spaces. |
| | | You helped Mom hang clothes outside instead of using the dryer. Go ahead 3 spaces | | | |
| | | | | | |

Energy Collage

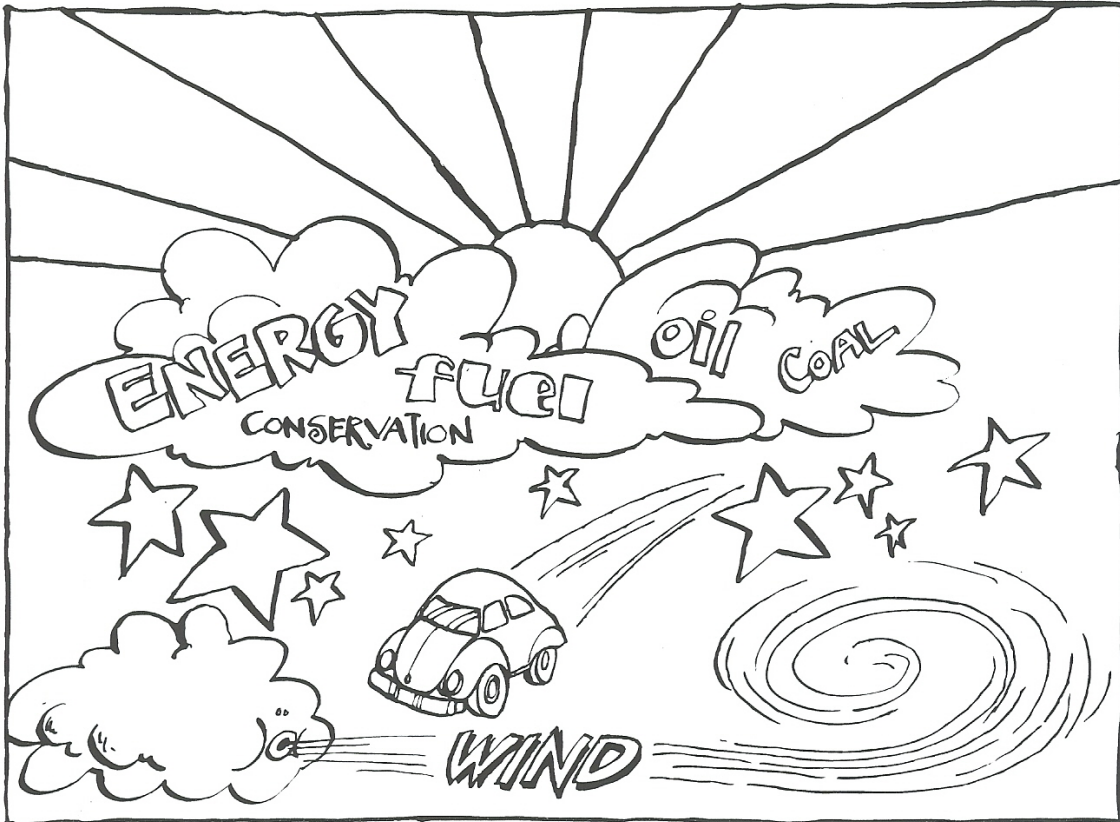
Second Grade

Activity: 5

Activity card: 2-5d

Student's Name:

Date:



1. Materials: scissors, glue, old magazines and heavy paper.
2. Have the students go through magazines and cut out pictures of objects using different types of energy sources (food, wind, sun, water, oil, coal, electrical, gas).

APS Power Posse™

Energy Seek and Find

Second Grade

Activity: 5

Activity Card 2-5e

Word Hunt

Find the words listed on the right. They can be found horizontally, vertically, or diagonally. Circle the words when you find them.

C M E N D A D D G R S A N D O P M Z X R V
A X X O L T I L L C C T I O A T F S R A T
T O P T A M N A M F O S S I L F U E L T U
H I L T T V O E X I T N O L A J E C D E M
E T O R I M S F S P O T S R S T L F G H N
F O R A L A A K L L O N I E J S I O E S B
S H A L E M U O K M L O S A R L M E N T E
O D T I N O R P T S R T R A L V E N T A R
M B I L E N V I R O N M E N T H E X V N V
A Y O U R F C X R L B E E T N A M A L Q E
C G N T G O T J A A L T E R N A T I V E T
E R A Y Y X R K O R M L A L N O G U A M I
R C E S T R U G E O T H E R M A L X T O V
G M O C P S I T G O T H Y D R A E I C F O
Y N U C Y I O S H A L S E O H Y D R O I F
N D I C E C N U C L E A R H A L E O A W U
U E K L B A L L R O C U Q U I T E W L E I
R C E S T R U E F C T H E R H A L X I O V
G H O C P S I T G D E B T U R A E I C F O

energy
environment
exploration
fossil fuel
conserve
recycle
oil
dinosaur
shale
coal
alternative
solar
nuclear
hydro
geothermal
source

Energy Seek and Find

Answer Sheet

Second Grade
Activity: 5
Activity card: 2-5f

C M E N D A D D G R S A N D O P M Z X R V
A X X O L T I L L C C T I O A T F S R A T
T O P T A M N A M F O S S I L F U E L T U
H I L T T V O E X I T N O L A J E C D E M
E T O R I M S F S P O T S R S T L F G H N
F O R A L A A K L L O N I E J S I O E S B
S H A L E M U O K M L O S A R L M E N T E
O D T I N O R P T S R T R A L V E N T A R
M B I L E N V I R O N M E N T H E X V N V
A Y O U R F C X R L B E E T N A M A L Q E
C G N T G O T J A A L T E R N A T I V E T
E R A Y Y X R K O R M L A L N O G U A M I
R C E S T R U G E O T H E R M A L X T O V
G M O C P S I T G O T H Y D R A E I C F O
Y N U C Y I O S H A L S E O H Y D R O I F
N D I C E C N U C L E A R H A L E O A W U
U E K L B A L L R O C U Q U I T E W L E I
R C E S T R U E F C T H E R H A L X I O V
G H O C P S I T G D E B T U R A E I C F O

Properties of Matter

Second Grade

Activity: 6

Time: 1 Class Period

General Description

Students need to understand that matter is everywhere and it takes different forms. Water can be seen as a liquid, solid or gas. Students are exposed to matter in all that they see and touch. There is matter even in the things we don't typically think of as touching, for example, air. It is also important that students understand that all matter takes up space and has a mass.

Objectives

Students will identify objects as a solid, liquid, or gas.

Students will use descriptive language to help identify objects as a solid, liquid or gas.

Students will provide evidence to support their answer when asked if something is a solid, liquid or gas.

Arizona State Standards

SC02 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry

SC02 S1C2 PO4 Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper)

SC02 S1C2 PO3 Use simple tools such as rulers, thermometers, magnifiers, and balances to collect data (U.S. customary units)

SC02 S1C4 PO1 Communicate the results and conclusions of an investigation (e.g., verbal, drawn, or written)

SC02 S5C1 PO2 Classify materials as solids, liquids, or gases

SC02 S5C1 PO3 Demonstrate that water can exist as a:

- gas – vapor
- liquid – water
- solid – ice

SC02 S5C1 PO4 Demonstrate that solids have a definite shape and that liquid and gases take the shape of their containers

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

R02 S3C2 PO1 Follow a set of written multi-step directions

M02 S2C2 PO1 Formulate questions to collect data in contextual situations

M02 S2C2 PO2 Make a simple pictograph or tally chart with appropriate labels from organized data

Teacher Background

Matter exists in different states- solid, liquid, and gas. A common example of all three states of matter is water which can be changed from one state to another by heating or cooling. Giving students the opportunity to explore and investigate the different states helps them develop their own understanding.

Materials

Toy truck
Magnets
Block of wood
Rock
Ice cubes
Hot plate
Balances
Yard stick
Balloons
Construction paper
Saucepan
Water
Vegetable oil
Juice
Lotion
Ziploc bag
Aerosol can with air
Measuring cups of different styles
Clear plastic containers of different sizes and shapes

Procedure/Exploration

1. Provide students with a piece of paper of what they think will happen when you put an ice cube in a saucepan on a hot plate and turn the heat on. (Students can either use words or drawings in their predictions.)
2. Place the ice in the pan and turn up the heat. Allow it to melt and then boil so that students get the experience of melting to water and boiling to steam. (You may want to use more than one ice cube.)
3. Give the students time to draw what actually happened on the other side of the paper.
4. Create stations in the room; solids, liquids and gas. At each station place the following
Solid: toy truck, magnets, block of wood, rock
containers that the students can use to put the objects in.
Liquid: water, vegetable oil, juice, lotion,
several containers students can put the liquids into.
measuring cups of different styles will help students see that the volume does not change
Gas: balloons
Ziploc bag
aerosol can with air
5. At each station the students will look at the objects and use descriptive words to tell about the objects in each group. Ask them to use the containers and see what happens when they put the objects into different containers (include-color, size, shape, texture, etc.).
6. After students explore each station have them share their thoughts and ideas.
7. Using the items from the solid table help the students see that solids take up space and have a definite shape. The toy truck will not change shape no matter what container we put it in.

8. Using the items from the liquid table help the students see that liquids take up space and will take the shape of the container they are in and have a definite volume. The water will take the shape of the container but the amount of water does not change from container to container.
9. Using the items from the gas table help the students see that gases take up space and have take the shape of the container they are in and does have mass. Take a yard stick/meter stick and tie a blown up balloon to each end of the stick. Balance the stick so that it is level and then place a tiny hole in one balloon. As the balloon deflates the volume is reduced and the stick will become unbalanced. This will demonstrate to students that gas does have mass.
10. Have the students correct their definitions/drawings of the states of matter.
11. Assess the students by giving them objects and having them tell you if they are solid, liquids, or gases.

More Matter

Second Grade

Activity: 7

Time: 1 Class Period

General Description

This activity is designed to be done after **Properties of Matter** (Activity 6) to help enhance student understanding of states of matter.

Objectives

Students will identify objects as a solid, liquid or gas.

Students will distinguish the difference between a solid, liquid or gas.

Students will explain the effect heat has on matter and causing it to be a solid or liquid.

Students will explain that the combination of some matter results in gas.

Arizona State Standards

SC02 S1C2 PO1 Demonstrate safe behavior and appropriate procedures (e.g., use of instruments, materials, organisms) in all science inquiry

SC02 S1C2 PO4 Record data from guided investigations in an organized and appropriate format (e.g., lab book, log, notebook, chart paper)

SC02 S1C2 PO3 Use simple tools such as rulers, thermometers, magnifiers, and balances to collect data (U.S. customary units)

SC02 S1C4 PO1 Communicate the results and conclusions of an investigation (e.g., verbal, drawn, or written)

SC02 S5C1 PO2 Classify materials as solids, liquids, or gases

SC02 S5C1 PO3 Demonstrate that water can exist as a:

- gas – vapor
- liquid – water
- solid – ice

SC02 S5C1 PO4 Demonstrate that solids have a definite shape and that liquid and gases take the shape of their containers

W02 S3C2 PO1 Write expository texts (e.g., labels, lists, observations, journals)

R02 S3C2 PO1 Follow a set of written multi-step directions

M02 S2C2 PO1 Formulate questions to collect data in contextual situations

M02 S2C2 PO2 Make a simple pictograph or tally chart with appropriate labels from organized data

Teacher Background

Matter exists in different states- solid, liquid, and gas. A common example of all three states of matter is water which can be changed from one state to another by heating or cooling. Giving students the opportunity to explore and investigate the different states helps them develop their own understanding.

Materials

Candles

Match

Baking soda

Vinegar

Procedure/Exploration

1. Set up four candles set up around the class. Direct the children to look at one of them, but keep away to prevent injuries.
2. Light the candle. It will take some time for the wax to begin to melt.
3. During this time ask the children what they expect to see happen. Have them record these predictions in a journal.
4. As the candle melts ask the students what causes it to melt. If they say fire ask them what they feel. Help them understand that it is the heat that is causing the wax to melt.
5. Ask them what the melted wax looks like. Help them see that the solid wax is now a liquid.
6. Ask the students what will happen to the wax that is now a liquid if the candle is blown out. Have them record their ideas into their journal.
7. Finally ask the students to go back to their desks and write down what they think made the solid candle turn not a liquid. Then ask them to write down what made the liquid candle turn back into a solid.
8. Provide students time to share their ideas and correct any misconceptions.
9. Tell the students that scientists often work with gases and they will be exploring with them today.
10. Have a small discussion about gases. Review with them the demonstration of the two balloons on the yard stick I will then blow up a balloon.
11. Show students that matter mixed together can produce a gas that is able to blow out a candle.
12. Place baking soda in the bottom of a container
13. Light a candle.
14. Place the candle so that when you mix vinegar into the baking soda the resulting gas will blow out the candle.
15. Ask students why the candle went out.
16. Provide time for them to share their ideas.
17. Clarify that scientist can test that a gas is present by using similar tests. (Scientists don't always use flame as some gases are flammable.)