

A SCHMAHL SCIENCE WORKSHOP

GRADE



5

HOUGHTON MIFFLIN

Reading

★ California ★

Grade 5 - Expeditions



STAR CST

Blueprint For
Grade 5 Science Test

A SCHMAHL SCIENCE WORKSHOP

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Houghton-Mifflin

GR-5

Theme 2:
Give It All You've Got

A SCHMAHL SCIENCE WORKSHOP

**DESIGN CHALLENGE:
SPACE EXPLORATION**

SSW: Workshop #27 HIS

California
STAR CST

Blueprint

Earth Sciences

• **5th – 30%**

Mae Jemison – Space Scientist, by Gail Sakurai (HM-TM 208K– 225)

Vocabulary, Transparency 2-25 (HM-TM 209A)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 226-229)
- R 2.2 Use order to analyze text (HM-TM 210-211)
- R 2.3 Discern main ideas (HM-TM 209B-223)
- R 2.4 Inferences/generalizations (HM-TM 210-2231)
- R 2.5 Facts, inferences, opinions (HM-TM 212-213)
- R 3.1 Analyze literary forms (HM-TM 226-227)
- R 3.3 Determine character traits (HM-TM 212-213)
- R 3.7 Evaluate author's techniques (HM-TM 212-213)
- LS 2.3.a, b, c, Respond to literature, summarize events/details, use examples HM-TM 208K-223)
- W2.2.a, b, c Demonstrate understanding, supporting judgments, develop interpretations (HM- TM 210-219)

Theme Paperbacks
(TM-208B)

Supergrandpa, by David Schwartz (Easy)
Off and Running, by Gary Soto (On Level)
Island of the Blue Dolphins, by Scott O'Dell (Challenge)

SSW Science Link:

- *Introduction to "A Schmahl Science Workshop" Science Fair Program*

Science Standards – California

5th Grade Workshop objectives:

- Design a space vehicle that can take them to Mars safely.
- Need to build and test a model of their space vehicle and the rocket booster that launches it.

5th The solar system consists of planets and other bodies that orbit the sun in predictable paths:

- *Students know* the Sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.
- *Students know* the solar system includes the planet Earth, the Moon, the Sun, eight other planets and their satellites, and smaller objects, such as asteroids and comets.
- *Students know* the path of a planet around the Sun is due to the gravitational attraction between the Sun and the planet.

Language Arts Standards - California

Reading: Vocabulary

- R 1.4 Find meaning from context (HM-TM 209)

Reading: Comprehension and Analysis of Grade-Level-Appropriate Text:

- R 1.1 Read aloud fluently (HM-TM 226-229)
- R 2.2 Use order to analyze text (HM-TM 210-211)
- R 2.3 Discern main ideas (HM-TM 209B-223)
- R 2.4 Inferences/generalizations (HM-TM 210-2231)
- R 2.5 Facts, inferences, opinions (HM-TM 212-213)
- R 3.1 Analyze literary forms (HM-TM 226-227)
- R 3.3 Determine character traits (HM-TM 212-213)
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Listen/Speaking & Writing:

- LS 2.3.a, b, c, Respond to literature, summarize events/details, use examples HM-TM 208K-223)
- W2.2.a, b, c Demonstrate understanding, supporting judgments, develop interpretations (HM- TM 210-219)

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Theme 2:
Give It All You've Got

A SCHMAHL SCIENCE WORKSHOP

**AGILENT:
NEWTON'S ROCKET CAR**

SSW: Workshop #3 PHY

California
STAR CST
Blueprint
Physical Sciences

• **5th – 30%**

Mae Jemison – Space Scientist, by Gail Sakurai (HM-TM 208K– 225)

Vocabulary, Transparency 2-25 (HM-TM 209A)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 226-229)
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SSW Science Link:

- *Introduction to "A Schmahl Science Workshop" Science Fair Program*

Science Standards – California

3th Grade Physical Science:

- **Energy and matter have multiple forms and can be changed from one form to another. As a basis for understanding this concept:**
 - a. *Students know* sources of stored energy take many forms, such as food, fuel, and batteries.
 - b. *Students know* machines and living things convert stored energy to motion and heat.
 - c. *Students know* energy can be carried from one place to another by waves, such as water waves and sound waves, by electric current, and by moving objects.
- **Repeat observations to improve accuracy and know that the results of similar scientific investigations seldom turn out exactly the same because of differences in the things being investigated, methods being used, or uncertainty in the observation.**
- **Use numerical data in describing and comparing objects, events, and measurements.**
- **Predict the outcome of a simple investigation and compare the result with the prediction.**

Language Arts Standards - California

Reading: Vocabulary

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Theme 2:
Give It All You've Got

A SCHMAHL SCIENCE WORKSHOP

THE SUN SCIENCE

SSW: Workshop #48 ASY

California
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Blueprint

Earth Sciences

• **5th – 30%**

Mae Jemison – Space Scientist, by Gail Sakurai (HM-TM 208K– 225)

Vocabulary, Transparency 2-25 (HM-TM 209A)

HM Objectives:

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SSW Science Link:

- *Introduction to "A Schmah Science Workshop" Science Fair Program*

Theme Paperbacks
(TM-208B)

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Island of the Blue Dolphins, by Scott O/Dell (Challenge)

Science Standards – California

5th Grade: Earth Science

The solar system consists of planets and other bodies that orbit the Sun in predictable paths. As a basis for understanding this concept:

- *Students know* the Sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.
- *Students know* the solar system includes the planet Earth, the Moon, the Sun, eight other planets and their satellites, and smaller objects, such as asteroids and comets.
- *Students know* the path of a planet around the Sun is due to the gravitational attraction between the Sun and the planet.

Language Arts Standards - California

Reading: Vocabulary

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Reading: Comprehension and Analysis of Grade-Level-Appropriate Text:

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Theme 6

Animal Encounters

A SCHMAHL SCIENCE WORKSHOP

GLACIERS

SSW: Workshop #171 EAR

California
STAR CST

Blueprint

Earth Sciences

• **5th – 30%**

The Grizzly Bear Family Book, by Michio Hoshino (HM-TM 600K– 617)

Vocabulary, Transparency 6-1 (HM-TM 601A)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 600-xxx)
- R 2.3 Discern main ideas (HM-TM 610-611)
- R 2.4 Inferences/generalizations (HM-TM 602-618)
- R 2.5 Facts, inferences, opinions (HM-TM 614-618)
- R 3.1 Analyze literary forms (HM-TM 226-227)
- R 3.3 Determine character traits (HM-TM 212-213)
- R 3.7 Evaluate author's techniques (HM-TM 604-618)
- LS 2.3.a, b, c Respond to literature, summarize events/details, use examples (HM-TM 608-616)
- W 1.1.a, b, c Establish a plot, describe setting, present ending (HM-TM 610-611)
- W2.2.a, b, c Demonstrate understanding, supporting judgments, develop interpretations (HM- TM 606-618)

SSW Science Link:

- *Introduction to "A Schmah Science Workshop" Science Fair Program*

Theme Paperbacks
(TM-208B)

Dolphin Adventures, by Wayne Grover (Easy)
The Tarantula in My Purse, by Jean Craighead George (On Level)
To the Top of the World, by Jim Brandenburg (Challenge)

Science Standards – California

5th Grade: Earth Science

Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:

- *Students know* when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.
- *Students know* water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
- *Students know* that the amount of fresh water located in rivers, lakes, underground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing the use of water.

Language Arts Standards - California

Reading: Vocabulary

- R 1.4 Find meaning from context (HM-TM 209)

Reading: Comprehension and Analysis of Grade-Level-Appropriate Text:

- R 1.1 Read aloud fluently (HM-TM 600-618)
- R 2.3 Discern main ideas (HM-TM 610-611)
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Theme 6:
Animal Encounters

A SCHMAHL SCIENCE WORKSHOP

EROSION

SSW: Workshop #191 EAR

California
STAR CST

Blueprint

Earth Sciences

• **5th – 30%**

The Grizzly Bear Family Book, by Michio Hoshino (HM-TM 600K– 617)

Vocabulary, Transparency 6-1 (HM-TM 601A)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 600-xxx)
- R 2.3 Discern main ideas (HM-TM 610-611)
- R 2.4 Inferences/generalizations (HM-TM 602-618)
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SSW Science Link:

- *Introduction to "A Schmah Science Workshop" Science Fair Program*

Theme Paperbacks
(TM-208B)

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The Tarantula in My Purse, by Jean Craighead George (On Level)
To the Top of the World, by Jim Brandenburg (Challenge)

Science Standards – California

5th Grade: Earth Science

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- *Students know* when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.
- *Students know* water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.
- *Students know* that the amount of fresh water located in rivers, lakes, underground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing the use of water.

Language Arts Standards - California

Reading: Vocabulary

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Reading: Comprehension and Analysis of Grade-Level-Appropriate Text:

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Theme 6:
Animal Encounters

A SCHMAHL SCIENCE WORKSHOP

ROTTING LOGS
SSW: Workshop #233 BIO

California
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Blueprint

Life Sciences

• **5th – 30%**

The Golden Lion Tamarin Comes Home, by George Ancona (HM-TM 626A– 647)

Vocabulary, Transparency 6-9 (HM-TM 627A)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 626A-647)
- R 2.3 Discern main ideas (HM-TM 628-631)
- R 2.4 Inferences/generalizations (HM-TM 628-643)
- W 1.1.a, b, c Establish a plot, describe setting, present ending (HM-TM 610-611)
- W 2.2 Write responses to literature (HM-TM 646-647)
- W 2.2.a, b, c Demonstrate understanding, supporting judgments, develop interpretations (HM- TM 606-618)
- LS 1.1 Ask new questions (HM-TM 634-641)
- LS 2.2 Informative presentations (HM-TM 647C-647D)
- LS 2.3.a, b, c Respond to literature, summarize events/details, use examples (HM-TM 636-647B)

Theme Paperbacks
(TM-208B)

Dolphin Adventures, by
Wayne Grover (Easy)
The Tarantula in My Purse,
by Jean Craighead George
(On Level)
To the Top of the World, by
Jim Brandenburg (Challenge)

SSW Science Link:

- *Introduction to “A Schmah Science Workshop” Science Fair Program*

Science Standards – California

Life Science

2. All organisms need energy and matter to live and grow. As a basis for understanding this concept:
 - *Students know* plants are the primary source of matter and energy entering most food chains.
 - *Students know* producers and consumers (herbivores, carnivores, omnivores, and decomposers) are related in food chains and food webs and may compete with each other for resources in an ecosystem.
 - *Students know* decomposers, including many fungi, insects, and microorganisms, recycle matter from dead plants and animals.
3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:
 - *Students know* ecosystems can be characterized by their living and nonliving components.
 - *Students know* that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.
 - *Students know* that most microorganisms do not cause disease and that many are beneficial.
6. Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:
 - Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
 - Formulate and justify predictions based on cause-and-effect relationships.

A SCHMAHL SCIENCE WORKSHOP

ROTTING LOGS

SSW: Workshop #233 BIO

Language Arts Standards - California

Reading: Vocabulary

- **R 1.4 Find meaning from context (HM-TM 627A)**

Reading: Comprehension and Analysis of Grade-Level-Appropriate Text:

- **R 1.1 Read aloud fluently (HM-TM 626A-647)**
- **R 2.3 Discern main ideas (HM-TM 628-631)**
- **R 2.4 Inferences/generalizations (HM-TM 628-643)**

Writing:

- **W 2.2 Write responses to literature (HM-TM 646-647)**
- **W 2.2.a, b, c Demonstrate understanding, supporting judgments, develop interpretations (HM- TM 606-618)**

Listening and Speaking:

- **LS 1.1 Ask new questions (HM-TM 634-641)**
- **LS 2.2 Informative presentations (HM-TM 647C-647D)**
- **LS 2.3.a, b, c Respond to literature, summarize events/details, use examples (HM-TM 636-647B)**



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CALIFORNIA STANDARDS SCIENCE TEST 5TH GRADE SCIENCE TEST CONTENT STANDARDS

	18	30%
Physical Sciences		
Physical Sciences – Grade 5 Test	11	
1. Elements and their combinations account for all the varied types of matter in the world. As a basis for understanding this concept:		
a. <i>Students know</i> that during chemical reactions the atoms in the reactants rearrange to form products with different properties.	1	
b. <i>Students know</i> all matter is made of atoms, which may combine to form molecules.	1	
c. <i>Students know</i> metals have properties in common, such as high electrical and thermal conductivity. Some metals, such as aluminum (Al), iron (Fe), nickel (Ni), copper (Cu), silver (Ag), and gold (Au), are pure elements; others, such as steel and brass, are composed of a combination of elemental metals.	1 or 2**	
d. <i>Students know</i> that each element is made of one kind of atom and that the elements are organized in the periodic table by their chemical properties.	1	
e. <i>Students know</i> scientists have developed instruments that can create discrete images of atoms and molecules that show that the atoms and molecules often occur in well-ordered arrays.	1	
f. <i>Students know</i> differences in chemical and physical properties of substances are used to separate mixtures and identify compounds.	2	
g. <i>Students know</i> properties of solid, liquid, and gaseous substances, such as sugar (C ₆ H ₁₂ O ₆), water (H ₂ O), helium (He), oxygen (O ₂), nitrogen (N ₂), and carbon dioxide (CO ₂).	2	
h. <i>Students know</i> living organisms and most materials are composed of just a few elements.	1	
i. <i>Students know</i> the common properties of salts, such as sodium chloride (NaCl).	0 or 1**	

COORELATED SSW WORKSHOPS – Physical Sciences

- **Fun with Chemistry** - Before we can discuss food chemistry, the students must understand basic chemistry concepts. The periodic table of the elements is the grand, unified theory of chemistry. With hands-on activities we introduce our students to The Periodic Table. We also present the Table as a landscape, with fields of metals, pools of mercury and bromine, clouds of gases, and the offshore island of rare earths.

Science Standards: 1a. 1b. 1c. 1d. 1e. 1f. 1a. 1h. 1i

COORELATED SSW WORKSHOPS – Physical Sciences

- **Canned Foods and Corrosion** - Materials that have highly desirable thermal properties also tend to be highly reactive (and vice-versa). Materials that are highly reactive tend to have chemical reactions with other substances around them. A good example would be iron, which tends to react with oxygen to form iron oxide or, as we commonly know it, rust. Students use fresh fruits and vegetables to extract pigments that are sensitive to iron and tin. Color changes in the presence of metals offer insight into the chemistry of oxidation-reduction reactions and its application to the shelf life of preserved foods.
Science Standards: 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1i
- **Liquid Nitrogen and States of Matter** - Liquid Nitrogen is an extremely cold, liquefied gas. It can be used to demonstrate lots of interesting effects from superconductivity to the properties of gases & liquids, and a whole lot more! We use liquid nitrogen to investigate how cold temperatures affect materials. We also discuss the phases of matter and how the Kinetic Theory of Gases models these phases.
Science Standards: 1a, 1b, 1c, 1f, 1g,
- **Pancakes, Marshmallows and Alka Seltzer** - In this workshop, students use simple ingredients to see the states of matter as they change from liquid to solid. They are also encouraged to pay attention to the chemistry in everyday cooking. Chemistry is the study of matter and its changes. Many of the changes that occur in cooking can be considered a form of chemistry.
Science Standards: 1f, 1g, 1h, 1i
- **Heat Conductivity of Pan Metals-** So, how does heat make it from the burner at the bottom of your pan through to the other side and into the food? The answer is: *Conduction*. Though not necessarily decisive, knowing how well a material conducts heat is the first step in making a cookware choice. At this workshop, students perform experiments that will determine the heat conductivity of aluminum, brass, copper, iron and stainless steel. This knowledge is essential for selecting the appropriate pots, pans, and skillets used primarily on the stovetop, where heat-up speed and responsiveness to temperature changes can be critical and uniform heating is essential for preventing hot spots that burn food before it's entirely cooked.
Science Standards: 1a, 1b, 1c, 1d, 1e, 1f, 1i
- **The Stoichiometry of Cooking:** What is the definition of stoichiometry? Stoichiometry is using molar mass to calculate the gram amount of reactants needed in order for a product to form. How important is it to add the correct amount of reactant in order for a reaction to occur? In this workshop students observe chemical reactions as they bake cupcakes. They try to predict what may happen if they vary the amount of reactants that they put in the cake. This relates to chemistry, because if you don't add the correct amount of chemical reactants before the reaction, the product might come out different, or the reaction might not occur. We look at the different cake batters and how they are different. The "mole" of the reactant, in the batter of one group, will be different than the "mole" of a reactant in another.
Science Standards: 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i
- **Principles of Calorimetry:** Students construct a calorimeter and use it to determine the heat of solution of 2 salts and the heat of neutralization. This lab exercise introduces students to endothermic and exothermic reactions and the relationship between heat and temperature.
Science Standards: 1a, 1b, 1c, 1d, 1e, 1f, 1g, 1h, 1i

CALIFORNIA STANDARDS SCIENCE TEST

5TH GRADE SCIENCE TEST

CONTENT STANDARDS

Life Sciences	18	30%
Life Sciences – Grade 5	9	
2. Plants and animals have structures for respiration, digestion, waste disposal, and transport of materials. As a basis for understanding this concept:		
a. <i>Students know</i> many multicellular organisms have specialized structures to support the transport of materials.	1	
b. <i>Students know</i> how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO ₂) and oxygen (O ₂) are exchanged in the lungs and tissues.	2	
c. <i>Students know</i> the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.	2	
d. <i>Students know</i> the role of the kidney in removing cellular waste from blood and converting it into urine, which is stored in the bladder.	1	
e. <i>Students know</i> how sugar, water, and minerals are transported in a vascular plant.	1	
f. <i>Students know</i> plants use carbon dioxide (CO ₂) and energy from sunlight to build molecules of sugar and release oxygen.	1	
g. <i>Students know</i> plant and animal cells break down sugar to obtain energy, a process resulting in carbon dioxide (CO ₂) and water (respiration).	1	

COORELATED SSW WORKSHOPS – Life Sciences

- **Analysis and Comparison of Various Mammalian Cell Types:** Students fix and stain cells on a microscopic slide. Four different cell types provided an exciting direct microscopic comparison of different cell types. Morphological differences between normal and transformed cells are observed.

Science Standards: 2a, 2b, 2c, 2d
- **What is Osmosis?** During this workshop, students work with a selectively permeable membrane to learn about osmosis, diffusion, and water potential of cells with one comprehensive lab activity.

Science Standards: 2a, 2d
- **Blood Typing** - You are watching ER and, once again, the doctor yells out for some "O neg". A patient lies bleeding on the gurney. You can actually see what happens if you mix the wrong types of blood together. Many life-threatening conditions can be treated by giving the patient blood, but scientists and doctors must understand the problems that can be caused. Besides the complications from getting the "wrong blood type", serious diseases can be spread through blood transfusions. Blood tests can indicate blood type, and also what diseases might be carried in the blood.

Science Standards: 2a, 2b,

COORELATED SSW WORKSHOPS – Life Sciences

- **Human Body: Organs** _ Students learn how a human body uses the lungs to breathe air and how to measure lung vital capacity. They learn diaphragmatic breathing and the variables that affect lung vital capacity and the role of blood circulation in bringing oxygen to cells throughout the body. Students learn how the movements of the mouth, tongue, and larynx are involved in swallowing, how swallowed material travels from the mouth to the pharynx (throat) to the esophagus, and then through the gastro esophageal sphincter into the stomach. They learn how involuntary muscular contractions, called peristalsis, propel food and fluid to the stomach and digestive tract independent of gravity.

Science Standards: 2a, 2b, 2c, 2d

- **Human Body: Muscles:** Students observe the action of muscles that cause the body to move. Given a number of facts about muscles, students build operational models to demonstrate how muscles move legs, thumbs, and arms. Students see how muscles contract when they work. They learn that muscles attach across joints to move bones, and muscles attach to bones with tissue called tendon. Ligaments attach bone to bone and some ligaments serve as guides through which tendons run. Students observe the workings of muscles to move bones and compare the muscle/bone functions of a model leg to a human leg.

Science Standards: 2a, 2b, 2c, 2d

- **Proteins:** Students learn about the sources of proteins and their uses in the food industry. They precipitate casein from milk using an acid. This method is used to make cottage cheese. Students also coagulate casein from milk using an enzyme. This method is used for making cheese. In addition, they coagulate soy protein from soymilk, using magnesium sulfate. This method is used to make tofu.

Science Standards: 2a, 2b, 2c, 2d

CALIFORNIA STANDARDS SCIENCE TEST

5TH GRADE SCIENCE TEST

CONTENT STANDARDS

Earth Sciences	18	30%
Earth Science – Grade 5	11	
3. Water on Earth moves between the oceans and land through the processes of evaporation and condensation. As a basis for understanding this concept:		
a. <i>Students know</i> most of Earth's water is present as salt water in the oceans, which cover most of Earth's surface.	0 or 1**	
b. <i>Students know</i> when liquid water evaporates, it turns into water vapor in the air and can reappear as a liquid when cooled or as a solid if cooled below the freezing point of water.	1	
c. <i>Students know</i> water vapor in the air moves from one place to another and can form fog or clouds, which are tiny droplets of water or ice, and can fall to Earth as rain, hail, sleet, or snow.	1	
d. <i>Students know</i> that the amount of fresh water located in rivers, lakes, underground sources, and glaciers is limited and that its availability can be extended by recycling and decreasing the use of water.	1	
e. <i>Students know</i> the origin of the water used by their local communities.	N/A*	
4. Energy from the Sun heats Earth unevenly, causing air movements that result in changing weather patterns. As a basis for understanding this concept:		
a. <i>Students know</i> uneven heating of Earth causes air movements (convection currents).	1	
b. <i>Students know</i> the influence that the ocean has on the weather and the role that the water cycle plays in weather patterns.	1	
c. <i>Students know</i> the causes and effects of different types of severe weather.	1	
d. <i>Students know</i> how to use weather maps and data to predict local weather and know that weather forecasts depend on many variables.	1	
e. <i>Students know</i> that the Earth's atmosphere exerts a pressure that decreases with distance above Earth's surface and that at any point it exerts this pressure equally in all directions.	1	
5. The solar system consists of planets and other bodies that orbit the Sun in predictable paths. As a basis for understanding this concept:		
a. <i>Students know</i> the Sun, an average star, is the central and largest body in the solar system and is composed primarily of hydrogen and helium.	0 or 1**	
b. <i>Students know</i> the solar system includes the planet Earth, the Moon, the Sun, eight other planets and their satellites, and smaller objects, such as asteroids and comets.	1	
c. <i>Students know</i> the path of a planet around the Sun is due to the gravitational attraction between the Sun and the planet.	1	

COORELATED SSW WORKSHOPS – Earth Sciences

- Conduction: Air Moves** - Using our flow density demonstrator, solar wind bag and singing pipe, students will learn that hot air rises and cold air sinks and how this principle is put to use in a conduction oven. Students won't believe their eyes as they explore the powerful properties of air as you put marshmallows to the pressure test. Students are be challenged to use Bernoulli's Principle to blow up an 8-foot long bag. With a little practice they are be able to inflate the bag using only one breath!

Science Standards: 4a, 4b, 4c, 4d, 4e

COORELATED SSW WORKSHOPS – Earth Sciences

- **Design Challenge: Space Exploration** (Correlates to [Houghton Mifflin Grade 5, Theme 2: Give It All You've Got, TM 208K-225](#)) - Students design a space vehicle that can take them to Mars safely. They build and test a model of their space vehicle and the rocket booster that launches it. Students learn Newton's Third Law of Motion, which states that for every action there is an equal and opposite reaction. In this case, air pressure forces the water out in one direction while the rocket flies in the other direction.

Science Standards: 4a, 4b, 4c, 4d, 4e

- **The Sun Science:** (Correlates to [Houghton Mifflin Grade 5, Theme 2: Give It All You've Got, TM 208K-225](#)) Students learn that sunspots were first discovered, described and tracked by Galileo. Sunspots have strong magnetic fields, thousands of times stronger than Earth's. Magnetic fields keep sunspots cool and also serve as a reservoir of energy for explosive events like solar flares and coronal mass ejections. The chemical composition of the sun is 71% hydrogen, 27.1% helium and less than 2% of all other elements.

Science Standards: 5a, 5b, 5c

- **Water Cycle** - Air pressure can tell us about what kind of weather to expect as well. If a *high pressure system* is on its way, often you can expect higher temperatures and clear skies. If a *low pressure system* is coming, then look for colder weather, storms and rain. Our workshops introduce the concept of cloud formation and the conditions necessary for precipitation. The students will start with a quick look at part of the water cycle, and the combined gas laws. They then progress through a hands-on/minds-on activity demonstrating the combined gas laws. Our experiments lead them through the conditions necessary for cloud formation. Students learn that weather can be observed, measured, and described. Students learn that water is a resource that needs to be conserved.

Science Standards: 3a, 3b, 3c, 3d, 3e, 4a, 4b, 4c, 4d, 4e

- **Glaciers** (Correlates to [Houghton Mifflin Grade 5, Theme 6 Animal Encounters, TM 600K-617](#))

Science Standards: 3b, 3c, 3d

- **Erosion** (Correlates to [Houghton Mifflin Grade 5, Theme 6 Animal Encounters, TM 600K-617](#))

Science Standards: 3c

- **Weather Instruments** - Students build Galileo thermometers, and barometers.

Science Standards: 3a, 3b, 3c, 3d, 3e, 4a, 4b, 4c, 4d, 4e

- **Air Pressure** - Students learn that air takes up space and has weight. They learn about some basic principles about pressure and discover how pressure and temperature differences cause air to move. Students learn that the wind that transports pollutants in the air and dilutes the pollution on the way. Knowledge of wind speed and direction can help you calculate in which direction pollution will travel and how much they will mix with the unpolluted air.

Science Standards: 4a, 4b, 4c, 4d, 4e