

A SCHMAHL SCIENCE WORKSHOP

GRADE



4



STAR CST

Blueprint For
Grade 5 Science Test

A SCHMAHL SCIENCE WORKSHOP

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GR-4

Theme 4:
Problem Solvers

A SCHMAHL SCIENCE WORKSHOP

EPIDEMIC!

SSW: Workshop #79 BIO

California
STAR CST

Blueprint

Life Sciences

• **5th – 30%**

Marven of the Great North Woods, by Katheryn Lasky (HM-TM 415-449)

Vocabulary, Transparency 4-9 (HM-TM 415B)

Comprehension Skill, Problem Solving (HM-TM 415D)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 432-433)
- R 2.2 Use reading strategies (HM-TM 420-435)
- R 2.3 Make predictions (HM-TM 424-435)
- R 2.4 Evaluate new information (HM-TM 420-437)
- R 3.2 Identify main events of plot (HM-TM 422-427)
- R 3.3 Character traits, motivation (HM-TM 426-441)
- LS 1.1 Ask and respond to questions (HM-Tm 426-427)
- LS 1.8 Clarify information (HM-TM 422-429)

Theme Paperbacks
(TM-658B)

First Flight, by George Shea
(Easy)

West Side Kids: The Pet Sitters, by Ellen Schecter
(On Level)

Who Stole The Wizard of Oz?, by Avi (Challenge)

Science Standards – California

4th Grade – Life Science:

3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:

- b. *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.
- d. *Students know* that most microorganisms do not cause disease and that many are beneficial.

Language Arts Standards - California

Reading: Vocabulary

- R 1.4 Find meaning from context (HM-TM 415B)

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

- R 1.1 Read aloud fluently (HM-TM 432-433)
- R 2.2 Use reading strategies (HM-TM 420-435)
- R 2.3 Make predictions (HM-TM 424-435)
- R 2.4 Evaluate new information (HM-TM 420-437)
- R 3.2 Identify main events of plot (HM-TM 422-427)
- R 3.3 Character traits, motivation (HM-TM 426-441)

Listening and Speaking:

- LS 1.1 Ask and respond to questions (HM-Tm 426-427)
- LS 1.8 Clarify information (HM-TM 422-429)

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Theme 4:
Problem Solvers

A SCHMAHL SCIENCE WORKSHOP

Life In The Rotting Log

SSW: Workshop #233 BIO

California
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Blueprint

Life Sciences

• **5th – 30%**

Marven of the Great North Woods, by Katheryn Lasky (HM-TM 415-449)

Vocabulary, Transparency 4-9 (HM-TM 415B)

Comprehension Skill, Problem Solving (HM-TM 415D)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 432-433)
- R 2.2 Use reading strategies (HM-TM 420-435)
- R 2.3 Make predictions (HM-TM 424-435)
- R 2.4 Evaluate new information (HM-TM 420-437)
- R 3.2 Identify main events of plot (HM-TM 422-427)
- R 3.3 Character traits, motivation (HM-TM 426-441)
- LS 1.1 Ask and respond to questions (HM-Tm 426-427)
- LS 1.8 Clarify information (HM-TM 422-429)

Theme Paperbacks
(TM-658B)

First Flight, by George Shea
(Easy)

West Side Kids: The Pet Sitters, by Ellen Schecter
(On Level)

Who Stole The Wizard of Oz?, by Avi (Challenge)

Science Standards – California

Life Sciences – Grade 4

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 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.
 - Construct and interpret graphs from measurements.
 - Follow a set of written instructions for a scientific investigation

A SCHMAHL SCIENCE WORKSHOP

Life In The Rotting Log

SSW: Workshop #233 BIO

Language Arts Standards - California

Reading: Vocabulary

- R 1.4 Find meaning from context (HM-TM 415B)

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

- R 1.1 Read aloud fluently (HM-TM 432-433)
- R 2.2 Use reading strategies (HM-TM 420-435)
- R 2.3 Make predictions (HM-TM 424-435)
- R 2.4 Evaluate new information (HM-TM 420-437)
- R 3.2 Identify main events of plot (HM-TM 422-427)
- R 3.3 Character traits, motivation (HM-TM 426-441)

Listening and Speaking:

- LS 1.1 Ask and respond to questions (HM-Tm 426-427)
- LS 1.8 Clarify information (HM-TM 422-429)

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Theme 4:
Problem Solvers

A SCHMAHL SCIENCE WORKSHOP

**Aspetic Technique:
Handwashing Science**

SSW: Workshop #155 BIO

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Life Sciences

● **5th – 30%**

Marven of the Great North Woods, by Katheryn Lasky (HM-TM 415-449)

Vocabulary, Transparency 4-9 (HM-TM 415B)

Comprehension Skill, Problem Solving (HM-TM 415D)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 432-433)
- R 2.2 Use reading strategies (HM-TM 420-435)
- R 2.3 Make predictions (HM-TM 424-435)
- R 2.4 Evaluate new information (HM-TM 420-437)
- R 3.2 Identify main events of plot (HM-TM 422-427)
- R 3.3 Character traits, motivation (HM-TM 426-441)
- LS 1.1 Ask and respond to questions (HM-Tm 426-427)
- LS 1.8 Clarify information (HM-TM 422-429)

Theme Paperbacks
(TM-658B)

First Flight, by George Shea
(Easy)

West Side Kids: The Pet Sitters, by Ellen Schecter
(On Level)

Who Stole The Wizard of Oz?, by Avi (Challenge)

Science Standards – California

4th Grade – Life Science:

3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:

b. *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.

d. *Students know* that most microorganisms do not cause disease and that many are beneficial.

Language Arts Standards - California

Reading: Vocabulary

- R 1.4 Find meaning from context (HM-TM 415B)

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

- R 1.1 Read aloud fluently (HM-TM 432-433)
- R 2.2 Use reading strategies (HM-TM 420-435)
- R 2.3 Make predictions (HM-TM 424-435)
- R 2.4 Evaluate new information (HM-TM 420-437)
- R 3.2 Identify main events of plot (HM-TM 422-427)
- R 3.3 Character traits, motivation (HM-TM 426-441)

Listening and Speaking:

- LS 1.1 Ask and respond to questions (HM-Tm 426-427)
- LS 1.8 Clarify information (HM-TM 422-429)

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Theme 4:
Problem Solvers

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**Making Yogurt,
An Ancient Chinese Secret**

SSW: Workshop #303 BIO

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Life Sciences

• **5th – 30%**

The Last Dragon, by Susan Miho Nunes (HM-TM 451-485R)

Vocabulary, Transparency 4-17 (HM-TM 451B)

Comprehension Skill, Drawing Conclusions (HM-TM 451D)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 464-475)
- R 1.6 Multiple-meaning words (HM-TM 466-467)
- R 2.2 Use reading strategies (HM-TM 451C-485D)
- R 2.3 Make predictions (HM-TM 458-469)
- R 2.4 Evaluate new information (HM-TM 460-477)
- R 2.5 Compare and contrast (HM-TM 580-481)
- R 3.2 Identify main events of plot (HM-TM 451-479)
- R 3.3 Character traits, motivation (HM-TM 456-470)
- W 1.1 Focus/structure/point of view (HM-TM 466-467)
- W 2.4 Write Summaries (HM-TM 458-450)
- LS 1.1 Ask and respond to questions (HM-Tm 464-465)
- LS 1.8 Clarify information (HM-TM 454-481)
- LS 2.3 Deliver Oral summaries (HM-TM 478-479)

Theme Paperbacks
(TM-658B)

First Flight, by George Shea
(Easy)

**West Side Kids: The Pet
Sitters**, by Ellen Schecter
(On Level)

**Who Stole The Wizard of
Oz?**, by Avi (Challenge)

Science Standards – California

Life Sciences – Grade 4

4. **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 most microorganisms do not cause disease and that many are beneficial.
7. **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.
 - Construct and interpret graphs from measurements.
 - Follow a set of written instructions for a scientific investigation

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Theme 6:

Nature: Friend or Foe

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SHARK DISSECTION

SSW: Workshop #22 BIO

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Earth Sciences

• **5th – 30%**

Salmon Summer, by Bruce McMillan (HM-TM 634– 655)

Vocabulary, Transparency 6-1 (HM-TM 633B)

Comprehension Skill, Following Directions (HM-TM 633D)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 633A-645)
- R 2.1 Identify structural patterns (HM-TM 652-653)
- R 2.2 Use reading strategies (HM-TM 633-645)
- R 2.4 Evaluate new information (HM-TM 648-659)
- R 2.6 Cause/effect; fact/opinion (HM-TM 652-653)
- R 2.7 Follow technical directions (HM-TM 653A-653B)
- R 3.2 Identify main events of plot (HM-TM 633C-647)
- R 3.3 Character traits, motivation (HM-TM 638-649)
- W 1.7 Use reference materials (HM-TM 653M-653N)
- W 2.4 Write summaries (HM-TM 642-643)
- LS 1.1 Ask and respond to questions (HM-TM 640-647)
- LS 1.8 Clarify information (HM-TM 640-653)
- LS 2.3 Deliver oral summaries (HM-TM 646-647)

Theme Paperbacks (TM-658B)

Snowshoe Thompson, by
Nancy Smiler Levinson
(Easy)

**Kate Shelley: Bound for
Legend**, by Robert D. San
Souci (On Level)

**Water Hole: Life in a
Rescued Tropical Forest**, by
Ken Mallory (Challenge)

Science Standards – California

Life Sciences – Grade 4

2. All organisms need energy and matter to live and grow. As a basis for understanding this concept:
 - b. *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.
3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:
 - a. Students know ecosystems can be characterized by their living and nonliving components.
 - b. 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.
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:
 - a. Differentiate observation from inference (interpretation) and know scientists' explanations come partly from what they observe and partly from how they interpret their observations.
 - b. Formulate and justify predictions based on cause-and-effect relationships.
 - f. Follow a set of written instructions for a scientific investigation

A SCHMAHL SCIENCE WORKSHOP

SHARK DISSECTION

SSW: Workshop #22 BIO

Language Arts Standards - California

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

- R 1.1 Read aloud fluently (HM-TM 633A-645)
- R 2.1 Identify structural patterns (HM-TM 652-653)
- R 2.2 Use reading strategies (HM-TM 633-645)
- R 2.4 Evaluate new information (HM-TM 648-659)
- R 2.6 Cause/effect; fact/opinion (HM-TM 652-653)
- R 2.7 Follow technical directions (HM-TM 653A-653B)
- R 3.2 Identify main events of plot (HM-TM 633C-647)
- R 3.3 Character traits, motivation (HM-TM 638-649)

Writing:

- W 1.7 Use reference materials (HM-TM 653M-653N)
- W 2.4 Write summaries (HM-TM 642-643)

Listening and Speaking:

- LS 1.1 Ask and respond to questions (HM-TM 640-647)
- LS 1.8 Clarify information (HM-TM 640-653)
- LS 2.3 Deliver oral summaries (HM-TM 646-647)

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Theme 6:

Nature: Friend or Foe

A SCHMAHL SCIENCE WORKSHOP

**NATIONAL PARKS:
BADLANDS**

SSW: Workshop #23 EAR

California
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Blueprint
Earth Sciences

• **5th – 30%**

Wildfires, by Seymour Simon (HM-TM 659A– 683)

Vocabulary, Transparency 6-10 (HM-TM 659B)

Comprehension Skill, Topic, Main Idea, and Supporting Details (HM-TN 659C-569D)

HM Objectives:

- R 1.1 Read aloud fluently (HM-TM 659A-663)
- R 2.1 Identify structural patterns (HM-TM 662-669)
- R 2.3 Make predictions (HM-TM 670-671)
- R 2.4 Evaluate new information (HM-TM 670-671)
- R 2.6 Cause/effect; fact/opinion (HM-TM 674-677)
- W 1.1 Focus/structure/point of view (HM- TM 685M-685N)
- W 1.7 Use reference materials (HM-TM 685M-685N)
- LS 1.8 Clarify information (HM-TM 666-681)
- LS 2.3 Deliver oral summaries HM-TM 680-681)

Theme Paperbacks
(TM-658B)

Snowshoe Thompson, by Nancy Smiler Levinson (Easy)

Kate Shelley: Bound for Legend, by Robert D. San Souci (On Level)

Water Hole: Life in a Rescued Tropical Forest, by Ken Mallory (Challenge)

Science Standards – California

4th Grade - Earth Science:

Waves, wind, water, and ice shape and reshape Earth’s land surface.

- Students know some changes in the earth are due to slow processes, such as erosion, and some changes are due to rapid process, such as landslides, volcanic eruptions, and earthquakes.
- Students know natural processes, including freezing and thawing and the growth of roots, cause rocks to break down into smaller pieces.
- Students know that moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).

Additional SSW Workshop Objectives

- Show how flowing water erodes the landscape
- Describe the benefits of paleontology fieldwork at Badlands National Park.
- Practice paleontology field techniques.

Language Arts Standards - California

Reading: Vocabulary

- R 1.4 Find meaning from context (HM-TM 658B)

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

- R 1.1 Read aloud fluently (HM-TM 659A-663)
- R 2.1 Identify structural patterns (HM-TM 662-669)
- R 2.3 Make predictions (HM-TM 670-671)
- R 2.4 Evaluate new information (HM-TM 670-671)
- R 2.6 Cause/effect; fact/opinion (HM-TM 674-677)

Writing:

- W 1.1 Focus/structure/point of view (HM- TM 685M-685N)
- W 1.7 Use reference materials (HM-TM 685M-685N)

Listening and Speaking:

- LS 1.8 Clarify information (HM-TM 666-681)
- LS 2.3 Deliver oral summaries HM-TM 680-681)



A SCHMAHL SCIENCE WORKSHOP

Belinda Lowe-Schmah

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CALIFORNIA STANDARDS SCIENCE TEST 5TH GRADE SCIENCE TEST CONTENT STANDARDS

CALIFORNIA CONTENT STANDARDS: Grade 5	# of Items	%
Physical Sciences	18	30%
Physical Sciences – Grade 4	7	
1. Electricity and magnetism are related effects that have many useful applications in everyday life. As a basis for understanding this concept:		
a. <i>Students know</i> how to design and build simple series and parallel circuits by using components such as wires, batteries, and bulbs.	1	
b. <i>Students know</i> how to build a simple compass and use it to detect magnetic effects, including Earth's magnetic field.	1	
c. <i>Students know</i> electric currents produce magnetic fields and know how to build a simple electromagnet.	1	
d. <i>Students know</i> the role of electromagnets in the construction of electric motors, electric generators, and simple devices, such as doorbells and earphones.	1	
e. <i>Students know</i> electrically charged objects attract or repel each other.	1	
f. <i>Students know</i> that magnets have two poles (north and south) and that like poles repel each other while unlike poles attract each other.	1	
g. <i>Students know</i> electrical energy can be converted to heat, light, and motion.	1	

COORELATED SSW WORKSHOPS – Physical Sciences

- **Enlightening Electrical Circuits** - You'll get a positive charge out of Enlightening Electricity... the electricity workshop! Demystify the shocking possibilities of electricity. Participants learn electrical basics while building and redesigning circuits with "D" cells, wire, paper clips, and Christmas tree mini-lights. We guarantee this workshop will be enlightening!

Science Standards 1a, 1c, 1d, 1g

COORELATED SSW WORKSHOPS – Physical Sciences

- **Static Electricity – Sparks and Shocks** - Some materials create more static electricity than others. Since static electricity is the collection of electrically charged particles on the surface of a material, various materials have a tendency of either giving up electrons and becoming positive (+) in charge or attracting electrons and becoming negative (-) in charge. The Triboelectric Series is a list of materials, showing which have a greater tendency to become positive (+) and which have a greater tendency to become negative (-). The list is a handy tool to determine which combinations of materials create the most static electricity. This workshop answers questions and explain how static electricity works. Students make their own static electricity generator to take home!

Science Standards 1e

- **Fun with Circuits** - The essential parts of a circuit are the conducting path, the electrical load, the power source, and a switch. The conducting path can be made from any material that conducts electricity. A switch can be made using a simple paper clip and small metal tabs. For this workshop, you will be using some unusual parts to create your circuits.

Science Standards 1a, 1c, 1d, 1g

- **Agilent: Steady Hand Game** - In this workshop, students explore the fundamentals of electricity. They build an electrical circuit that includes an energy source, resistance, a light and a switch. The completed assembly is also a steady hand game that students have fun playing and demonstrating to family and friends.

Science Standards 1a, 1d, 1g

- **Agilent: Invisible Forces** - *Invisible Forces* begins with a series of experiments that help students discover the invisible forces of magnetism and electromagnetism. During these experiments, students observe and analyze compasses, magnetic influences on various objects, and the magnetic fields created by electricity. In the second half of the session, students build their own electromagnetic motor, combining the magnetic forces caused by their magnets and the electricity flowing through a coil of wire.

Science Standards 1c, 1d, 1f, 1g

- **Experiments In Electrochemistry:** In 1791 Luigi Galvani discovered electrical activity in the nerves of the frogs that he was dissecting. He thought that electricity was of animal origin and could be found only in living tissues. A few years later, in 1800 Alessandro Volta discovered that electricity could be produced through inorganic means. In fact, by using small sheets of copper and zinc and cloth spacers soaked in an acid solution, he built a battery - the first apparatus capable of producing electricity. Naysayers were quick to predict that electricity would never serve a useful purpose. Obviously they were very wrong. Electricity has a central role in our lives and to this day Electrochemistry is a standard course of study. Students apply concepts relating to electrochemistry by constructing a fruit-powered battery. This workshop is designed to compliment/reinforce discussion of concepts regarding electricity and chemistry (e.g., ions, electrolytes, voltage, & batteries).

- **Magnetism:** Some materials are *magnetic*; these are attracted to magnets. Students learn there are *naturally occurring* magnets and *manufactured* magnets. A magnetic field surrounds every magnet, creating a distinctive pattern around and between its poles.

Science Standards 1b, 1c, 1f

CALIFORNIA STANDARDS SCIENCE TEST

5TH GRADE SCIENCE TEST

CONTENT STANDARDS

Life Sciences	18	30%
Life Sciences – Grade 4	9	
2. All organisms need energy and matter to live and grow. As a basis for understanding this concept:		
a. <i>Students know</i> plants are the primary source of matter and energy entering most food chains.	1	
b. <i>Students know</i> 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.	2	
c. <i>Students know</i> decomposers, including many fungi, insects, and microorganisms, recycle matter from dead plants and animals.	1	
3. Living organisms depend on one another and on their environment for survival. As a basis for understanding this concept:		
a. <i>Students know</i> ecosystems can be characterized by their living and nonliving components.	1	
b. <i>Students know</i> that in any particular environment, some kinds of plants and animals survive well, some survive less well, and some cannot survive at all.	2	
c. <i>Students know</i> many plants depend on animals for pollination and seed dispersal, and animals depend on plants for food and shelter.	1	
d. <i>Students know</i> that most microorganisms do not cause disease and that many are beneficial.	1	

COORELATED SSW WORKSHOPS – Life Sciences

- Traveling Seeds:** Millions of seeds are produced from a variety of plants. The seeds are the beginning of life for future species of the same plant. The challenge to plant survival is moving the seed to a suitable germination site. Many plants disperse the seeds through wind, water, or unique vectors (animals that carry the seeds and pollen). Some plants are unique in their means of regenerating. Through hands-on activities, students become familiar with methods of seed dispersal.

Science Standards 2a, 2b, 2c, 3a, 3b, 3c
- Epidemic!** - The ease with which pathogens can spread through a population is very relevant today as we cope the possibility of a flu epidemic. Using diluted acids and bases as "body fluids," students participate in a classroom simulation of a spreading epidemic. Students then figured out who the original "carrier" was.

Science Standards 2c, 3a

COORELATED SSW WORKSHOPS – Life Sciences

- **Aspetic Technique: Handwashing Science** - Students learn the mechanism of the spread of contact-based microbes using a product called Glo-Germ[®]. This experiment is reinforced by describing the history of hygiene and a few of the diseases that can be transmitted by contact.
Science Standards 2c, 3a, 3d
- **Lesson in Decomposition – Life in the Rotting Log** - When dead matter decomposes it does not disappear, but is recycled through living things and the physical environment. (The atoms are recycled.) Students learn that when dead matter decomposes it breaks down into its basic elements, some of which are nutrients. The nutrients from dead matter are put back into the surrounding physical environment (soil, water, air) by decomposers
Science Standards 2a, 2b, 2c, 3a, 3b, 3c, 3d
- **Spicy Inhibitors** - For centuries, spices have been used to preserve foods. Marco Polo's trip to China was partly to locate a source of spices. Some spices contain natural inhibitors to food spoilage microbes. Students grow 5 food spoilage microbes on black pepper, cloves, and chili powder agars and observe the inhibition of some of the microbes. Application to food spoilage prevention and the history of the spice trade is discussed.
Science Standards 2a, 2b, 2c, 3a, 3b, 3d
- **Owl Pellets** - This hands-on experiment allows students to investigate the food web, identify animal skeletons, and practice dissecting skills. Each student dissects an owl pellet and classifies the remains using a bone-sorting chart.
Science Standards 2a, 2b, 3a, 3b,
- **Microbes and You** - The workshop begins with a brief introduction to the origins and characteristics of bacteria, followed by activities and discussions that involve the students directly with common practices performed by microbiologists in their labs daily. The students review the scientific method, learned about bio-safety, collected samples, streaked plates, analyzed and identified different types of bacteria, and even explored the cause and effect relationship associated with epidemiology. This workshop requires two days for completion - one for the students to streak their plates, and another for them to read the incubated plates and discuss the results. We also introduce the role of microbiologists in the modern workforce.
Science Standards 2a, 2b, 2c, 3a, 3b, 3d
- **Making Yogurt, an Ancient Chinese Secret?** Humans began to realize the benefits of food biotechnology long ago. In fact, as far back as 6000 B.C. the Sumerians and Babylonians utilized yeast in beer-making. Today on the supermarket shelves we have the option to buy yogurt with dinosaurs on the label or colored sprinkles neatly packaged atop the lid. One would hardly guess that this seemingly modern product has been around for thousands of years! Hold onto your hat! We are traveling back in time to where we will harness some bacterial power and make yogurt! This workshop takes two workshop periods.
Science Standards 2a, 2b, 2c, 3a, 3b, 3d

COORELATED SSW WORKSHOPS – Life Sciences

- **Vermicomposting:** Students work in groups of four to conduct experiments related to the behaviors and adaptations that earthworms have developed for survival in the environment. Students create their own ecosystems with sand, soil, live earthworms, and real plants in a 2-litre pop bottle. Everyone also learns the components of soil. Students learn how to culture soil microbes.

Science Standards 2a, 2b, 2c, 3a, 3b, 3d

- **Spicy Inhibitors - Identifying Bacteria** - Hans Christian Gram was originally looking for a stain for all bacteria to make them more easily visible in a microscope field. In the process of looking for a universal stain, he stumbled upon a fundamental difference between two distantly related groups of bacteria - those that retained the stain (Gram-positive) and those that did not (Gram-negative). Thus, today the Gram stain is one of the first steps in identifying an unknown bacterial culture. Gram reaction is important in medicine because some antibiotics are effective against only Gram-negative bacteria (e.g. erythromycin) and some against only Gram-positive ones (e.g. penicillin, actinomycin). This workshop incorporates a number of laboratory techniques, including the use of microscope, Gram's Stain, and a basic understanding of bacteria morphology.

Science Standards 2a, 2b, 2c, 3a, 3b, 3d

- **Pasteur's Experiment** - Prior to the 17th century, it was generally believed that living things could arise from nonliving materials, a process called "spontaneous generation". Using an S-shaped flask of his own design, Louis Pasteur was able to disprove this "theory" once and for all. In this brilliant lab, developed by teacher Patricia Herzberg, students recreate Pasteur's famous experiment, putting the scientific method into practice, and determining if Pasteur's experiment was valid.

Science Standards 2a, 2b, 2c, 3a, 3b, 3d

- **A Microbial Detective Story** - Students become field epidemiologists as they search for the source of an artificial epidemic. Our instructors hide the commonly used, non-pathogenic yeasts in workshop. Our students, knowing that yeasts produce catalase (which breaks down hydrogen peroxide into oxygen and water), sample various locations as they attempt to track down the source of the microorganisms. This lab lends itself to an almost infinite number of variations, and helps students appreciate the work of public health officials.

Science Standards 2a, 2b, 2c, 3a, 3b, 3d

- **Bioremediation by Oil Eating Bacteria** - Students simulate bioremediation of marine oil spills using microbes that consume oil. These microbes have specialized metabolic pathways that enable them to use oil as food while converting it into nontoxic byproducts. In a controlled experiment, students work in pairs to apply a suspension of oil-degrading microbes to a small amount of oil and chemical indicator in a culture tube. A change in indicator color signifies breakdown of the oil. Students also perform the experiment without indicator and over time observe visible changes in the appearance of the oil.

Science Standards 2a, 2b, 2c, 3a, 3b, 3d

- **Square Foot Gardening** - Students create garden beds that are divided into square foot areas. Students grow relatively large numbers of plants together in one square, following the given spacing guides. Row planting was mainly developed for modern agriculture; this isn't needed in back gardens.

Science Standards 2a, 2b, 2c, 3a, 3b, 3c, 3d

CALIFORNIA STANDARDS SCIENCE TEST

5TH GRADE SCIENCE TEST

CONTENT STANDARDS

Earth Sciences	18	30%
Earth Science – Grade 4	7	
4. The properties of rocks and minerals reflect the processes that formed them. As a basis for understanding this concept:		
a. <i>Students know</i> how to differentiate among igneous, sedimentary, and metamorphic rocks by referring to their properties and methods of formation (the rock cycle).	1	
b. <i>Students know</i> how to identify common rock-forming minerals (including quartz, calcite, feldspar, mica, and hornblende) and ore minerals by using a table of diagnostic properties.	1	
5. Waves, wind, water, and ice shape and reshape Earth's land surface. As a basis for understanding this concept:		
a. <i>Students know</i> some changes in the earth are due to slow processes, such as erosion, and some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.	2	
b. <i>Students know</i> natural processes, including freezing and thawing and the growth of roots, cause rocks to break down into smaller pieces.	1	
c. <i>Students know</i> moving water erodes landforms, reshaping the land by taking it away from some places and depositing it as pebbles, sand, silt, and mud in other places (weathering, transport, and deposition).	2	

COORELATED SSW WORKSHOPS – Earth Sciences

- **Rock Cycle** - The Earth is active. As you are reading this information, volcanoes are erupting; earthquakes are shaking; mountains are being pushed up and are being ground down; rivers are carrying sand and mud and laying them down; and all the time huge slabs of the Earth's surface are moving - about as fast as your fingernails grow. All this Earth action is linked by the rock cycle. Find out for yourself how different parts of the rock cycle work by coming to this workshop.

Science Standards 5a, 5b, 5c
- **Rock and Mineral Identification** - Students learn how to identify and classify rocks using the MOH hardness scale, color, texture, buoyancy, and cleavage. Students learn that the properties of rocks and minerals reflect the processes that form them.

Science Standards 4a, 4b
- **Gold Rush Mining** - Students learn how miners used science in the mining of gold in California.

Science Standards 4a, 4b

COORELATED SSW WORKSHOPS – Earth Sciences

- **Plate Tectonics** -Students make a paper model illustrating the concept of sea-floor spreading and the development of symmetrical magnetic "stripes" on either side of a mid-ocean spreading center.

Science Standards 5a

- **Plate Tectonics and Volcanoes** - Exploding Hair Gel, Alka Seltzer and Baking Soda Volcanoes, Fig Newton Convergent Zones and Milky Way Divergent Zones! Using these exciting and fun hands-on activities, students will learn about the types of volcanoes and how they relate to plate boundaries, what makes some volcanoes more dangerous than others, Volcanic rocks and landforms, and how volcanic eruptions affect Earth's climate and living things

Science Standards 5a

- **Earthquakes & Plate Tectonics** - The Earth's crust is made up of huge slabs called plates, which fit together like a jigsaw puzzle. These plates sometimes move. The friction causes earthquakes and volcanic eruptions near the edges of the plates. The theory that explains this process is called *plate tectonics*. St. Helens was an awesome reminder that Earth is not a boring, static hunk of rock, but a living planet wrapped around a giant ball of ancient heat. It reminds us that the planet coalesced from a hot cloud of gas and dust about 4.5 billion years ago. Heat from the surface radiated to space, cooling the skin. But the high-temperature rock inside was insulated by the crust, and actually has gained heat from radioactive decay and gravitational energy.

Science Standards 5a

- **Earthquakes: Strength of Materials** - Students observe and describe the properties of wood, clay, plastic, metals (copper, steel, zinc, and brass). Students investigate the causes of failure for various materials. How and why do things break? How do engineers decide what materials to use in their designs?

Science Standards 5a

- **National Parks: Grand Canyon - Exploring a Model River** - Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment. Students learn water running downhill is the dominant process in shaping the landscape, including California's landscape. Students also discover that rivers and streams are dynamic systems that erode, transport sediment, change course, and flood their banks in natural and recurring patterns.

Science Standards 5a, 5b, 5c

- **Erosion** - Students learn that waves, wind, water, ice and chemical reactions shape and re-shape the Earth.

Science Standards 5a, 5b, 5c

- **Glaciers** - Have you ever wondered how something as big as a glacier can flow like a river? Whether your answer is "yes" or "no," come join us for a "cool" look at glaciers - what they're made of and how they travel.

Science Standards 5a, 5b, 5c