



San Diego Unified School District
Science Department

Grade 2 – Insects and Plants
Life Science
Unit of Study



Table of Contents

Page	
2	Module Overview/Conceptual Flow
4	California Science Standards
5	Pacing the Unit as a Whole
6	Investigation 1: Mealworms
9	Investigation 2: Brassica Seeds
12	Investigation 3: Milkweed Bugs
15	Investigation 4: Silkworms
19	Investigation 5: Butterflies
22	Recommended Body of Evidence
24	Module Materials and Equipment
25	Caring for Live Materials

**Science Vision for
San Diego Unified School District**
Science is an integral part of the intellectual development of a child. Interest in science begins with attitudes and values established in the earliest years through daily experiences. Students graduating from high school must have a foundation in scientific knowledge and evidence based reasoning.

Updated versions of this unit of study can be found online at www.sandi.net/science.



Grade 2 – Insects and Plants Module Overview



Overview of the Unit

The **Insects and Plants Module** provides experiences that heighten students’ awareness of the living world. They come to know firsthand the life sequences of a number of insects. Four investigations introduce an insect and students observe structures and behaviors, discuss their findings, and record observations over time. Students see the life cycle of insects unfold and compare the stages of metamorphosis exhibited by each species. At the same time, students grow a plant from seeds and observe brassica go through its life cycle to produce new seeds. Students relate these firsthand experiences to information they gather from reading about life cycles of other plants and animals.

Grade 2 Life Science Conceptual Flow

<u>Concept #1</u> Plants and animals have predictable life cycles.		
Subconcepts Investigation #1: Mealworms	Subconcepts Investigation #2: Brassica Seeds	Subconcepts Investigation #3: Milkweed Bugs
Insects need air food, water and space; environment affects growth	Seeds need water, light, air, and nutrients to grow and develop.	Insects have three body parts; head, thorax, and abdomen.
Insects have characteristic structures and behaviors; some are inherited from parents.	As plants grow, they develop roots, stems, leaves, buds, flowers, and seeds in a sequence called life cycle.	Insects have different structures for eating different kinds of food.
The life cycle of the beetle is egg, larva, pupa, and adult, which produces eggs.	Environment affects growth.	Some insects go through simple metamorphosis (egg, nymph, adult)
		Offspring resemble parents.
		There is variation in a population.

Grade 2 Life Science Conceptual Flow – continued

Concept #1 (continued)

Plants and animals have predictable life cycles.

Subconcepts

Investigation #4: Silkworms

Insect larva have characteristic structures.

Insect adults have characteristic structures.

Male and Female insects mate. The life cycle of a silkworm is egg, larva, pupa, and adult, which produce eggs.

Subconcepts

Investigation #5: Butterflies

Insect adults have structures in common.

The life cycle of the butterfly is egg, larva, pupa, and adult, which produces eggs.

There are similarities and differences in the life cycles of different kinds of animals.

2nd Grade Science Content Standards Addressed in this Module

Life Sciences

LS2 Plants and animals have predictable life cycles. As a basis for understanding this concept:

- LS2a Students know that organisms reproduce offspring of their own kind and that the offspring resemble their parents and one another.
- LS2b Students know the sequential stages of life cycles are different for different animals, such as butterflies, frogs, and mice.
- LS2c Students know many characteristics of an organism are inherited from the parents. Some characteristics are caused or influenced by the environment.
- LS2d Students know there is variation among individuals of one kind within a population.
- LS2e Students know light, gravity, touch, or environmental stress can affect the germination, growth, and development of plants.
- LS2f Students know flowers and fruits are associated with reproduction in plants.

Investigation and Experimentation

I&E4 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:

- I&E4a Make predictions based on observed patterns and not random guessing.
- I&E4b Measure length, weight, temperature, and liquid volume with appropriate tools and express those measurements in standard metric system units.
- I&E4c Compare and sort common objects according to two or more physical attributes (e.g., color, shape, texture, size, weight).
- I&E4d write or draw descriptions of a sequence of steps, events, and observations.
- I&E4e Construct bar graphs to record data, using appropriately labeled axes.
- I&E4f Use magnifiers or microscopes to observe and draw descriptions of small objects or small features of objects.
- I&E4g Follow oral instructions for a scientific investigation.

Pacing the Unit as a Whole

Day 1 Start Inv. 1 Part 1 A/W	Day 2 Start Inv. 1 Part 2 A	Day 3 A	Day 4 A	Day 5 A
Day 6 A	Day 7 W	Day 8 Start Inv. 1 Part 3 A	Day 9 Start Inv. 2 Part 1 A/W	Day 10 Start Inv. 2 Part 2 A
Day 11 A/W	Day 12 Start Inv. 2 Part 3 A	Day 13 A	Day 14 A	Day 15 A
Day 16 A	Day 17 A	Day 18 W	Day 19 Start Inv. 3 Part 1 A/W	Day 20 Start Inv. 3 Part 2 A/W/R
Day 21 Start Inv. 3 Part 3 A	Day 22 A	Day 23 A	Day 24 A	Day 25 A
Day 26 A	Day 27 A	Day 28 W	Day 29 R	Day 30 Extensions
Day 31 Start Inv. 4 Part 1 A/W	Day 32 Start Inv. 4 Part 2 A/W	Day 33 Start Inv. 4 Part 3 A/W	Day 34 Start Inv. 4 Part 4 A/W	Day 35 R
Day 36 Start Inv. 4 Part 5 A	Day 37 A/W	Day 38 R	Day 39 Start Inv. 5 Part 1 A/W	Day 40 A/W
Day 41 Start Inv. 5 Part 2 A/W	Day 42 R	Day 43 Start Inv. 5 Part 3 A	Day 44 A	Day 45 A
Day 46 A	Day 47 A/W	Day 48 R		

A – Active Investigation sessions include firsthand observations about energy and matter, active thinking about the experiences, small group discussion, simulations, writing in science notebooks, learning new vocabulary in context, viewing a video, and completing written embedded assessments to inform instruction. (Approximately 60 minutes)

W – Wrap-up sessions are teacher-directed vocabulary reinforcement and science content review. (Approximately 30 minutes)

R – Reading sessions (*Science Resources* book) include individual and interactive reading, answering review questions, and discussing the reading to ensure that students integrate the information. (Approximately 30 minutes)



Grade 2 – Insects and Plants
Pacing Guide – Investigation 1: Mealworms



Investigation Overview

Investigation 1: Mealworms		
Concept: Plants and animals have predictable life cycles.		
Each student receives two larval mealworms in a vial to care for and observe. Over 10 weeks students observe the larvae grow, molt, pupate, and turn into beetles (adults), which mate, lay eggs, and die. They read two articles about insects in the environment.		
Part 1: Mealworms	Part 2: Larva, Pupa, Adult	Part 3: First Sorting
<u>Summary</u> Students begin their study of insect. They meet mealworms and observe their structures and behaviors. Each student keeps two mealworms on his or her desk, attends to their needs-food, water, and air	<u>Summary</u> Part 2 is a series of minisessions that are conducted whenever students observe a change in their mealworms. They discuss molting, pupation, adults and mating. They learn the three parts of an insect body; head, thorax, and abdomen. Students observe, compare, and draw the mealworms as they progress through their stages. They read an article that introduces them to a variety of insects.	<u>Summary</u> Students discover tiny larvae in the class mealworm culture several weeks after adults appear. They read how some characteristics are inherited from parents, and others are changed by their environment.
<u>Subconcepts</u> <ul style="list-style-type: none"> ▪ Insects need air, food, water, and space. ▪ Living organisms need to be treated with care and respect. ▪ Mealworms resemble each other. 	<u>Subconcepts</u> <ul style="list-style-type: none"> ▪ Insects have characteristic structures and behaviors. ▪ The structures of some insects change as the insect grows. ▪ As insects grow, they molt their hard, external covering. ▪ Adult insects have a head, thorax, and abdomen. 	<u>Subconcepts</u> <ul style="list-style-type: none"> ▪ The life cycle of the beetle is egg, larva, pupa, and adult, which produce eggs.
<u>Time Allocation</u> Active Investigation: 1 day	<u>Time Allocation</u> Active Investigation: 6 days	<u>Time Allocation</u> Active Investigation: 1 day
<u>CA Science Standards</u> LS2a, I&E4f, I&E4g	<u>CA Science Standards</u> LS2a, I&E4d, I&E4f	<u>CA Science Standards</u> LS2a, LS2c, I&E3d, I&E4f



Grade 2 – Insects and Plants
Pacing Guide – Investigation 1: Mealworms

Pacing Guide – Investigation 1: Mealworms

Day 1		Day 2		Day 3	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “Science Background” <i>TG p. 6-9</i> <input type="checkbox"/> Read “At a Glance” <i>TG p. 40-41</i> <input type="checkbox"/> Read “Background for the Teacher” <i>TG p. 42-43</i> <input type="checkbox"/> Read “Teaching Children About mealworms” <i>TG p. 44-45</i> <input type="checkbox"/> Watch Video demo of Inv. 1, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 46-50</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Mealworms; Wrapping up Pt 1” <i>Steps 1-15</i> <i>TG p. 51-55</i>	<input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 56-57</i> <input type="checkbox"/> Watch Video demo of Inv. 1, Pt 2	Guiding the Investigation <input type="checkbox"/> “Part 2: Larva, Pupa, Adult” <i>Steps 1-3</i> <i>TG p. 58</i>		Guiding the Investigation <input type="checkbox"/> “Part 2: Larva, Pupa, Adult” <i>Steps 4-6</i> <i>TG p. 58-59</i>
Day 4		Day 5		Day 6	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 2: Larva, Pupa, Adult” <i>Step 7</i> <i>TG p. 59</i>		Guiding the Investigation <input type="checkbox"/> “Part 2: Larva, Pupa, Adult” <i>Steps 8-9</i> <i>TG p. 59-60</i>		Guiding the Investigation <input type="checkbox"/> “Part 2: Larva, Pupa, Adult” <i>Steps 10-12</i> <i>TG p. 60</i>

Pacing Guide – Investigation 1: Mealworms (continued)

Day 7		Day 8	
Prep	Instruction	Prep	Instruction
	<p>Guiding the Investigation</p> <ul style="list-style-type: none"> <input type="checkbox"/> “Part 2: Larva, Pupa, Adult; Wrapping up Pt 2” Steps 13-16 <i>TG p. 61-62</i> <p>Reading in Science Resource</p> <ul style="list-style-type: none"> <input type="checkbox"/> Steps 17-18 <i>TG p. 63-64</i> <p>Student Reading; Science Resources p. 3-7</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 65-66</i> <input type="checkbox"/> Watch Video demo of Inv. 1, Pt 3 	<p>Guiding the Investigation</p> <ul style="list-style-type: none"> <input type="checkbox"/> “Part 3: Life Cycle; Wrapping up Pt 3” Steps 1-9 <i>TG p. 67-69</i> <p>Reading in Science Resource</p> <ul style="list-style-type: none"> <input type="checkbox"/> Steps 10-12 <i>TG p. 70</i> <p>Student Reading; Science Resources p. 8-14</p>



Grade 2 – Insects and Plants
Pacing Guide – Investigation 2: Brassica Seeds



Investigation Overview

Investigation 2: Brassica Seeds		
<p>Concept: Plants and animals have predictable life cycles. Each student plants tiny rapid- cycling brassica seeds in a planter cup. The brassica plants grow under continuous light and develop for a month. Students observe and record the complete life cycle from seed to seed. They read about flower and seeds.</p>		
Part 1: Introducing Recording	Part 2: Planting Brassica	Part 3: Observing Brassica Growth
<p><u>Summary</u> Students prepare for several weeks of plant-growth investigations. They discuss what they know about plants and use the class calendar to keep track of growth and development.</p>	<p><u>Summary</u> Students plant rapid-cycling brassica seeds in soil and place them under a lamp where they will receive continuous light. Students view a video showing what plants need to grow and their different stages of development</p>	<p><u>Summary</u> Students observe germination, growth, flowering and seedpod formation. The investigation culminates in the harvesting of the seeds, providing an introduction to the concept of life cycle in plants. Students read about the importance of fruit, seeds and flowers for a plant’s life cycle</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Plants are alive. ▪ Scientists use notebooks to record their observations. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Plants need water, air, nutrients, and light to grow. ▪ The environment can cause changes in the growth of plants. ▪ Plants produce seeds that will grow into the same kind of plant. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Plants are alive. ▪ Seeds are alive and grow into new plants. ▪ As plants grow, they develop roots, stems, and leaves, buds, flowers and seeds in sequence called a life cycle. ▪ Bees and other insects help some plants by moving pollen from flower to flower.
<p><u>Time Allocation</u> Active Investigation: 1 day</p>	<p><u>Time Allocation</u> Active Investigation: 2 days</p>	<p><u>Time Allocation</u> Active Investigation: 7 days Reading: 1 session</p>
<p><u>CA Science Standards</u> LS2a</p>	<p><u>CA Science Standards</u> LS2a, LS 2e, LS 2f, I&E4g</p>	<p><u>CA Science Standards</u> LS2d, LS2, LS2f, I&E4d, I&E4g</p>



Grade 2 – Insects and Plants
Pacing Guide – Investigation 2: Brassica Seeds



Pacing Guide – Investigation 2: Brassica Seeds

Day 9		Day 10		Day 11	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 76-77</i> <input type="checkbox"/> Read “Science Background” <i>TG p. 78-81</i> <input type="checkbox"/> Read “Teaching Children About Plants” <i>TG p. 82-84</i> <input type="checkbox"/> Watch Video demo of Inv. 2, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 85-86</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Introducing Recording; Wrapping up Pt 1” <i>Steps 1-6</i> <i>TG p. 87-88</i>	<input type="checkbox"/> Watch Video demo of Inv. 2, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 89-93</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Brassica Seeds” <i>Steps 1-12</i> <i>TG p. 94-97</i>		Guiding the Investigation <input type="checkbox"/> View Video Step 13 <i>TG p. 97</i> <input type="checkbox"/> “Wrapping Up Part 2” <i>Steps 14-15</i> <i>TG p. 98</i>
Day 12		Day 13		Day 14	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Watch Video demo of Inv. 2, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 99-100</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Observing Brassica Growth” <i>Steps 1-4</i> <i>TG p. 101-102</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Observing Brassica Growth” <i>Steps 5-7</i> <i>TG p. 102-103</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Observing Brassica Growth” <i>Steps 8-11</i> <i>TG p. 103-104</i>

Pacing Guide – Investigation 2: Brassica Seeds (continued)

Day 15		Day 16		Day 17	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Reading in Science Resource <input type="checkbox"/> “Part 3: Observing Brassica Growth” Steps 12-14 <i>TG p. 105</i> Student Reading; Science Resources p. 15-19		Guiding the Investigation <input type="checkbox"/> “Part 3: Observing Brassica Growth” Step 15 <i>TG p. 106</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Observing Brassica Growth” Steps 16-20 <i>TG p. 106-107</i>
Day 18					
Prep	Instruction				
	<input type="checkbox"/> “Wrapping up Part 3: Observing Brassica Growth” Steps 21-24 <i>TG p. 108-109</i>				



Grade 2 – Insects and Plants
Pacing Guide – Investigation 3: Milkweed Bugs



Investigation Overview

Investigation 3: Milkweed Bugs		
<p>Concept: Plants and animals have predictable life cycles. Groups of students receive vials of milkweed bug eggs. Each group prepares a habitat for the bugs, providing air, space, food, and water. They observe structure, pattern, and behavior as the insects advance through simple metamorphosis. They read two articles about insect variation, shape, and color.</p>		
Part 1: Eggs	Part 2: Habitats	Part 3: Growing Milkweed Bugs
<p><u>Summary</u> Students observe the tiny yellow or orange milkweed bug eggs in vials and guess what they are.</p>	<p><u>Summary</u> Students prepare milkweed bug habitats for the nymphs and outfit them with food (sunflower seeds), water, air, and space. They hang up the habitat in the classroom. A thermometer is introduced as a tool to measure the air temperature near the habitats. Students read about the variation in color, size, and shape in different groups of organisms.</p>	<p><u>Summary</u> Students care for the bugs and observe the changes that occur as the bugs mature. They will observe egg hatching, molting, feeding, growth, movement, change of color patterns, mating, egg laying, and death – leading to opportunities to develop the concept of life cycle. Each time they observe, they record the temperature of the air near the habitats. Finally, students read an article describing the wide variety of shapes and colors of insects.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Insects hatch from eggs. ▪ Live organisms need to be treated with care and respect. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Insects need air, food, water, and space and different insects meet these needs in different ways. ▪ Variations exist within a group of organisms. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ As insects grow, they molt their hard external covering. ▪ Insects and other animals have different structures that help them grow and survive. ▪ The life cycle of some insects is egg, nymph stages, and adult, which produce eggs.
<p><u>Time Allocation</u> Active Investigation: 1 day</p>	<p><u>Time Allocation</u> Active Investigation: 1 day</p>	<p><u>Time Allocation</u> Active Investigation: 6 days</p>
<p><u>CA Science Standards</u> LS2a, I&E4f, I&E4g</p>	<p><u>CA Science Standards</u> LS2a, LS2d, I&E4b, I&E4g</p>	<p><u>CA Science Standards</u> LS2, I&E4b, I&E4d, I&E4g</p>



Grade 2 – Insects and Plants
Pacing Guide – Investigation 3: Milkweed Bugs



Pacing Guide – Investigation 3: Milkweed Bugs

Day 19		Day 20		Day 21	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 114-115</i> <input type="checkbox"/> Read “Science Background” <i>TG p. 116-117</i> <input type="checkbox"/> Read “Teaching Children About Milkweed Bugs” <i>TG p. 118-120</i> <input type="checkbox"/> Watch Video demo of Inv. 3, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 121-123</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Eggs; Wrapping up Pt 1” Steps 1-8 <i>TG p. 124-125</i>	<input type="checkbox"/> Watch Video demo of Inv. 3, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 126-130</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Habitats; Wrapping up Pt 2” Steps 1-17 <i>TG p. 131-135</i> Reading in Science Resources <input type="checkbox"/> Steps 1-20 <i>TG p. 136</i> Student Reading; Science Resources p. 20-25	<input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 137-138</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Step 1 <i>TG p. 139</i>
Day 22		Day 23		Day 24	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Step 2 <i>TG p. 139</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Step 3 <i>TG p. 139-140</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Steps 4-5 <i>TG p. 140</i>

Pacing Guide – Investigation 3: Milkweed Bugs (continued)

Day 25		Day 26		Day 27	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Step 6 <i>TG p. 140-141</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Steps 7-9 <i>TG p. 141-142</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Growing Milkweed Bugs” Steps 10-11 <i>TG p. 142</i>
Day 28		Day 29		Day 30	
Prep	Instruction				
	Guiding the Investigation <input type="checkbox"/> “Wrapping up Part 3” Steps 12-13 <i>TG p. 143</i>		Reading in Science Resources <input type="checkbox"/> Steps 14-15 <i>TG p. 144</i> Student Reading; Science Resources p. 26-29		<input type="checkbox"/> Interdisciplinary Extensions TG p. 145-147



Grade 2 – Insects and Plants
Pacing Guide – Investigation 4: Silkworms



Investigation Overview

<p>Investigation 4: Silkworms Concept: Plants and animals have predictable life cycles. Students observe the life history of one of the most commercially successful insects. They start with eggs and observe the growth and changes to larvae, pupae, and adults who produce eggs. Students study the structure of a moth larva, and read two articles about insects.</p>		
Part 1: Eggs	Part 2: Larvae	Part 3: Close Observations
<p><u>Summary</u> Students observe silkworm eggs in vials</p>	<p><u>Summary</u> Students set up a class habitat for the tiny hairy silkworm larvae</p>	<p><u>Summary</u> Students build small paper habitats that they keep at their desks for close observations of silkworm larvae</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Insect’s eggs will hatch into insect young. ▪ Live organisms need to be treated with care and respect. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Insects hatch from eggs and will grow and change. ▪ Insects need air, food, water, and space. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Soils vary from place to place. ▪ Soils have properties of color and texture. ▪ Different soils differ in their ability to support plants, including the retention of water.
<p><u>Time Allocation</u> Active Investigation: 1 day</p>	<p><u>Time Allocation</u> Active Investigation: 1 day</p>	<p><u>Time Allocation</u> Active Investigation: 3 days</p>
<p><u>CA Science Standards</u> LS2a, I&E4a, I&E4f, I&E4g</p>	<p><u>CA Science Standards</u> LS2d, I&E4a, I&E4f, I&E4g</p>	<p><u>CA Science Standards</u> LS2a, I&E4a, I&E4f, I&E4g</p>

Investigation Overview (continued)

Investigation 4: Silkworms

Concept: Plants and animals have predictable life cycles.

Students observe the life history of one of the most commercially successful insects. They start with eggs and observe the growth and changes to larvae, pupae, and adults who produce eggs. Students study the structure of a moth larva, and read two articles about insects.

Part 4: Silkworm Structures	Part 5 Pupae and Adults	
<p><u>Summary</u> Students make detailed observations of silkworm larval structures. They read an article that describes what insects are.</p>	<p><u>Summary</u> Students investigate silkworms through the rest of the life cycle, observing changes as the silkworms mature: molting, feeding, growth, movement, silk production, cocoon spinning, mating, egg laying, and death, leading to opportunities to reinforce the concept of life cycle. At the end, they read an article describing the characteristics of insects.</p>	
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ The basic structures of all insects include six legs and three body parts. ▪ Silkworms larvae have characteristic structures. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Silk Worms spin silk to make a cocoon around them as the pupate. ▪ The life cycle of silkworms is egg, larva, pupa, and adult, which produce eggs. 	
<p><u>Time Allocation</u> Active investigation: 1 day Reading: 1 Day</p>	<p><u>Time Allocation</u> Active investigation: 2 days Reading: 1 Day</p>	
<p><u>CA Science Standards</u> LS2a, LS2d, I&E4a, I&E4d</p>	<p><u>CA Science Standards</u> LS2a, LS2d, I&E4a, I&E4d</p>	



Grade 2 – Insects and Plants
Pacing Guide – Investigation 4: Silkworms



Pacing Guide – Investigation 4: Silkworms

Day 31		Day 32		Day 33	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 150-151</i> <input type="checkbox"/> Read “Science Background” <i>TG p. 152-155</i> <input type="checkbox"/> Read “Teaching Children About Silkworms” <i>TG p. 156-157</i> <input type="checkbox"/> Watch Video demo of Inv. 4, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 158-159</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Eggs; Wrapping up Pt 1” Steps 1-6 <i>TG p. 160-161</i>	<input type="checkbox"/> Watch Video demo of Inv. 4, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 162-163</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Larvae; Wrapping up Pt 2” Steps 1-11 <i>TG p. 164-166</i>	<input type="checkbox"/> Watch Video demo of Inv. 4, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 167-168</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Close Observations; Wrapping up Pt 3” Step 7-9 <i>TG p. 169-170</i>
Day 34		Day 35		Day 36	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Watch Video demo of Inv. 4, Pt 4 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 171-172</i>	Guiding the Investigation <input type="checkbox"/> “Part 4: Silkworm Structures; Wrapping up Pt 4” Steps 1-11 <i>TG p. 173-176</i>		Reading in Science Resources <input type="checkbox"/> Steps 12-15 <i>TG p. 177-178</i> Student Reading; Science Resources p. 30-34	<input type="checkbox"/> Watch Video demo of Inv. 4, Pt 5 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 179-180</i>	Guiding the Investigation <input type="checkbox"/> “Part 5: Pupae and Adults” Steps 1-2 <i>TG p. 181</i>

Pacing Guide – Investigation 4: Silkworms (continued)

Day 37		Day 38	
Prep	Instruction	Prep	Instruction
	Guiding the Investigation <input type="checkbox"/> “Part 5: Pupae and Adults; Wrapping up Part 5” Steps 3-7 <i>TG p. 181-183</i>		Reading in Science Resources <input type="checkbox"/> Steps 8-9 <i>TG p. 184</i> Student Reading; Science Resources p. 35-36



Grade 2 – Insects and Plants
Pacing Guide – Investigation 5: Butterflies



Investigation Overview

<p>Investigation 5: Butterflies Concept: Plants and animals have predictable life cycles. The class observes the painted lady larvae grow, pupate, and emerge as adults. Students experience the stages of complete metamorphosis and compare the behaviors of moths and butterflies. They read about life cycles of other animals and compare to insects.</p>		
Part 1: Caterpillars	Part 2: Larvae Chrysalises	Part 3: Butterflies
<p><u>Summary</u> Students are introduced to a painted lady caterpillar (larval stage) and observe it closely to determine its structures. They monitor its behaviors – eating, moving, molting – until it pupates in a chrysalis.</p>	<p><u>Summary</u> The painted lady pupae are transferred to a net cage to prepare for the emergence of adult painted ladies. Students read an article about insect life cycles.</p>	<p><u>Summary</u> Students observe butterflies feeding at a sugar-water fountain, watch for mating and search for eggs. With luck some eggs will hatch, and tiny larvae will emerge to start the cycle again. Students read an article about the life cycles of a fish, frog, duck, and mouse. It tells students that all living things progress through a life cycle.</p>
<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Insects need air, water, food, and space ▪ Live organisms need to be treated with care and respect. ▪ Insect larvae have common structures, such as six legs and three body parts. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Butterflies construct chrysalises when they pupate. 	<p><u>Subconcepts</u></p> <ul style="list-style-type: none"> ▪ Adult insects have common structures , including six legs and three body parts. ▪ The life cycle of the butterfly is egg, larva, pupa, and adult, which produce eggs.
<p><u>Time Allocation</u> Active Investigation 3 days</p>	<p><u>Time Allocation</u> Active Investigation: 1 day Reading 1 day</p>	<p><u>Time Allocation</u> Active Investigation: 4-6 days Reading 1 day</p>
<p><u>CA Science Standards</u> LS2a, I&E4a, I&E4f, I&E4g</p>	<p><u>CA Science Standards</u> LS2d, LS2b, I&E4a, I&E4f,</p>	<p><u>CA Science Standards</u> LS2a, LS2b, LS2c, I&E4a, I&E4d</p>



Grade 2 – Insects and Plants
Pacing Guide – Investigation 5: Butterflies



Pacing Guide – Investigation 5: Butterflies

Day 39		Day 40		Day 41	
Prep	Instruction	Prep	Instruction	Prep	Instruction
<input type="checkbox"/> Read “At a Glance” <i>TG p. 188-189</i> <input type="checkbox"/> Read “Science Background” <i>TG p. 190-193</i> <input type="checkbox"/> Teaching Children About Metamorphosis <i>TG p. 194-195</i> <input type="checkbox"/> Watch Video demo of Inv. 4, Pt 1 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 196-197</i>	Guiding the Investigation <input type="checkbox"/> “Part 1: Caterpillars” Steps 1-8 <i>TG p. 198-199</i>		Guiding the Investigation <input type="checkbox"/> “Part 1: Caterpillars; Wrapping up Pt 1” Steps 9-15 <i>TG p. 199-201</i>	<input type="checkbox"/> Watch Video demo of Inv. 5, Pt 2 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 202-204</i>	Guiding the Investigation <input type="checkbox"/> “Part 2: Chrysalises; Wrapping up Pt 2” Step 1-4 <i>TG p. 205-206</i>
Day 42		Day 43		Day 44	
Prep	Instruction	Prep	Instruction	Prep	Instruction
	Reading in Science Resources <input type="checkbox"/> Steps 5-8 <i>TG p. 207-208</i> Student Reading; Science Resources p. 37-43	<input type="checkbox"/> Watch Video demo of Inv. 5, Pt 3 <input type="checkbox"/> Review “Materials” and “Getting Ready” <i>TG p. 209-211</i>	Guiding the Investigation <input type="checkbox"/> “Part 3: Butterflies” Steps 1-2 <i>TG p. 212</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Butterflies” Steps 3-5 <i>TG p. 212-213</i>

Pacing Guide – Investigation 5: Butterflies (continued)

Day 44		Day 45		Day 46	
Prep	Instruction	Prep	Instruction		
	Guiding the Investigation <input type="checkbox"/> “Part 3: Butterflies” Step 6 <i>TG p. 213</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Butterflies” Step 7 <i>TG p. 213</i>		Guiding the Investigation <input type="checkbox"/> “Part 3: Butterflies” Steps 8-10 <i>TG p. 213-214</i>
Day 47		Day 48			
Prep	Instruction	Prep	Instruction		
	Guiding the Investigation <input type="checkbox"/> “Wrapping up Part 3” Steps 11-12 <i>TG p. 215</i>		Reading in Science Resources <input type="checkbox"/> Steps 13-16 <i>TG p. 216-217</i> Student Reading; Science Resources p. 44-56		



**Grade 2 – Insects and Plants
Recommended Body of Evidence**



Overview

This guide is intended to support the collection of a Body of Evidence. A student's Body of Evidence should, at a minimum, include work from the listed prompts and in-class investigations. Other class work and assessments that demonstrate a student's level of proficiency may be included. Download samples of proficient work @ <https://eteams.sandi.net/sites/sbrc>

Note: Administer Grade 2 FOSS Life Science End-of-Module assessment (can also be used as a pre-assessment at the beginning of the unit).

Recommended Body of Evidence – Grade 2 Life Science

Concept #1

Plants and animals have predictable life cycles. (CA Standards LS2a, LS2b, LS2c, LS2d, LS2e, LS2f)

Prompt #1: (I&E) FOSS: Insects and Plants Investigation 1: Mealworms Part 2: Larva, Pupa, Adult

(TG p. 224 – Insect Record – No. 2 – Science Notebook)

Record your observations of the darkling beetle changing from a pupa to an adult.

Prompt #2: (I&E) FOSS: Insects and Plants Investigation 1: Mealworms Part 3: Life Cycle

(TG p. 225 – Environment Review – No. 3 – Science Notebook)

1. What can happen to a darkling beetle to change its characteristics? 2. Will these changes be passed to offspring? 3. What characteristics of a tree can the environment change?

Prompt #3: (I&E) FOSS: Insects and Plants Investigation 2: Brassica Seeds Part 3: Observing Brassica Growth

(TG p. 228 – Flowers and Seeds Review – No. 6 – Science Notebook)

1. Name one of the plants, and tell about its flower. 2. Where are the seeds on a full-grown brassica plant? 3. Name two fruits you like to eat. 4. Name the parts of plants that are important for their life cycle.

Prompt #4: (I&E) FOSS: Insects and Plants Investigation 2: Brassica Seeds Part 3: Observing Brassica Growth

(TG p. 229 – Brassica A – No. 7 – Science Notebook *or* TG p. 230 – Brassica B – No. 8 – Science Notebook)

No. 7: Draw lines from the words to the parts of the plant.

No. 8: Label the parts of the plant.

Prompt #5: (I&E) FOSS: Insects and Plants Investigation 3: Milkweed Bugs Part 2: Habitats

(TG p. 231 Milkweed Bug Habitat – No. 9 – Science Notebook)

Draw a home you have made for the milkweed bugs. What will they need?

Prompt #6: (I&E) FOSS: Insects and Plants Investigation 3: Milkweed Bugs Part 2: Habitats

(TG p. 232 – Variation Review – No. 10 – Science Notebook)

1. Name five variations you can observe in people. 2. Tell about variation in trout. 3. Think of another animal, and tell about variation.

Recommended Body of Evidence – Grade 2 Life Science (continued)

Prompt #7: (I&E) FOSS: Insects and Plants Investigation 3: Milkweed Bugs Part 2: Habitats

(TG p. 233 – Life Cycle of the Triangle Bug – No. 11 – Science Notebook)

1. Put the pictures in order to show how the make-believe triangle bug grows. 2. Write the name of the stage under each picture.

Prompt #8: (I&E) FOSS: Insects and Plants Investigation 4: Silkworms Part 2: Larvae

(TG p. 224 – Insect Record – No. 2 – Science Notebook)

Record your observations throughout the silkworms' life cycle.

Prompt #9: (I&E) FOSS: Insects and Plants Investigation 4: Silkworms Part 4: Silkworm Structure

(TG p. 236 – What Makes An Insect? Review – No. 14 – Science Notebook)

1. What are the three parts of an insect? 2. Tell about insect legs, antennae, and wings.

Prompt #10: (I&E) FOSS: Insects and Plants Investigation 5: Butterflies Part 1: Caterpillars

(TG p. 237 – Caterpillar Structures– No. 15 – Science Notebook)

Do caterpillar have legs? How many? Do caterpillars have bristles or hairs? Do caterpillars have antennae? How many? Do caterpillars have ears? How many? What colors are on the caterpillars?

Prompt #11: (I&E) FOSS: Insects and Plants Investigation 5: Butterflies Part 3: Butterflies

(TG p. 239 – Life Cycle of the Square Moth– No. 17 – Science Notebook)

1. Put the pictures in order to show how the make-believe square moth grows. 2. Write the name of the stage under each picture.

Prompt #12: (I&E) FOSS: Insects and Plants Investigation 5: Butterflies Part 3: Butterflies

(TG p. 240 – Life Goes Around Review– No. 18 – Science Notebook)

1. Does the ladybug larva look like its parents? 2. Tell about the life cycle of a ladybug. 3. Tell about the life cycle of a different animal. 4. Name five animals that hatch from eggs. 5. Name some animals that are born alive (not as eggs).



**Grade 2 – Insects and Plants
Module Materials and Equipment**



Materials Provided

The FOSS kit comes with most of the supplies that are needed to teach the unit. The kits will be delivered to the school site prior to the start of the 12-week unit of instruction. At the end of the 12-weeks, the kit will be returned to the Science Resource Center where it will be refurbished and prepared for its next use. Please review the refurbishment calendar for kit drop-off and return dates. Kits must be returned according to the refurbishment calendar to ensure that all kits are checked and restocked with consumable materials.

Materials Supplied by the Teacher or School Site

Be aware that the classroom teacher or school site must supply a few items. These are indicated in the materials list for each part of the investigation with an asterisk (*). Here is a summary of those items.

Investigation 1: Mealworms	Investigation 2: Brassica Seeds	Investigation 3: Milkweed Bugs	Investigation 4: Silkworms	Investigation 5: Butterflies
<ul style="list-style-type: none"> ▪ Apple, sweet potato, carrot, or potato ▪ 8 small boxes or berry baskets (optional) ▪ Flip chart or chart paper ▪ 2 marking pens, different colors ▪ 1-overhead -transparency pen ▪ Paring knife ▪ Spoon ▪ Wheat Bran ▪ Marking Pen- Permanent ▪ Measuring spoon ¼ teaspoon ▪ 1 fresh orange (optional) ▪ 2 Paper towels ▪ Colored pencils ▪ Scissors ▪ Sugar ▪ Transparent Tape ▪ VCR and Monitor ▪ 32 Pieces of White Paper 	<ul style="list-style-type: none"> ▪ 1 Sheet of Chart Paper ▪ Cotton Swabs (optional) ▪ Extension Cord (optional) ▪ Graph Paper (optional) ▪ Marking Pen ▪ Marking Pen, permanent (optional) ▪ Newspaper ▪ Overhead –Transparency pen ▪ Paper towels ▪ 16 pencils ▪ 1 pitcher or 2-liter soda bottle ▪ Potting soil 4 liters (4 quarts) ▪ Rulers ▪ Scissors ▪ String ▪ Transparent Tape ▪ VCR and Monitor ▪ 1 Zip lock bag, 1 liter (optional) 	<ul style="list-style-type: none"> ▪ Glue ▪ Light Colored Paper ▪ Overhead transparency pen ▪ Paper clips- jumbo ▪ Sharp Pencils ▪ Pitcher or 2-liter soda bottle ▪ Scissors ▪ String (optional) ▪ 20 Twigs ▪ 1 Large piece of white paper 	<ul style="list-style-type: none"> ▪ Large Flat box or lid ▪ 8 pieces of card stock 8.5 x 11 inch (optional) ▪ 1 Sheet of chart paper ▪ Medium Sized corrugated box or clear plastic box ▪ 1 crayon – yellow ▪ 2 Paper egg cartons ▪ Marking Pen ▪ Modeling clay ▪ Mulberry Leaves (optional) ▪ Overhead transparency Pen ▪ Piece of paper to line medium sized box ▪ Paper towels ▪ Plastic bag to fit over shoebox ▪ Rulers ▪ Transparent tape ▪ 1 large piece of white paper ▪ 32 Pieces of white paper ▪ 1 1-liter zip bag 	<ul style="list-style-type: none"> ▪ 1 Sheet of chart paper ▪ 2 pieces of construction paper, 1 red or orange and 1 any other color ▪ Glue ▪ Plastic lid (Optional) ▪ Mallow Plant or fresh mallow leaves (optional) ▪ Marking pen ▪ Marking Pen- Permanent ▪ Measuring spoon ¼ teaspoon ▪ 1 fresh orange (optional) ▪ 2 Paper towels ▪ Colored pencils ▪ Scissors ▪ Sugar ▪ Transparent Tape ▪ VCR and Monitor ▪ 32 Pieces of White Paper



San Diego Unified School District
Science Department

Grade 2 – Insects and Plants Caring for Live Materials



Live Materials Used in This Module

Mealworms
Milkweed Bugs
Silkworms
Painted Lady Butterflies

Introduction to Life in the Classroom

In several of the FOSS modules and courses, living organisms are brought into the classroom to be cared for and observed by K-5 students. Through the direct experience with organisms provided by these modules, we hope to engender in students a sense of respect for all life and to spark a desire to understand the complex systems that support life on Earth.

The FOSS program endorses the National Science Teachers Association Guidelines for Responsible Use of Animals in the Classroom as they apply to elementary and middle school classrooms.

The FOSS program provides detailed information on how to obtain organisms, how to prepare for their arrival, how to care for them in the classroom, and how to instruct students to properly handle each animal. The animals in the modules were selected because they are abundant, safe for students, easy to care for, and hardy and well-adapted to classroom environments. FOSS selected organisms that were nonexotic, commonly available from local and regional suppliers, and, in some cases, found in the natural environments in many regions. When investigations are carried out as described in the FOSS teacher guide, the insects, worms, crustaceans, snails, and fish are not harmed in any way.

MEALWORMS

The mealworm is not a worm; it is a larva. Any similarity to a true worm is incidental. mealworm larvae are golden yellow and have 13 segments—a head, three thoracic segments, and nine abdominal segments. Mealworm larvae are the counterpart of the familiar caterpillar in the butterfly story. They pull themselves around on six stubby legs, one pair on each thoracic segment.

Mealworms should be kept in large, relatively flat containers. They seem to thrive best when the colony has a large surface area. Keep the bran about 2 or 3 cm (± 1 ") deep in a basin, bus tray, aquarium, or plastic shoe box. If the container sides are steep and smooth, it is not necessary to keep the container covered. Adults and larvae seem to prefer hiding under bits of paper or light cardboard; the pupae give no indication that they care.

The mealworm's preferred environment is very dry, moderately warm, and dark. A bit of apple provides extra moisture for the mealworms and seems to stimulate rapid growth. As the temperature increases, so does the rate at which mealworms advance through their life cycle. Under ideal conditions, in a classroom, the complete life cycle can take place in as little as 3 months, but more likely it will take 4 months. Cold slows the process almost to the point of suspended animation. Mealworms can be put into the refrigerator (not the freezer) for periods of time to stop metamorphosis.

In addition to providing reliable opportunities for observing a complete life cycle in the classroom as in the Insects and Plants Module, mealworms can also be used for other activities. In the Environments Module their response to various environmental factors is investigated. Mealworms can be used for structure/function observations and behavior investigations. And they are just nice to have around to remind us that life on earth takes a seemingly endless variety of forms, and that part of being human is to have compassion and respect for all life.

Food and Water. The mealworm culture must be kept dry. Mealworms can go through their complete life cycle without any added water (they are very efficient at extracting water from their food), but it is recommended that moisture continually be provided in the form of small bits of apple, sweet potato, or carrot. Otherwise the larvae and adults may attack each other in search of additional moisture. If carrot or sweet potato is used as the moisture source, the frass will be orange, adding evidence that the granules are waste rather than eggs.

What to do when they arrive. Mealworm beetles are shipped in a container with a "breathing" cap to provide air. They need no special care but should be used as soon as possible, as they have a rather short life span. Keep beetles at normal room temperatures in low light. Store in a cool place at 45 to 65° F out of direct sunlight. At warmer room temperatures, larvae will soon pupate. Cover loosely with a paper towel to provide crawling space. Add slices of potato or carrot for moisture and add a substrate of bran for food. Replace as necessary or if it becomes moldy.

Mealworm Life Cycle				
Stage	How Long?	Food	Moisture	Other information
Egg	7-14 days			
Larva	30-90 days	Bran	Apple	5 molts occur
Pupa	10-20 days			
Adult	5-10 days	Bran	Apple	Death: 30 days
Egg	The cycle continues.			

MILKWEED BUGS

Milkweed bugs are true bugs; beetles, moths, flies, and butterflies are not. Bugs have the usual complement of structures that they share with just about all other insects: six legs, three body parts (head, thorax, and abdomen), and two antennae. True bugs (order Hemiptera) do not have mouths for biting and chewing food—they have a tubelike beak for sucking fluids. The milkweed bug in nature sucks nutrients from milkweed seeds, but those in the classroom have been bred to feed exclusively on sunflower seeds.

Milkweed bug habitat. Culturing milkweed bugs is fairly easy. The bugs require no soil or green plant material. Just about any container is suitable for a habitat. Because milkweed bugs can walk on any surface, including smooth plastic, glass, metal, wet surfaces, and all textured surfaces, the habitat must be closed tightly, and the ventilation holes must be tiny so the first instar nymphs can't escape.

We suggest a plastic zip bag for the habitat container. Use a pin to poke a hundred holes in the bag, and install a water container in the bottom. To add interest, put a branch in the bag and attach a bundle of raw, shelled sunflower seeds and a cotton ball to the branch. Hang the bag from a paper clip next to a wall out of direct sunlight.

Maintenance. Maintenance is minimal. Keep an eye on the water level, and when it gets low after 3–4 weeks, add water and perhaps replace the wick. A new bundle of 20 to 30 sunflower seeds each month should be adequate for a modest culture of 25 bugs. The culture may start to look a little messy after a month as little brown spots of waste appear on the walls of the bag and the molts start to accumulate. Transfer the branch, water fountain, and bugs to a new bag to renew the aesthetic appeal of the culture.

What to do when they arrive.

* Eggs are shipped on a wad of floss. If you are unable to begin the investigation when the eggs arrive, they may be kept in the container at cool room temperatures or refrigerated for short periods; otherwise they will hatch within one week. If the eggs have hatched upon arrival, add a few sunflower seeds and hatched nymphs to the vials for distribution to the students.

* Keep adult males and females in separate containers. A 1/2-liter container with small air holes can be used for a few days. Add a few sunflower seeds and a moist paper towel wick for moisture. To keep adult milkweed bugs for a longer period of time, place in milkweed bug habitats with sunflower seed packets, water fountain, twigs, and floss for eggs.

End the life cycle. As long as the four needs are attended to, new generations of milkweed bugs will continue to flourish in the habitat. At some point you may want to end the cycle. Although the bugs would probably soon perish if released into the environment, it is not suggested that you do so, as they were not originally from the environment. Place the bag in the freezer overnight to kill the bugs; discard the bag in the trash.

SILKWORM MOTHS

Silk is a natural fiber of exceptional strength, texture, and luster. When silk fibers are spun into thread and woven into fabrics, the result is an exquisite commodity. Silk was first made in China, and for centuries the methods of production were cloaked in secrecy, so valuable was the technology to those who controlled the art and industry of silk making. Eventually, however, the secret and the organisms escaped the control of the Chinese, and thriving silk industries were established in Japan, Arabia, and Spain. Even today, with the vast array of synthetic fibers that rival silk in many ways, the demand for the real thing is still high.

If you are doing the Silkworm Investigation in the winter, there is an alternative food. With every order of silkworm eggs you will be sent a half-pound of dry silkworm chow. Preparation requires hot tap water and a heat-source such as a microwave oven or stove-top. Water is mixed with the dry powder and then brought to a boil. The resulting mixture is poured onto a sheet of cling wrap, cooled, wrapped, and stored in the refrigerator. When firm, the silkworm chow can be sliced and fed to the hungry larvae.

The cooked Silkworm Chow can be stored in the refrigerator for a month or two if kept in an airtight container. Each bag of the dry powder comes with detailed instructions on the back of the package. **Make sure your hands are clean when handling the cooked chow as the silkworms are susceptible to bacterial problems if their food is not kept sterile.**

But remember, if you are raising silkworms in the spring, summer or early fall, fresh leaves are the best food source. Ask the Kindergarten teachers to plant a mulberry tree during their FOSS Tree module and you'll be set!

If you are using mulberry leaves, the first 10 days the larvae will need catkins or young tender leaves, but after that the larvae will eat any leaf you can provide. Keep leaves in the refrigerator. Feed the silkworms once or twice a day.

Think about the timing of the investigation. The silkworm eggs must hatch when mulberry leaves and catkins (flowering portion of the mulberry tree) are available (see the above section for an alternate feeding possibility if mulberry leaves are not available). If you are not sure when mulberry trees begin budding in your area, ask a colleague or inquire at a nursery. See the background section for the Silkworms Investigation for more specific information.

What to do when they arrive. Purchased silkworm eggs usually arrive loose in a vial. Working on a large piece of white paper, use the little paintbrush to divide the eggs into eight piles, and put one pile into each of eight vials. Cap the vials. Keep them in a warm place out of direct sunlight until you are ready to introduce them to students.

Eggs from a colleague may be stuck to paper. If this is the case, cut or tear the paper so that each piece has 10–15 eggs, and put the bits of paper into the vials.

Habitat. A shoe box is all that you need to make a silkworm habitat. Choose a place in the room where the silkworms will be warm but not in direct sunlight. Place the shoe box in an open plastic bag, or drape a sheet of plastic over the box. The idea is to reduce evaporation from the leaves a bit without developing a humid environment.

PAINTED LADY BUTTERFLIES

Painted lady butterflies can be purchased from a biological supply house as small fuzzy larvae—maybe as small as 1 cm (1/2") long. They arrive in a plastic container with a centimeter or two of green goop that looks like guacamole. The ventilated lid holds a piece of filter paper over the top of the container. Keep the lid and paper on the container

San Diego Unified School District – Science Department

Grade 2 – Insects and Plants

Draft: September 23, 2008 **Page 27**

at all times. The painted ladies will spend all of their larval days, perhaps 2 weeks or a little more, in the container eating the food layer, molting, and growing to a length of 4 cm (1-1/2") or a little more. They require no special attention other than to keep them in a well-lighted area, but out of direct sun and safe from temperature extremes. After the larvae are about 2 cm (3/4") long, it is all right for students to remove the larvae from the containers from time to time for close observation of structures and behaviors.

Order butterfly larvae. Painted lady butterfly larvae are available from several biological supply companies. They arrive in a container of food and will advance through their entire larval stage without ever leaving the container. They are usually sold three to five in a container. It is nice to have about ten larvae (two containers), but the activity will be a great success with one container. The larvae can be delivered in 2–4 days after you call in your order into KLM.

What to do when they arrive. Butterfly larvae are shipped with their own food in the shipping container. Warmer temperatures will encourage larvae to grow more quickly. Maintain container out of direct sunlight. No further care is necessary, as they will pupate within 7 to 10 days. (See above)

Discuss death. Butterflies don't live long. After 3 weeks they will be tattered and tired. With luck they will have fulfilled their destiny by producing eggs. Discuss the inevitability of the death of the butterflies and that it is not caused by captivity or the result of any failing on the part of the caregivers. Butterflies just don't live very long.