



Pacifica's Mobile Nature & Horticulture Center

"The All – Encompassing ECO-WEB" Four and Five Grade Program Outline

Introduction: All of life is interdependent on each other. Within each habitat are niches where the most fragile of species can be found. Each organism is part of a larger ECO-WEB called life. Students will learn how all living things are parts of this fragile web. As students enter, they will be given the names of creatures and plants. During the discussion of the interdependence of all things, the "student-creatures" will be temporarily connected by a string in an appropriate eco-web sequence. In addition, there will be a discussion of the finiteness of the earth's resources.

NATURE CENTER STATION OBJECTIVES:

1. To develop a hypothetical food chain and determine how changes will affect it.
2. To explore the differences between habitats and niches.
3. To understand how different species live in different habitat niche "worlds".

ACTIVITIES:

YELLOW:

1. Students will choose a predator, hypothesize how much land and water will be needed for their predator, and then come up with an approximate answer, along with an understanding of how energy is dispersed through the eco-web. (2 page activity sheet).

BLUE:

2. Each species lives in its own very different world, filling a niche, and using a far different "clock" than humans use. Students will observe and discuss ants in their world and then make an "ant's trail map" in a square foot of forest sod, noting landmarks that ants might notice. (1 page activity sheet)

HORTICULTURE CENTER STATION OBJECTIVES:

1. To discuss the concept of "good" and "bad" insects.
2. To learn about aphids, lady bugs, cockroaches, honey bees, mosquitoes, grasshoppers, and butterflies.

ACTIVITIES:

RED:

1. Students will play the Aphid Multiplication game and then consider how to define insects as "good" and "bad". (2 page activity sheet)

GREEN:

1. Planting Station:

*Note: Use of the planting station in the mobile classroom will be used for these experiments.

Connections to the Certificate of Initial Mastery (CIM) Standards:
Nature Center Objectives –

Unifying Concepts and Processes: Understand and apply major concepts and processes common to all sciences.

Common Curriculum Goal: Apply foundation concepts of change, cycle, cause and effect, energy and matter, evolution, perception, and fundamental entities.

Content Standards: Use concepts and processes of – Systems, order, and organization.
Leads to or meets Benchmark at Grade 5:

Identify interactions among parts of a system.

1. Student will be able to describe the relationships among organisms in food chains and simple food webs.

Unifying Concepts and Processes: Understand and apply major concepts and processes common to all sciences.

Common Curriculum Goal: Apply foundation concepts of change, cycle, cause and effect, energy and matter, evolution, perception, and fundamental entities.

Common Curriculum Goal: Apply relationship concepts of population, equilibrium, force, interaction, field, structure, and function, time and space, and order.

Content Standards: Use concepts and processes of – Evidence, models, and explanation.

Leads to or meets Benchmark at Grade 5:

Use models to explain how objects, events, and/or processes work in the real world.

1. Student will be able to use pictorial models to explain relationships within systems such as food chains, food webs, chains of events, and their community.

Unifying Concepts and Processes: Understand and apply major concepts and processes common to all sciences.

Common Curriculum Goal: Apply foundation concepts of change, cycle, cause and effect, energy and matter, evolution, perception, and fundamental entities.

Content Standards: Use concepts and processes of – Evolution and equilibrium.

Leads to or meets Benchmark at Grade 5:

Organize evidence of a change over time.

1. Student will be able to observe and record change in phenomena for a period of time.
2. Student will be able to sort data and display in a logical sequence.

Life Science: Understand structures, functions, and interactions of living organisms and the environment.

Common Curriculum Goal: ORGANISMS – Understand the characteristics, structure, and functions of organisms.

Content Standards: Describe the characteristics, structure, and functions of organisms.

Leads to or meets Benchmark at Grade 5:

Describe basic plant and animal structures and their functions.

1. Student will be able to associate specific structures with their functions in the survival of the organism. For example, the colorful petals of a flower serve to attract insects, which aid in the reproduction of the plant.
2. Student will be able to correlate specific

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Leads to or meets Benchmark at Grade 5:

Describe the basic needs of living things.

1. Student will be able to distinguish between basic and nonessential needs of an organism.

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2. Student will be able to describe how a plant or animal grows when its needs are met.

Life Science: Understand structures, functions, and interactions of living organisms and the environment.

Common Curriculum Goal: ORGANISMS – Understand the characteristics, structure, and functions of organisms.

Content Standards: Describe the characteristics, structure, and functions, of organisms. .

Leads to or meets Benchmark at Grade 5:

1. Student will be able to describe the basic needs of living things.

Life Science: Understand structures, functions, and interactions of living organisms and the environment.

Common Curriculum Goal: HEREDITY – Understand the transmission of traits in living things.

Content Standards: Describe the transmission of traits in living things.

Leads to or meets Benchmark at Grade 5:

Describe the life cycle of an organism—

1. Student will be able to identify, from a series of drawings, the life cycle of common organisms such as seed plants, butterflies, and frogs.
2. Student will be able to identify the stages of metamorphosis and various larval forms.
3. Student will be able to recognize that new organisms are produced by living organisms of similar kind, and do not appear spontaneously from inanimate materials.

Life Science: Understand structures, functions, and interactions of living organisms and the environment.

Common Curriculum Goal: DIVERSITY/INTERDEPENDENCE – Understand the relationships among living things and between living things and their environment.

Content Standards: Explain the interdependence of organisms in their natural environment.

Leads to or meets Benchmark at Grade 5:

Describe the relationship between characteristics of specific habitats and the organisms that live there.

1. Student will be able to draw a series of food chains for specific habitat.
2. Student will be able to identify the producers, consumers, and decomposers, and the predatory-prey relationships in a given habitat.
3. Student will be able to explain if and why each of the living and nonliving elements present within a closed environment (such as an aquarium) is

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needed. For example, rocks are needed for shelter and plants provide oxygen for fish.

4. Student will be able to recognize how all animals depend upon plants whether or not they eat the plants directly.

Life Science: Understand structures, functions, and interactions of living organisms and the environment.

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Horticulture Center Objectives –

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Common Curriculum Goal: Apply foundation concepts of change, cycle, cause and effect, energy and matter, evolution, perception, and fundamental entities.

Content Standards: Use concepts and processes of – Systems, order, and organization.

Leads to or meets Benchmark at Grade 5:

Identify interactions among parts of a system.

1. Student will be able to describe the relationships among organisms in food chains and simple food webs.

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These benchmark standards can be used for both the Nature Center and Horticulture Center Objectives.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Formulate and express scientific questions and hypotheses to be investigated.

Content Standards: Formulate and express scientific questions and hypotheses to be investigated.

Leads to or meets Benchmark at Grade 5:

Ask questions and make predictions that are based on observations and can be explored through simple investigations—

1. Student will be able to ask questions about objects and events in the world.
2. Student will be able to identify questions that can be explored through scientific investigation.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Design scientific investigations to address and explain questions and hypotheses.

Content Standards: Design scientific investigations to address and explain questions and hypotheses.

Leads to or meets Benchmark at Grade 5:

Design an investigation to answer questions or check predictions.

1. Student will be able to identify which tools to use for the investigation.
2. Student will be able to use appropriate units of measure for the investigation.
3. Student will be able to recognize reasons for controlling variables.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Conduct procedures to collect, organize, and display scientific data.

Content Standards: Conduct procedures to collect, organize, and display scientific data.

Leads to or meets Benchmark at Grade 5:

Collect, organize, and summarize data from investigations—

1. Student will be able to select and use an appropriate organization for data summary.

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2. Student will be able to select and use familiar tools, such as magnifiers, thermometers, and rulers, to gather data.
3. Student will be able to recognize how to measure and record simple properties such as temperature, time, distance, volume, and mass.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Analyze scientific information to develop and present conclusions.

Content Standards: Analyze interpret, and summarize the data from investigation.

Leads to or meets Benchmark at Grade 5:

1. Student will be able to analyze and interpret data related to the question or hypothesis.
2. Explain why the data from one person's investigation might differ from the data of others performing the same investigation.
3. Analyze data to determine possible questions for further investigation.

The Eco-Web Activity

Instructions: Choose a **CARNIVORE** (a creature that eats what _____?) . . . either a mountain lion, an owl, or a wolf. Write its name at the top of the box below.

Questions:

- 1) How many "squares" of land will my carnivore need to survive?

- 2) **HYPOTHESIS:** I think that my carnivore will need _____ squares of land to survive.

- 3) **METHOD:** Your pretend test period must be the following almost-real-life rules:
 - A. To survive, each carnivore needs to be able to eat 3 **HERBIVORES**
(What do herbivores eat? _____)
 - a. Each herbivore needs to eat 6 **PLANTS** to survive.
 - b. Each plant needs 10 squares of land and water to survive.

Choose 3 **HERBIVORES** that your **CARNIVORE** might eat: insects, rabbits, mice, squirrels, or deer. Write their names below. There can be more than one of each.

Choose 6 **PLANTS** that your herbivores might eat: grass, berries, leaves, nuts (there can be more than one of each . . . a deer may eat many grass plants). Write their names below.

Each plant needs **WATER** and 10 squares of **LAND** to survive. Mark them below your plants. Is there a special habitat you plants live in and depend on?

4) **CONCLUSION:** How large an area IS required to support your predator?

Carnivore

Herbivore

Herbivore

Herbivore

Plant

Plant

Plant

Plant

Plant

Plant

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10 land + water					
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The Energy Game

Instructions: Use your pyramid picture from the other side of the page to answer these questions.

Where do plants get their energy? _____

There are 24 energy points from the sun to begin this game.

Each plant gets 4 and uses half (how many is that? _____) to keep itself alive. Half it passes on to the herbivores that it eat. How many energy points did the herbivore get? _____

Each herbivore uses half of its energy points (how many is that? _____) to keep itself alive and passes the other half onto a carnivore that eats it. How many energy points did the carnivore get with each herbivore it eats?

Why are plants so important to the food chain? _____

Humans eat both plants and animals. They are OMNIVEROUS. Would a human get more energy "points" from eating a plant or a carnivore?

If the land area were to get smaller or drier, how would the number of predators it could support change? Try it. Take out 20 "squares" of land. What happened?

Can your carnivore still survive? _____

If carnivores were starting to disappear what would it mean? _____

**.....
With arrows and words or pictures show how all the different plants, herbivores, and carnivores that you chose are connected in a food chain.**

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A Different World

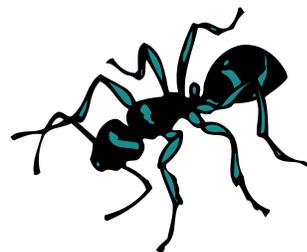
Each creature sees the world in a different way than we do. A tree might be much larger and live much longer than we do. On the other hand, some insects think that the world is only the size of a life. That IS their whole world. They don't know or need to know or want to know about anything else. Different creatures also see time in different ways. What seems like a day to you might be some creature's whole life, or it might seem like just the blink of an eye to another. **OUR WAY IS ONLY ONE WAY TO SEE THE WORLD. THERE ARE MANY OTHERS.**

First, some information about ants

There are about 20,000 species of ants on Earth.

How many species of man are there?

_____.



Ants can walk at what would be 65 miles per hour for us, and can carry something 50 times as heavy as they are. Could you carry something that weighs 2000 (1 ton) pounds?

Ants have been on the earth over 100 million years. Man has been here for around 3 million years.

Watch the ants in the colony. What do they do when they meet each other? _____

Ants use their bent (elbowed) antennae for smell, touch, and taste. They leave a scent trail to find their way home or to tell other ants where there is food.

THINK SMALL!! – Pretend you're an Ant

Choose a trail through the square of forest floor in front of you to the food at the far end. Then draw your trail in the box below. Note at least 4 things that could be landmarks for other ants along the way. Draw a picture. What would the trail look like to an ant?

COPYCATE PAGE – AN ANT'S A-MAZING WORLD



Aphid Multiplication Game
THE GOOD, THE BAD, and the UGLY!

The Aphid Baby Game: Aphids are tiny insects that have sucking straw-like mouthparts. Though tiny, because they can reproduce rapidly, they can destroy entire crops. Using the giant leaf below, pretend that each bean is an aphid. Pick one to be the Mother Aphid. She and each of her babies can produce 10 babies each week.

HOW MANY WEEKS DO YOU THINK IT WILL TAKE THE "APHID" BEANS TO COVER YOUR LEAF BELOW WITH "BABY APHID" BEANS? _____

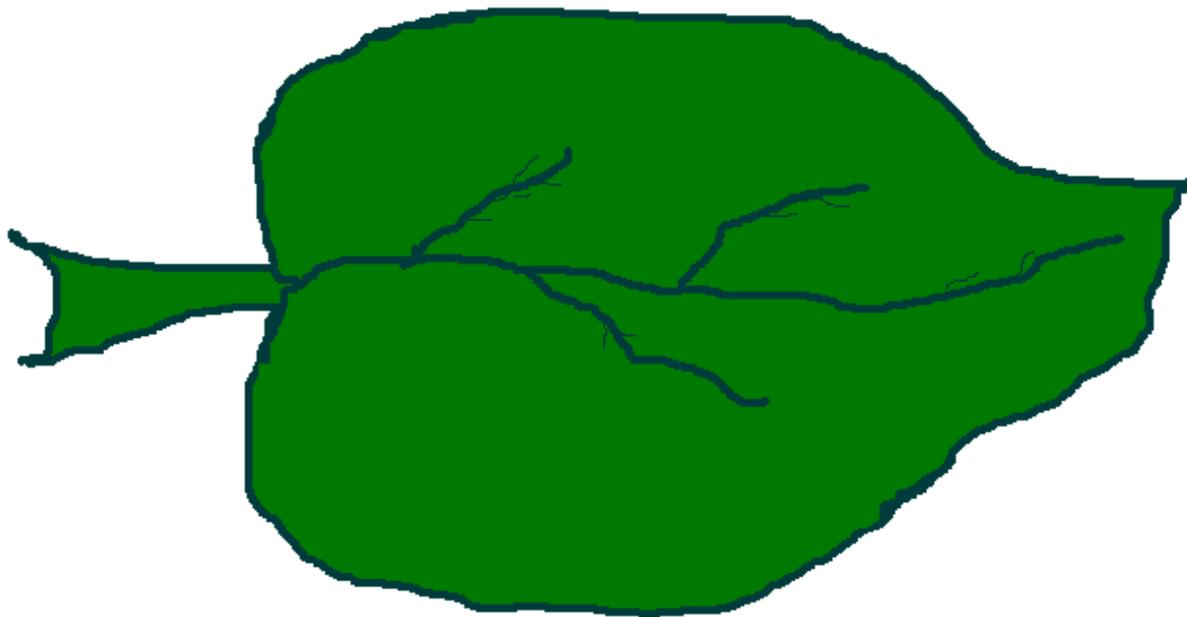
Put the Mother Aphid on your leaf.

First Week: The Mother has produced 10 babies. Add them to your leaf.

Second Week: If each of the 10 babies produced 10 babies how many "baby aphid" beans do you need to add to your leaf now? _____ Add them.

Third Week: If each of the 100 babies now **SUCKING JUICES** out of the leaf produced 10 babies this week, how many new "baby aphid" beans must you add?

Is your leaf full yet? _____ How many weeks did you guess it would take? _____
You can wash aphids off the roses and pumpkins and peas and everything else with soapy water . . . temporarily. Keep watching and washing!



**Aphid Multiplication Game
THE GOOD, THE BAD, and the UGLY!**

Aphids, like all creatures, are doing what they're adapted to do. Are they good or bad? Because they can do SO much damage so quickly people consider them to be "bad" along with other insects that can bite us or make us sick. Here are some other insects. Do you think they are good or bad?

INSECT	GOOD OR BAD	WHY?
LADY BUGS		
COCKROACHES		
HONEY BEES		
MOSQUITOES		
GRASSHOPPERS		
BUTTERFLIES		

AN ANT STORY: Once upon a time, a grasshopper grew old and died. Along came an ant and found the grasshopper. The ant ran back to his friends and they all followed the little ant to where the grasshopper lay. Together, they picked up the grasshopper and carried it to their nest which was not far away. For many days the ants ate the grasshopper and fed their little ants from the grasshopper, too. As they ate the grasshopper, they changed

it into nice, rich soil. The next Spring new plants grew on this new soil. The plants that grew were good food for rabbits, deer and even grasshoppers.

Was the work of the ants good when they ate the grasshopper? _____

Why? _____

Are ants good in your kitchen? _____ Are termites good? _____

A TERMITE STORY: Once upon a time, a big old tree died in the deep forest. The old dead tree stood until the wind from a big storm blew it over. A mother termite found the old tree and laid her eggs on it. The eggs hatched and soon the little termites were busy eating the old tree. After a few years, the old tree was almost gone and all that remained was a mound of soil where the old tree had once lain. The new soil from the old tree was rich and after a few years little trees and other good plants were growing there.

Was the work of the termites good? _____ Why? _____

Sometimes termites get into our houses and begin eating the wood. Termites just cannot tell the difference between the dead wood in our houses and the dead wood in the forest!
There's often both "good" and "bad" in things.