



BUTTERFLY GARDEN (3-6)

Overview: Students will learn about the interrelationship between butterflies and plants. Working in pairs in the Butterfly Garden, students will find the native plant that each butterfly needs to lay its eggs on. Students will record data and present it to the rest of the group.

Content Standards Correlations: Science, p. 307

Grade: 3-6

Key Concepts: Butterflies need water, air shelter, space and the right kind of plant food to survive. Many butterflies need specific native plants as their larval food source. Their larvae are important links in the food chain.

Objectives:

Students will be able to:

- Identify at least one butterfly and its plant "partner."
- Describe at least one value each of the native plants and butterflies have to wildlife and/or to humans.

Materials:

Provided by the Refuge

- 1 large plastic egg and sock caterpillar
 - 1 green "Chrysalis" bag
 - 1 plastic butterfly
 - 1 artificial flower
 - 6 native plant labels
 - 6 butterfly and native plant picture/ description cards
 - 6 tape measures
 - 6 clipboards
 - 12 carpet squares
 - 1 set of pictures: flower, bird, people and butterflies
 - 1 monarch metamorphosis display
 - 1 life cycle poster
- Provided by the educator**
- Copies of data sheets and pencils (one for each pair of students)

Note: Description and illustrations of Butterfly and Plant Partners of the Butterfly Garden can be found on p. 213.

TIME FRAME FOR CONDUCTING THIS ACTIVITY

Recommended Time: 30 minutes

Introduction (2 minutes)

Butterfly Life Cycle Demonstration (6 minutes)

- Demonstrate butterfly life stages with the puppets

Plant Partners (18 minutes)

- Hand each student either a butterfly card or a plant card
- Students with a butterfly card search for the student with the corresponding plant card by asking questions
- Plant and butterfly partners search for their actual plant in the Butterfly Garden
- Partners complete their data sheets

Wrap-Up (4 minutes)

- Have students present their data to the rest of the group
- Go over the values of butterflies and how to protect them.

HOW THIS ACTIVITY RELATES TO THE REFUGE'S RESOURCES

What are the Refuge's resources?

- significant wildlife habitat
- endangered species
- migratory birds

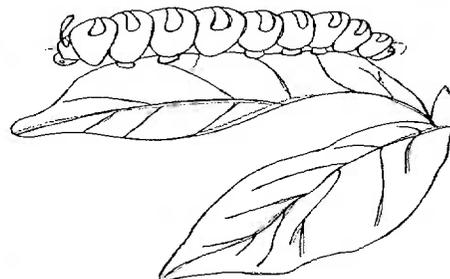
What makes it necessary to manage the resources?

- Loss of butterfly habitat due to development and pesticides..

What can students do to help?

Refuge staff work with volunteer organizations to plant native plants and garden without using chemicals, but we need you help.

- Plant native plants that are beneficial to butterflies.
- Maintain your gardens without using chemicals.
- Teach others what you have learned about the importance of the upland to butterflies and birds.



SUPPORTING INFORMATION FOR THIS ACTIVITY

Upland Ecosystem

- One of the major plant communities of the Santa Clara Valley is grassland, which was once dominated by native bunchgrasses intermixed with many kinds of wildflowers.
- Many years ago, European settlers brought European plants with them, which they introduced into the California landscape.
- They did not realize the major impact it would have on the environment. California's vegetation was drastically changed by the invasion of these alien plants.
- Furthermore, domestic livestock destroyed the perennial bunchgrasses and many of the herbs and shrubs were replaced by the annual European grasses, which could tolerate heavy grazing.
- Also, annual grasses could compete better than slow-growing native perennials for sunlight, soil moisture and nutrients. Plowing, farming and fire control by European settlers further changed the natural patterns of plant growth in coastal California.
- In a short period of time, the grassland was converted from a perennial cover of nutritious native plants to an annual grassland of introduced species with diminished food value for wildlife.
- Near the San Francisco Bay, the upland plant communities are now characterized by nonnative grasses, trees and drought-resistant perennial herbs and shrubs.
- A number of native plants from various plant communities have been planted in the Butterfly Garden, including sticky monkey flower, coffee berry, lupine, ceanothus, yarrow, buckwheat, milkweed, tree mallow and purple needlegrass.
- Not all would naturally grow together in the same community, but all are endemic to the Bay Area.
- These native plants are important in the upland ecology. Native California plants are the plants best suited for our landscape because they have evolved with the climate and soil conditions found in Northern California. They provide homes, shelter and many different food sources for endemic animals, such as deer, rabbits, grey foxes, birds and countless insects.
- Butterflies are one group of insects that form a

vital link between plants and animals higher on the food chain, such as lizards and birds. Plants of the Butterfly Garden were selected especially to attract these beautiful insects.

Butterflies

- The butterfly goes through four (4) distinct stages in its life cycle, beginning with an egg cluster or a single egg laid by the female, usually on the host plant that will feed her young.
- The tiny caterpillar is well designed for eating. It devours its host plant rapidly and grows so fast that it sheds its skin about five (5) times before changing into a pupa. Some caterpillars can eat only one kind of plant and others may feed on many kinds.
- To protect themselves from predators, caterpillars eat from the underside of the leaf, or they may weave a silk roof over it, pulling its edges together to form a shelter.
- After two to three weeks, the fattened caterpillar stops eating and changes into a chrysalis. Within the hardened chrysalis, a miracle occurs. The insect dissolves and rearranges itself into a completely new insect.
- After seven to ten days, the chrysalis shell splits and a butterfly emerges with shriveled wings. The brand new butterfly sits on the chrysalis and pumps fluid into the wings to expand them until they are strong enough to fly.
- Then it flutters off to feed on flower nectar, mud, carrion or dung. While nectar supplies energy food, muddy water provides the salts and minerals they need.
- The butterfly's main purpose is to find a mate and lay eggs for the next generation. At all stages of its life, the butterfly needs food, water, air, shelter and space, just like humans do.

Butterfly Garden

- The plants in the Butterfly Garden were chosen specifically for their value to wildlife, especially butterflies. The plant/butterfly associations for this activity are listed on p. 213.
- The arrival of the Europeans caused replacement of native cover with weedy introduced species, which they brought with them. The composition of California's vegetation is changed drastically by this invasion of nonnative species.

- Ecologists are beginning to recognize the importance of preserving California's native plant populations. That is why we should grow and preserve native California plants.
- Their restoration efforts include introducing and nurturing the original plant species in degraded areas where they once thrived.
- Although the Butterfly Garden is an artificial plant community and not a restoration project, it allows for students to study interrelationships between endemic plants and animals.
- Students will gain a better perspective of the work performed by restoration ecologists by planting seeds and tending native plants in a school garden or greenhouse and then bringing them back to the Refuge to plant in the Butterfly Garden or at school.

HOW TO LEAD THIS ACTIVITY BY FOLLOWING THE "DO, READ, ASK" TEACHING FORMAT

Introduction (2 minutes)

Do

- Before the students arrive, familiarize yourself with the location of the native plants used in this activity.
- Ask a staff member to show you the area in the butterfly garden where the labels with pictures of the plant and its butterfly "partner" are located.

Do

When students arrive, have them sit in a circle on the carpet squares in front of the bench.

Read

"In this activity, we will see how the butterfly changes as it goes through its life cycle. Then, we will look for the plants different butterflies lay their eggs on so they can hatch and the larva (caterpillar) can begin eating the plant leaves."

Butterfly Life Cycle Demonstration(6 minutes)

Ask

? What is the first stage of a butterfly's life? (Butterflies begin life as an egg) Could I have a volunteer to help me show everyone?

Do

Show the students the plastic egg.

Read

"This represents a butterfly egg,"

Ask

? How big would a butterfly egg actually be?

(About the size of a pinhead.)

? Where would you find a butterfly egg? (The female butterfly may lay her eggs under leaves or on the ground in leaf litter to hide them.)

Read

- "The eggs need to be hidden because they can be eaten by predators such as birds and some insects. The eggs may hatch in a few days, or they may wait for favorable conditions.
- "For instance, they may wait for winter to pass, when the weather is warm and there is enough food. Let's say that it is spring and the eggs are ready to hatch."

Do

- Select a student to help demonstrate the life cycle of the butterfly.
- Ask the student to open the egg and take out the sock caterpillar puppet. Put the scrunched-up sock over the student volunteer's hand.

Read

"The larval stage is the second stage of the butterfly's life."

Ask

? What do we call a butterfly larva? (A caterpillar)

? What is the main job of the caterpillar? (Eating)

Read

"If the caterpillar is not already on its food plant, it must find it. Some caterpillars eat the leaves of many different plants, while others are limited to eating only one plant food."

Ask

? What would happen to the butterfly if its special kind of plant disappeared? (The butterfly would also disappear in the area. That is how some butterflies have become extinct or endangered, like the bay checkerspot and San Bruno elfin butterflies.)

Read

"As the caterpillar eats constantly, it grows and sheds its skin several times before reaching full size."

Do

Stretch the scrunched-up sock over the student's arm to make it bigger.

Read

"A caterpillar must also avoid predators such as birds and insects."

Ask

? **What are some clever ways to do this?** (Some eat poisonous plants so they don't taste good. Their bright colors, like the monarch butterfly's, warn predators. Some spin silk webs to curl the plant leaves and make a tent.)

Do

Call up a second student to stand beside the first.

Read

"Once fully grown, the caterpillar is ready to begin the third stage of life, the pupa."

Ask

? **What is a butterfly pupa called?** (A chrysalis, NOT a cocoon.)

Do

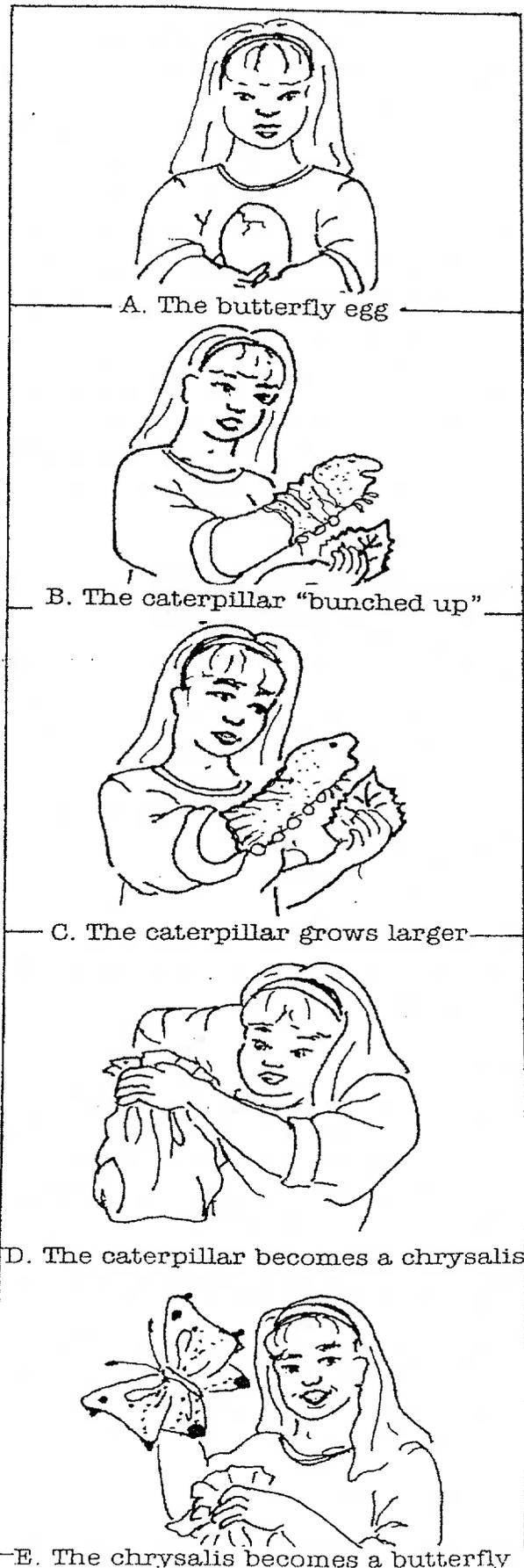
Have the second student hold the green "chrysalis" bag. Ask the first student to take off the sock caterpillar and put it in the bag, which represents the chrysalis.

Read

- "The caterpillar finds a safe place, often where it is camouflaged or blends into the background. It uses silk to attach itself and sheds its skin for the last time.
- "Now our caterpillar has turned into a chrysalis. Inside its protective shell, an amazing thing is happening.
- "The caterpillar turns into a mushy liquid. The liquid rearranges itself into the adult body of a butterfly. Pretend you are the chrysalis with mysterious changes going on inside."

Ask

? **What does it feel like?** (Accept all appropriate answers)



? How long will it take? (It may take a few weeks or as long as a year!)

? What happens next? (A butterfly emerges from the chrysalis.)

Do

Ask the student to reach into the bag and pull out the plastic butterfly.

Read

“The butterfly begins the final stage of its life by chewing its way out of the chrysalis. It clings to the old skin and pumps liquid to inflate its wings. When the wings dry off, it flies off to look for the flowers that are its adult nectar food.”

Ask

? What type of animal is the butterfly? (An insect)

? How many legs do insects have? (Six)

? How many wings do butterflies have? (Four)

Read

- “An adult butterfly’s job is to eat, mate and reproduce.
- “When the butterfly feeds, it probes the flower for nectar with its long proboscis, it rubs against the plant’s stamen and becomes dusted with pollen.
- “Now, when the butterfly visits the next flower of the same species, the pollen fertilizes the flower so that it can produce seeds for the next generation.”

Do

Demonstrate with plastic butterfly (from Butterfly-in-a-Bag) and mock flower how the butterfly crawls in the center and probes for nectar.

Ask

? Do you know what this kind of helping relationship this is called? (Symbiosis)

? Can anyone think of another symbiotic relationship? (Birds that eat fruit “plant” the seeds in their droppings; ants carry aphids to their food and then “milk” them; any other relationship from which two different organisms mutually benefit.)

Plant Partners (18 minutes)

Read

- “Many butterflies have a special relationship with

native California plants. There are many different species of butterflies, and each one prefers a different kind of plant for food.

- “The adult butterfly and caterpillar of the same species may not use the same type of plant to feed on. The adult butterfly lays her eggs on the specific plant the caterpillar will need to eat.
- “Therefore, when the eggs hatch, the caterpillar will immediately have the right food to provide nourishment for growth.”

Do

Divide the students into two groups. Give one group butterfly picture/question cards. Give the other group native plant picture/information cards.

Read

- “You are now going to become either a butterfly or a plant, depending on whether you have a picture of a butterfly or a plant.
- “Plants will spread out in the middle of the enclosure. It is your job to ‘stay planted’ and show your picture cards to the butterflies.
- “Butterflies, will ‘fly’ from plant to plant, looking for the right plant to lay your eggs on. Butterflies will ask the plant the two questions on their card.
- “Plants answer either *yes* or *no* depending on the correct answer to the question. In order for your caterpillar babies to survive in the garden, you need to find their special food plant.
- “Everyone take time right now to read your cards and about the kind of plant or butterfly you are.”

Do

Allow about 2 minutes for plants and butterflies to get acquainted with who they are by reading their picture cards to themselves. Assist students who may be having difficulty.

Read

“Is everybody finished? Now butterflies may fly to the plants ask them your questions. When you find your Plant Partner, stay together.”

Do

Allow about 3 minutes for butterflies to find their Plant Partners.

Read

- “Now the butterfly/plant partner teams will go to

find the real plant in the garden. Together, complete the data sheet about both the plant and the butterfly.

- "In the garden the real plant has a label with the name of the plant *and a picture of your butterfly and plant on it.*"

Do

- Give butterfly/plant partners data sheets, pencils(*must be provided by the educator*) and tape measures.
- Send them to search for the plants in the Butterfly Garden in the direction of where these plants are located.
- Plants are labeled and will be found in an area outside of the enclosure. Have plant partner teams collaborate to complete the data sheets.

Discussion (4 minutes)

Do

- After students have finished exploring the garden and filled out their data sheets, gather students together at the planting table to share discoveries and compare data.
- Talk about differences in plants. Use the following questions for more discussion.

Ask

? **Why are native plants important to butterflies?** (The plants that naturally grow in the Bay area are the ones valuable to its wildlife as food and shelter.)

? **At what stage of life does your butterfly use your plant?** (Larval -- as a caterpillar)

? **What do butterflies need to survive?** (Food, water, shelter, air and space - like you do!)

? **What are some human threats to butterflies?** [Catching butterflies or their caterpillars, insecticides (bug killer) and herbicides (weed killer) and habitat destruction due to development.]

Do

Show the pictures illustrating some values of butterflies.

Read

"Here are pictures that represent some of the values of butterflies. Your job is to guess what benefit is represented by the picture."

Do

Hold up the following pictures:

Flower: Butterflies pollinate flowers as they move from one plant to another drinking nectar. In this way, plants benefit from butterflies.

Ask

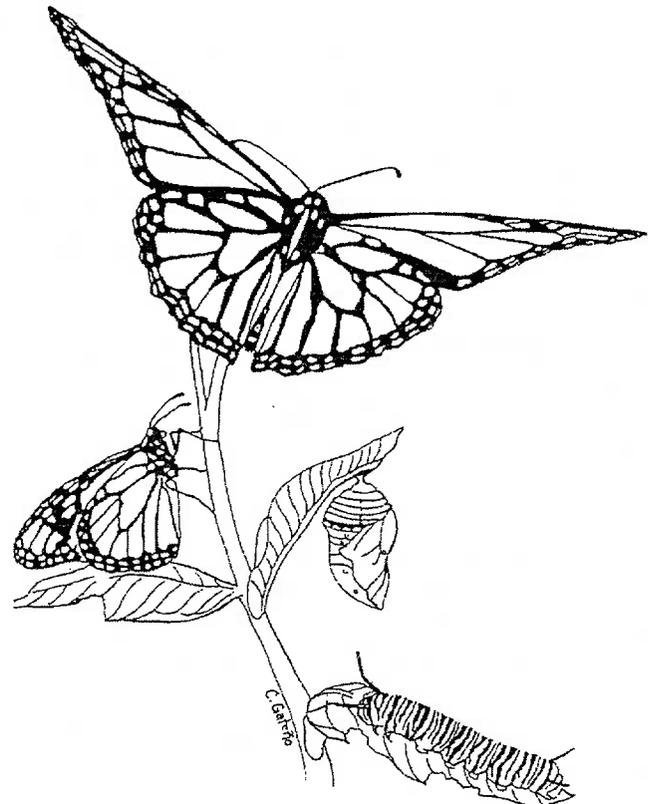
? **What is the relationship called where both living things benefit?** (Symbiosis.)

Bird: Butterflies are an important part of the food chain. Birds are one example of an animal that use butterflies as a food source. Insects and reptiles are other examples.

People: People enjoy butterflies because they are beautiful and fascinating!

Ask

? **What can we do to help butterflies?** (Plant native plants that naturally grow in the Bay Area that supply larval food for butterflies. Garden without using chemicals.)



For the Educator:
Extension for the Classroom

Grow native plants, from seed, in your classroom.

Instructions:

A. Take a pinch of the tiny seeds between your thumb and forefinger. Scatter them thinly and evenly over the surface of your soil in the milk carton. Then spread some of the soil over them to barely cover. Seeds that are covered too deeply will not sprout.

B. Spray the surface of the soil lightly with water from the spray bottle. Cover it with a small sheet of plastic to hold in the moisture.

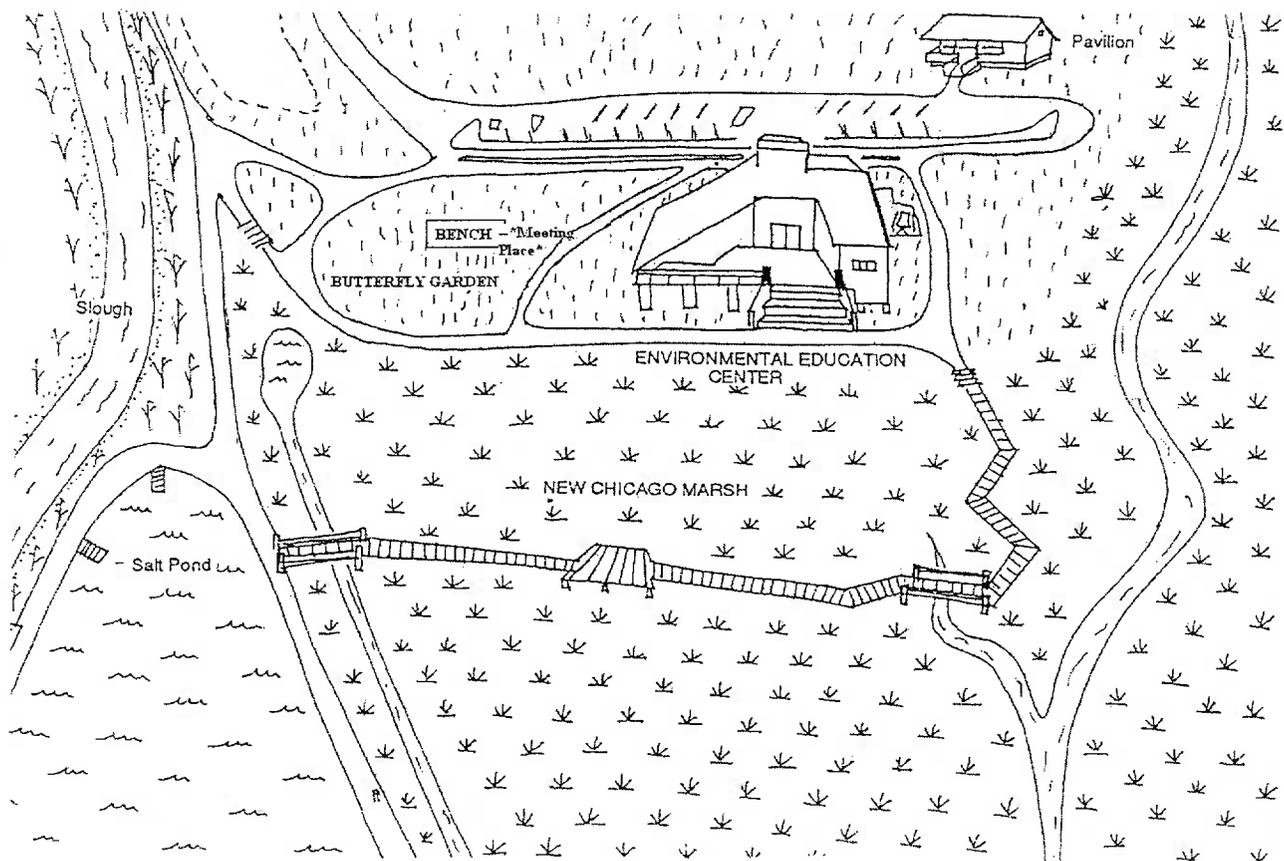
C. Place the container in a sheltered location out of direct sunlight, but where it is warm.

D. Keep the surface of the soil moist at all times, but not too. If the soil is too wet, the

seeds may mold. If it is too dry, they will not sprout and seedlings will shrivel and die. Check the surface of the soil once a day and spray with water from a spray bottle at needed to keep it moist until the seeds sprout. Cover the top of the container with plastic wrap will help hold in the moisture. Place a single sheet of newspaper on top of the plastic. After the seeds germinate, remove the plastic wrap and newspaper.

E. If the seedlings become crowded in the container, you may need to repot them. Use a putty knife or other small tool to carefully separate the roots without tearing them off or losing the soil around them. Place each one in its own separate carton of potting soil with drainage holes in the bottom. Press the soil firmly around the roots. Soil should be kept moist as before.

BUTTERFLY GARDEN MAP (3-6)



Your Names: _____ Today's Date: _____

Plant Partners Data Sheet

Circle all correct answers or fill in the blank

Plant Data

My plant name is: Yarrow Buckwheat Purple needlegrass Milkweed
Ceanothus Mallow Sticky monkeyflower Big Saltbush/Quailbush

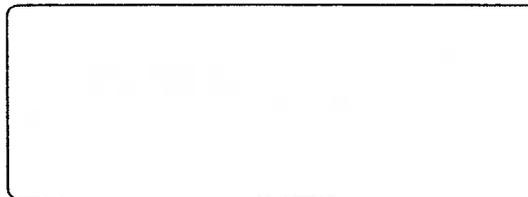
Use the tape measure to fill in the blanks

I am _____ in. / _____ cm tall.

My leaves are _____ in. / _____ cm long and _____ in. / _____ cm wide

My leaves are: Thin like paper Thick and fleshy Almost cylindrical
Smooth Rough Shiny Dull Fuzzy Feather-like

Here is a picture of my leaf
(Draw a leaf in the box)



Today I Do Do Not **have flowers. When I do have flowers, they are:**

White Blue Pink Purple Yellow Green Orange Red

Butterfly Data

My butterfly name is: Monarch Buckeye Acmon blue West Coast lady
Western pygmy blue Painted lady Echo blue California ringlet

As a caterpillar I eat: seeds nectar leaves **from the** _____
plant name

I have 2 4 6 **wings** **and** 4 6 8 **legs.**

The habitat I live in is called the: field upland highland