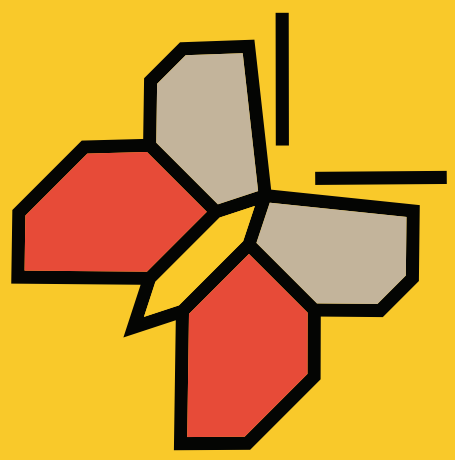


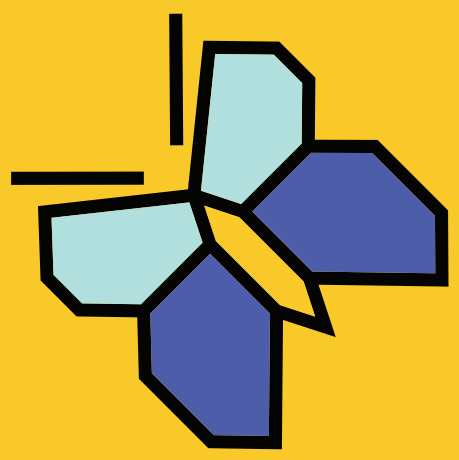
The Outdoor Garden Classroom

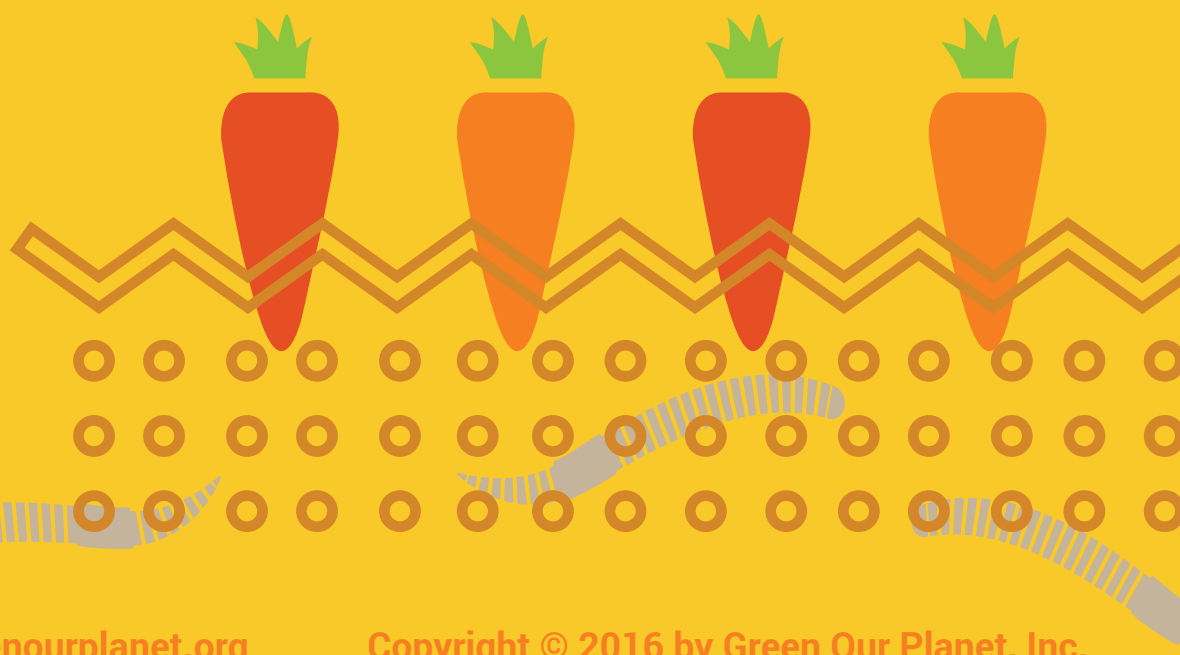
Hands-On STEM Teaching Curriculum, Pre-K-5

Second Grade Lessons

Insects in the Garden
(Second Edition)

2





THE OUTDOOR GARDEN CLASSROOM

Hands-On STEM Teaching Curriculum, Pre K-5

Lessons are to Nevada State and Next Generation Science Standards

Written by: Suzanne Cormier, William R. Lummis Elementary School
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The Outdoor Garden Classroom: Hands-On STEM Curriculum K-5 was funded by The American Honda Foundation and created by teachers from the Clark County School District in Southern Nevada in Association with Green Our Planet and Three Square.

The **American Honda Foundation** helps meet the needs of American society in the areas of youth and scientific education by awarding grants to nonprofits, while strategically assisting communities in deriving long-term benefits. Since 1984, the American Honda Foundation has awarded more than $32 million to organizations serving over 115 million people in every state in the U.S.

Green Our Planet is a nonprofit, 501(c)(3) organization established in 2013. Its mission is to raise money for green projects worldwide via its crowdfunding platform and to educate the public about the most pressing environmental issues facing the planet today. Green Our Planet's overall goal is to help conserve, protect, and improve the environment through funding green projects and through education, which includes STEM, nutrition and conservation education in K-12 schools. In 2013, Green Our Planet launched its "Outdoor Garden Classroom Program" in Las Vegas, Nevada, which is designed to help schools fund and use outdoor vegetable gardens as "hands-on" classrooms. For more information on Green Our Planet and its programs, please visit *www.greenourplanet.org*.

Three Square's mission is to provide wholesome food to hungry people, while passionately pursuing a hunger-free community. Three Square combines food banking (warehousing canned and boxed goods), food rescue (obtaining surplus or unused meats, bread, dairy and produce from hospitality and grocery outlets), and ready-to-eat meals as the most complete food solution for Southern Nevada. Three Square works with more than 1,300 partner sites in the Southern Nevada community. Three Square distributed more than 30 million pounds of food, the equivalent of more than 25 million meals.

Achieving Excellence Through Education. The vision of Clark County, in conjunction with the Clark County School District, is to provide a safe, supportive environment which enables each student to acquire knowledge, skills and values necessary to a lifelong learner and to become a responsible, contributing member of our changing society.

Published by: Green Our Planet, Inc., 1701 Sandecker Court, Suite 203, Las Vegas, Nevada, 89146.

A NOTE ON THE SECOND (REVISED) EDITION

Since its release in October, 2014, the Outdoor Garden Classroom Hand-On STEM Teaching Curriculum has been used at an increasingly greater number of schools. During the 2014-2015 school year, 63 teachers at 15 CCSD schools provided feedback on their use of the curriculum with their students. The feedback and improvements they suggested were used by five of the original teachers who created the curriculum so that the 2nd edition could be revised and improved. In addition, the curriculum was extended into Pre-K. Further improvements occurred in the summer of 2015 when nutritional facts were added to the lessons for grades Pre-K through 5. The nutritional facts are aligned to Nevada State Standards and are tied to the information in each science lesson. Also added to this edition are "Brain Breaks" that occur every 15 minutes. These consist of vigorous exercise breaks that are connected to gardening. For example, students might jump up and down while picking imaginary apples from a tree or students might pretend to dig holes in the ground in order to transplant vegetables. Grades 3, 4, and 5 also now have worksheets and a "lesson map" added to them, so that teachers can more easily plan out the teaching of each lesson.

In subsequent years, the OGC curriculum will continue to be revised based on further teacher feedback. In this way, the lessons can continually be improved so that they become a "living curriculum." A special thanks to all of the teachers who contributed to this revised 2nd edition!

TEACHER FEEDBACK—LET US HEAR FROM YOU!

Teacher feedback is welcome—we want to hear from you about your experiences using this curriculum so that the lessons can be continually improved! All feedback can be left at: **lessons.greenourplanet.org**

Click on the tab at top that says " Teacher Feedback."

Teachers and administrators can also contact us directly at:
info@greenourplanet.org

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The goal for Grade 2 is to foster the creativity and curiosity of the students. Each student plays the role of detective in the garden. Students investigate, observe and track garden progress, plant health, weather, wildlife, etc. Activities are designed to promote students' curiosity about insects in their garden and to allow for the realization that not all insects are pests. Activities in the garden will elicit and explore students' prior knowledge to be followed with a deeper understanding through yearlong observation, research and investigation. Collecting regular data enables students to analyze records for a deeper understanding of how the insect life in the garden changes over the seasons.

SEPTEMBER – MAY

Objectives

Students will observe the garden and keep a running record in their class of observations. Students will regularly check for the health, reduced vigor or damage symptoms, beneficial insects, and pests.

Overview

Observe insects in garden to understand what they eat, to demonstrate their feeding preferences, to encourage beneficial and discourage harmful insects to the garden.

SEPTEMBER

Insects in the Garden!

Objectives

NV Standards: (2)1.1-(2)1.4 Science Inquiry (2)1.5-(2)1.9 Science, Technology, and Society (2)4.1, (2)4.2, (2)4.4, (2)4.8 Life Science.
Next Generation Standards: 2LS2-1 Events have causes that generate observable patterns.

Overview

Observe insects in garden to understand what they eat, to demonstrate their feeding preferences, to encourage beneficial and discourage harmful insects to the garden.

SEPTEMBER

Is it an Insect?

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society(2) 1.5-(2) 1.9 Life Science (2). 4.4, (2). 4.8 Reading- Compare and Contrast.
Next Generation Standards: 2LS4-1 Biological Evolution: Unity and Diversity

Overview
Compare and contrast similarities and differences between insects to gain basic knowledge.

SEPTEMBER
Insects in the Garden!

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.4, (2). 4.8 Reading- Compare and Contrast Reading- Cause and Effect Health- NS-7.2.2 Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2) 4.4, 4.5
Next Generation Standards: 2LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview
Observe a variety of insects in their natural habitats.Caterpillars, grasshoppers, crickets, slugs, aphids, and snails are herbivores that live in the garden.

OCTOBER
Anatomy of Insects

Objectives
NV Standards: Science Inquiry(2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.4, (2). 4.8
Next Generation Standards: K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview
Compare and contrast similarities and differences of anatomy between insects. Create diagrams to label the parts of an insect.

OCTOBER
Mouth Parts

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science 2.4.1, 2.4.4-2.4.7 Diversity of Life 2.4.8

Next Generation Standards: K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview
Students will understand the correlation between what the insect eats and how it eats. Students will be given an opportunity to eat various foods with the utensils provided that will imitate the mouth of an insect. Through this exploration, students will identify which foods they can eat with their specific mouthpart.

SPRING

The Life Cycle of an Insect

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.1, (2) 4.2 (2) 4.4, (2) 4.8

Next Generation Standards: 2-LS2-1 Events have causes that generate observable patterns. 2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview

Become familiar with the life cycles of a number of different types of insects. (simple and complete metamorphous)

DECEMBER

Introduction to Beneficial/ Keeping Beneficials Around

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.2-4.8

Next Generation Standards: 2-LS2-1 Events have causes that generate observable patterns. 2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview

Decide which insects are beneficial and/or harmful by observing what insects eat and their feeding preferences. Learn how to encourage beneficial insects and discourage harmful insects to the garden.

FEBRUARY

Pollinators

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.4-4.7

Next Generation Standards: 2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview

Understand what it means to pollinate, why pollination is necessary, and identify pollinators in the garden.

MARCH

Lesson 9 –Pests

Objectives

Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.2-4.8

Next Generation Standards: 2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview

Students will learn what is considered a harmful insect for the garden: why it's harmful and ways to prevent harmful insects in the garden.

APRIL

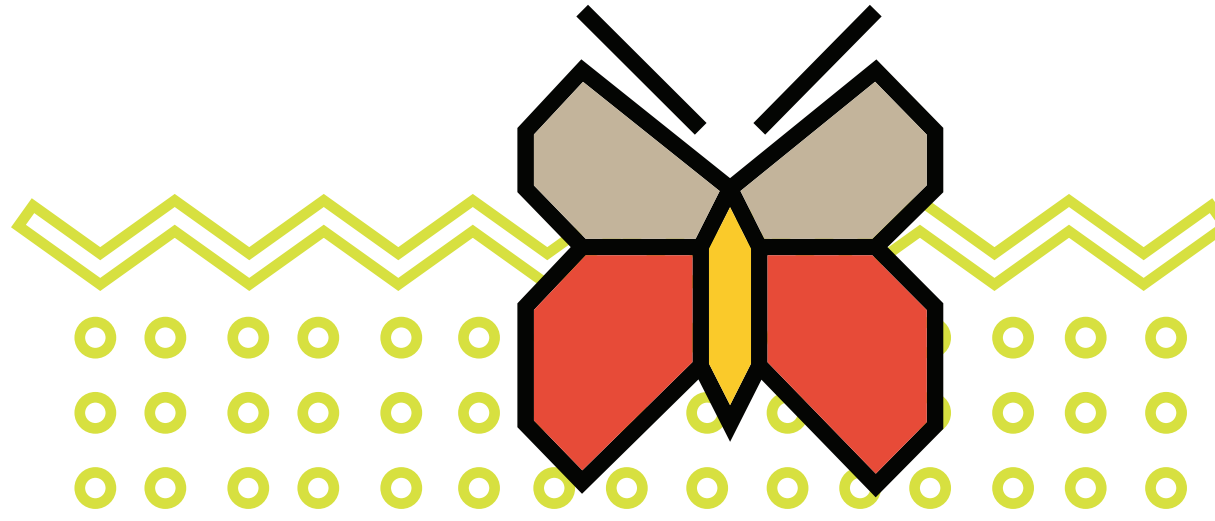
Lesson 10 – Camouflage

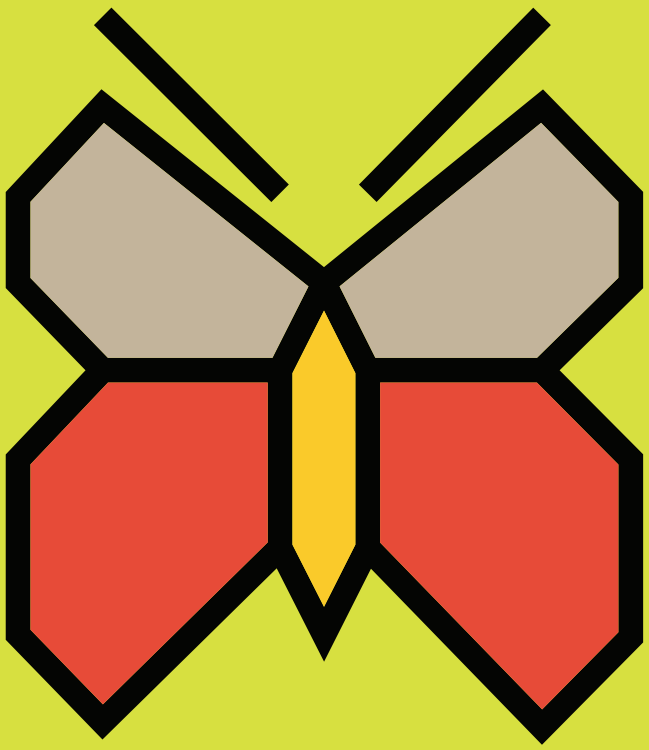
Objectives

NV Standards: Science Inquiry (2) 1.1-(2) 1.4 Science, Technology, and Society (2) 1.5-(2) 1.9 Life Science (2). 4.4, (2). 4.8 Reading-Compare and Contrast
Next Generation Standards: K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

Overview

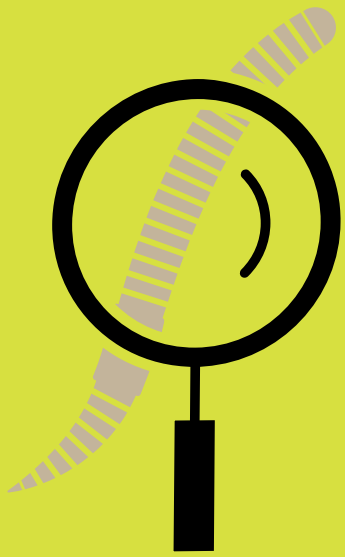
Students will learn ecologically sound methods to discourage pests in the garden and learn about the role of camouflage in living creatures.

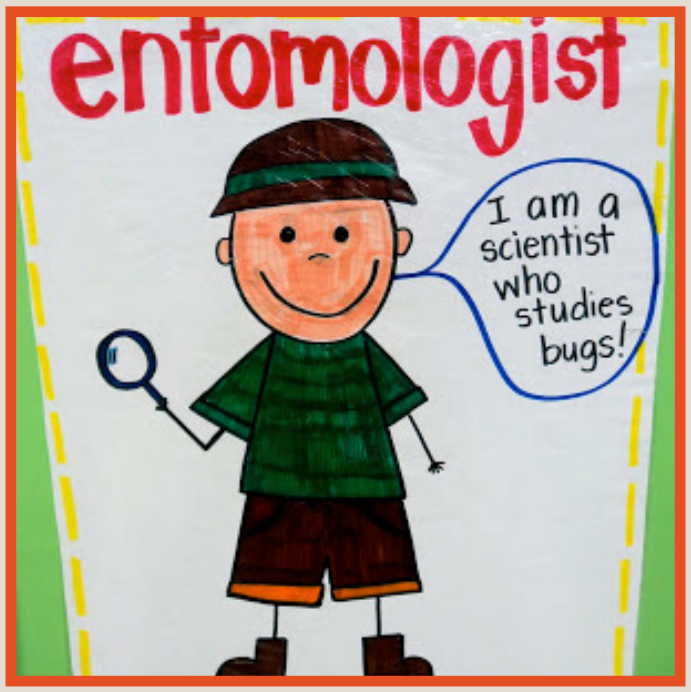


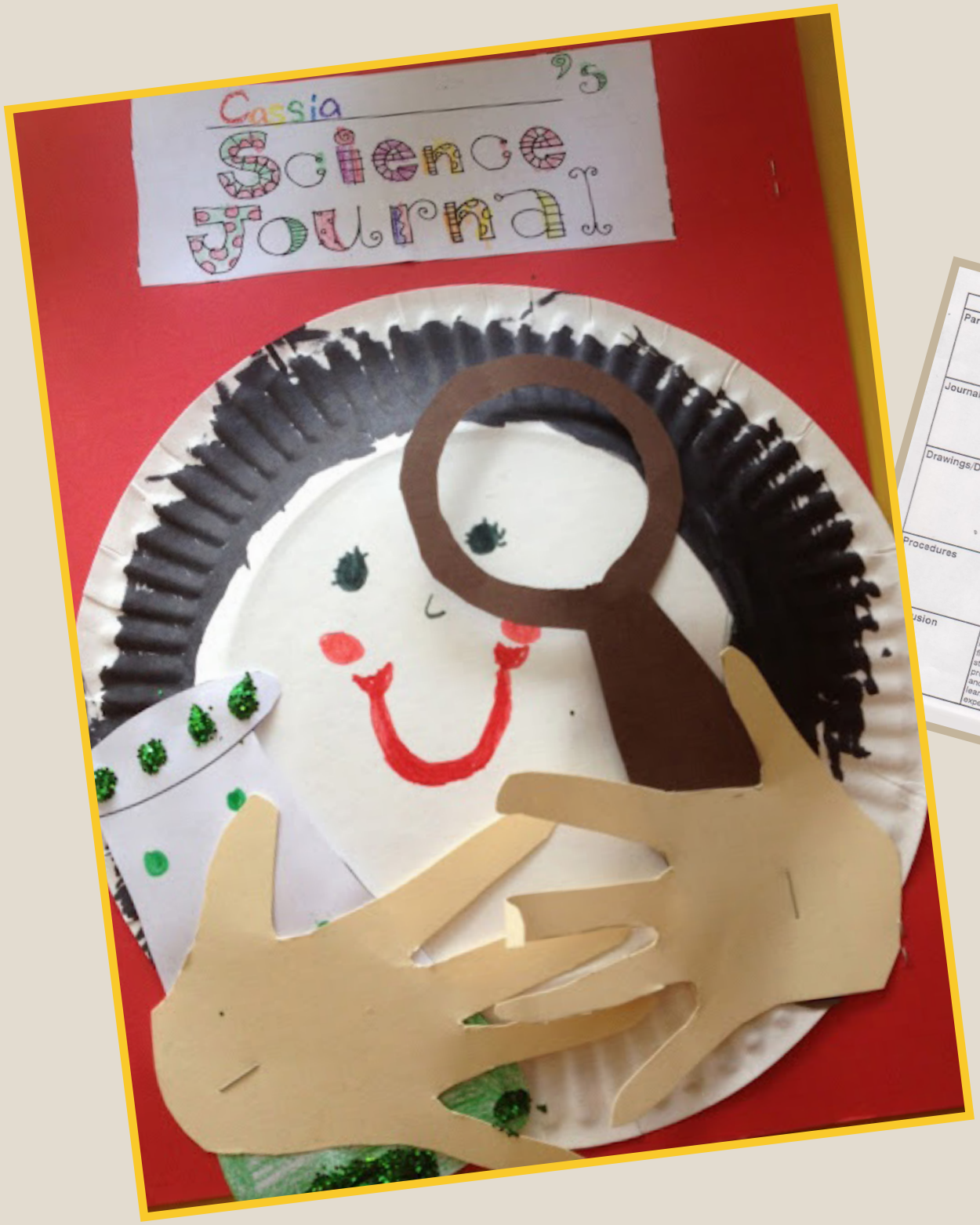


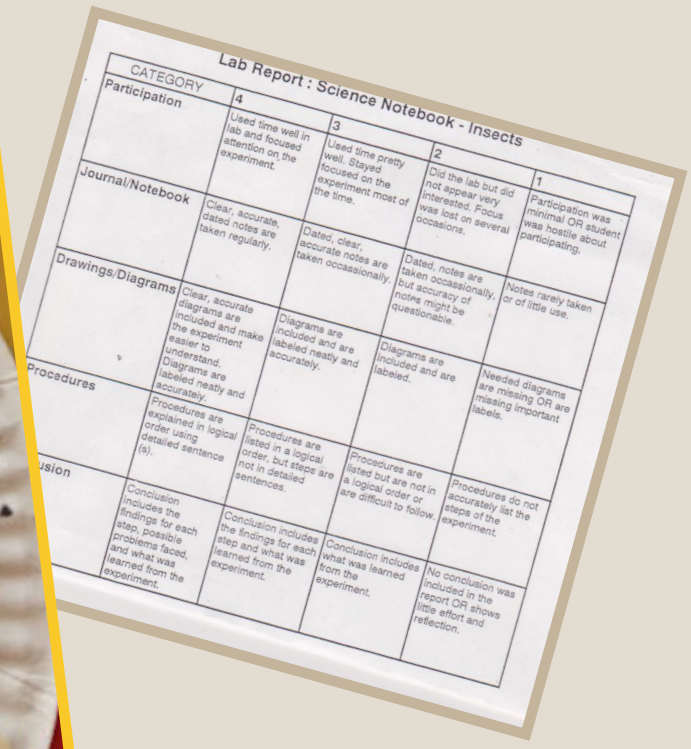
Lesson One

Garden Detectives



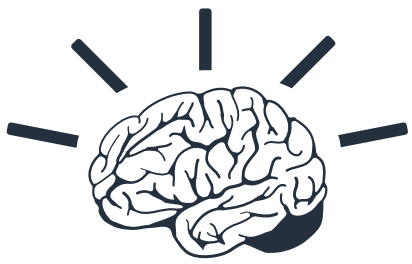






Lab Report : Science Notebook - Insects

CATEGORY	4	3	2	1
Participation	Used time well in lab and focused attention on the experiment.	Used time pretty well. Stayed focused on the experiment most of the time.	Did the lab but did not appear very interested. Focus was lost on several occasions.	Participation was minimal OR student was hostile about participating.
Journal/Notebook	Clear, accurate, dated notes are taken regularly.	Dated, clear, accurate notes are taken occassionally.	Dated, notes are taken occassionally, but accuracy of notes might be questionable.	Notes rarely taken or of little use.
Drawings/Diagrams	Clear, accurate diagrams are included and make the experiment easier to understand. Diagrams are labeled neatly and accurately.	Diagrams are included and are labeled neatly and accurately.	Diagrams are included and are labeled.	Needed diagrams are missing OR are missing important labels.
Procedures	Procedures are explained in logical order using detailed sentence (s).	Procedures are listed in a logical order, but steps are not in detailed sentences.	Procedures are listed but are not in a logical order or are difficult to follow.	Procedures do not accurately list the steps of the experiment.
usion	Conclusion includes the findings for each step, possible problems faced, and what was learned from the experiment.	Conclusion includes the findings for each step and what was learned from the experiment.	Conclusion includes what was learned from the experiment.	No conclusion was included in the report OR shows little effort and reflection.



BRAIN BREAKS!

1. Seed Planter Students will squat down to dig a hole, stand up, squat down to plant the seed then stand up, squat down to cover the seed, squat down and water the seed.

2. Fruit/Veggie Talk Teacher will give class a color and students turn to a partner taking turns going back and forth naming a vegetable or fruit of that color, Partner “A” starts. Repeat until partners can no longer name fruits or vegetables of that color.

3. Apple Picker Students reach above their head alternating arms to pretend to pick apples from the apple tree. Teacher can time students for 10 sec. – 1 min asking students to count the number of apples they pick.

4. Syllable Snacks Students will work with a partner. Partner “A” will name a garden snack. Partner “B” will have to identify how many syllables are in the name of the snack. Students will repeat switching roles. Play as many rounds as possible in a given time frame.

5. Plant “Party” Students stand up pretending to be a plant. Teacher calls out part of plant (roots-feet, stem-legs, leaves-body, flowers-head). Students touch that part of body where that part of the plant would be located.

6. The Harvester Students bend down and pick crop, stand up to bundle it, then throw it over their shoulder. Repeat for as many rounds as possible in given time frame.

7. The Watering Can Students stand up and alternately move their hands across their bodies pretending to water their plants.

8. Insect Cycle Students will act out the life cycle of an insect. Egg- student is curled up on floor, Pupa- students crawl around, Larva- students stand up straight and still, Adult- students flap wings and fly.

9. Freeze Students walk/dance around room as teacher calls out vegetable names. Students have to freeze when teacher calls out a fruit.

10. Corn Shuffle Students bend down to pick the corn, then stand up to shuck the corn, eat the corn, then throw it over their shoulder into compost pile.

11. Earthworm Students lay on floor and do the earthworm shuffle by wiggling on the floor.

12. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Go back and forth repeating chant as long as desired.

13. Insect Talk Students will turn to a partner taking turns going back and forth naming a garden insect. Repeat until partners can no longer name insects.

OVERVIEW

Students will observe and track garden progress, plant health, weather, wildlife, etc.

These activities are designed to promote students' curiosity about insects in their garden and to allow for the realization that not all insects are pests. Activities in the garden should elicit and explore students' prior knowledge to be followed with a deeper understanding through yearlong observation, research and investigation. Collecting regular data enables students to analyze records for a deeper understanding of how the insect life in the garden changes over the seasons.

OBJECTIVE

- Students will become aware of factors that affect the garden such as weather and insects.
- Students will represent and communicate ideas and observations in a variety of ways such as diagrams, picture representations, and recordings.

STANDARD

Nevada Standards

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.1, (2)4.2, (2)4.4, (2)4.8 Life Science

Common Core State Standards

W.2.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section

Next Generation Science Standards

2LS2-1 Events have causes that generate observable patterns.

TIME

This will be done throughout the year with the various garden classes.

QUESTIONS

- What will we observe in the garden today?

MATERIALS

- Detective notebooks
- Pencils

PROCEDURE

1. Have students gather in the garden area and hold up the detective log notebook.
2. Explain that the special class detective notebooks will be used to write down official garden conditions on a consistent basis such as weather, new weeds, if the soil is wet or dry, new growth, damage, insects, leaf damage, etc.
3. As students explore the garden, prompt them with questions that may assist in writing down the first notebook entry.
4. If the garden needs water or weeding be sure to take care of it together.
5. Return as a group and discuss observations and recordings.
6. Have students share their first entries and discuss how being detectives will help us keep our garden healthy.

ASSESSMENT

The initial diagrams and writings can be compared with future recordings and notebook entries.

ADAPTATION

Together, you might compile a class book with students' observations and knowledge, as they become garden detectives.

DIGGING DEEPER

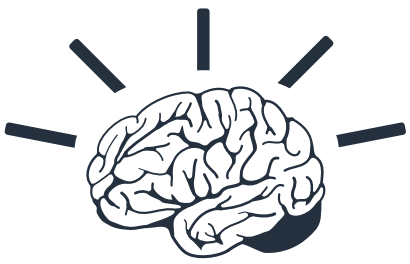
- Have students use toothpicks and put flags on them with the names of the insects – put them in the garden where they are spotted by students – take a picture of the garden and draw with a map of the flags.

NUTRITION FACTS

- Garden insects can provide a safe, natural way for organic pest control in the garden.

Lesson Two

Is it an Insect? Prove It!



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13. Insect Talk Students will turn to a partner taking turns going back and forth naming a garden insect. Repeat until partners can no longer name insects.

OVERVIEW

The purpose of this lesson is for students to observe and examine different bugs, and to classify bugs into insect and non-insect categories.

OBJECTIVE

- Students will learn new terminology about insects.
- Students will compare and contrast similarities and differences between insects to gain basic knowledge.

STANDARD

Nevada Standards

CCSS: ELA: W. 2.7, 2.8

(2)1.1-(2)1.4 NV State Science: Science Inquiry

(2)1.5-(2)1.9 Science Technology

(2)4.4, (2)4.8 Life Science

Next Generation Science Standards

(2)-LS4-1 Biological Evolution: Unity and Diversity

TEACHER INFORMATION

Insects are animals with the following characteristics:

- They belong to a group called **arthropods** (Arthropod means having limbs with many joints that bend in many directions).
  - Not all arthropods are insects.
  - Spiders and centipedes are arthropods, but they are not insects.
- They have an **exoskeleton** (an external hard 'shell')
- They have three body parts:
  - Head
  - Thorax
  - Abdomen
- They have 6 legs (3 pairs)
  - They have **compound eyes** (eyes with many lenses)
- Many have wings
- They use **spiracles** (openings on the sides of their abdomen) in order to breathe.

TIME

60 minutes

QUESTIONS

- What makes an insect an insect?

MATERIALS

- Science notebooks
- Bug and insect cards
- Butcher paper -1 per group
- Magnifying lenses
- Look for insect books in your class/school library to use as anchor texts

PROCEDURE

1. Teacher will introduce the word entomologist. An entomologist is a scientist who studies insects.
2. Teacher will ask *"What is an insect?"*
3. Teacher will work with students to sort insect and bug cards using a pocket chart.
4. Teacher will ask the question: *"What similarities do you notice about the bugs labeled insects? What do all the pictures have in common? How are they different from the non-insects?"*
5. Teacher will give students the following task: Observe the insects with your group to identify what makes a bug an insect. Students will take turns writing the characteristics of an insect on their group butcher paper.
6. Students will identify the similar characteristics of the insects to draw their own conclusion of what an insect is and record their finding in their science journals.
7. Students will share their conclusions with the class.
8. As a class, students will create a definition of what an insect is based on their conclusions.

ASSESSMENT

Students will write an informational paragraph comparing an insect to a non-insect. Students should include diagrams, labels, and include evidence from their science journals.

ADAPTATION

- Group students into heterogeneous groups to insure peer support.

DIGGING DEEPER

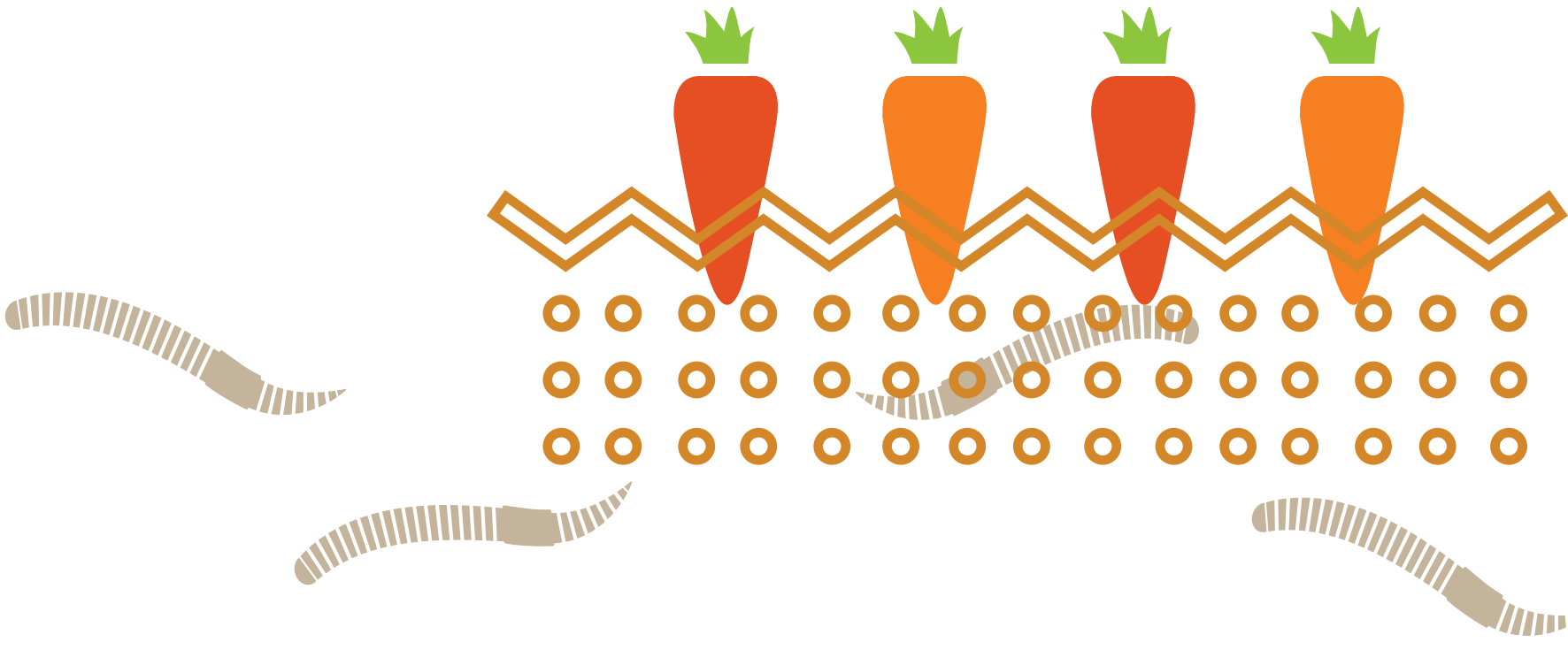
- Students will create their own insect using knowledge gained from observations and discussions. Student can use clay or drawings to create their insect.
- Have students research to find out the number of different types of insects there are in the world.
- Create a timeline showing the span of insects on the planet.
- What is the symbiotic relationship between the yucca moth and the yucca?
- How can you tell the temperature by the cricket chirps?
- How many legs do millipedes and centipedes have? Prefixes and Root words.

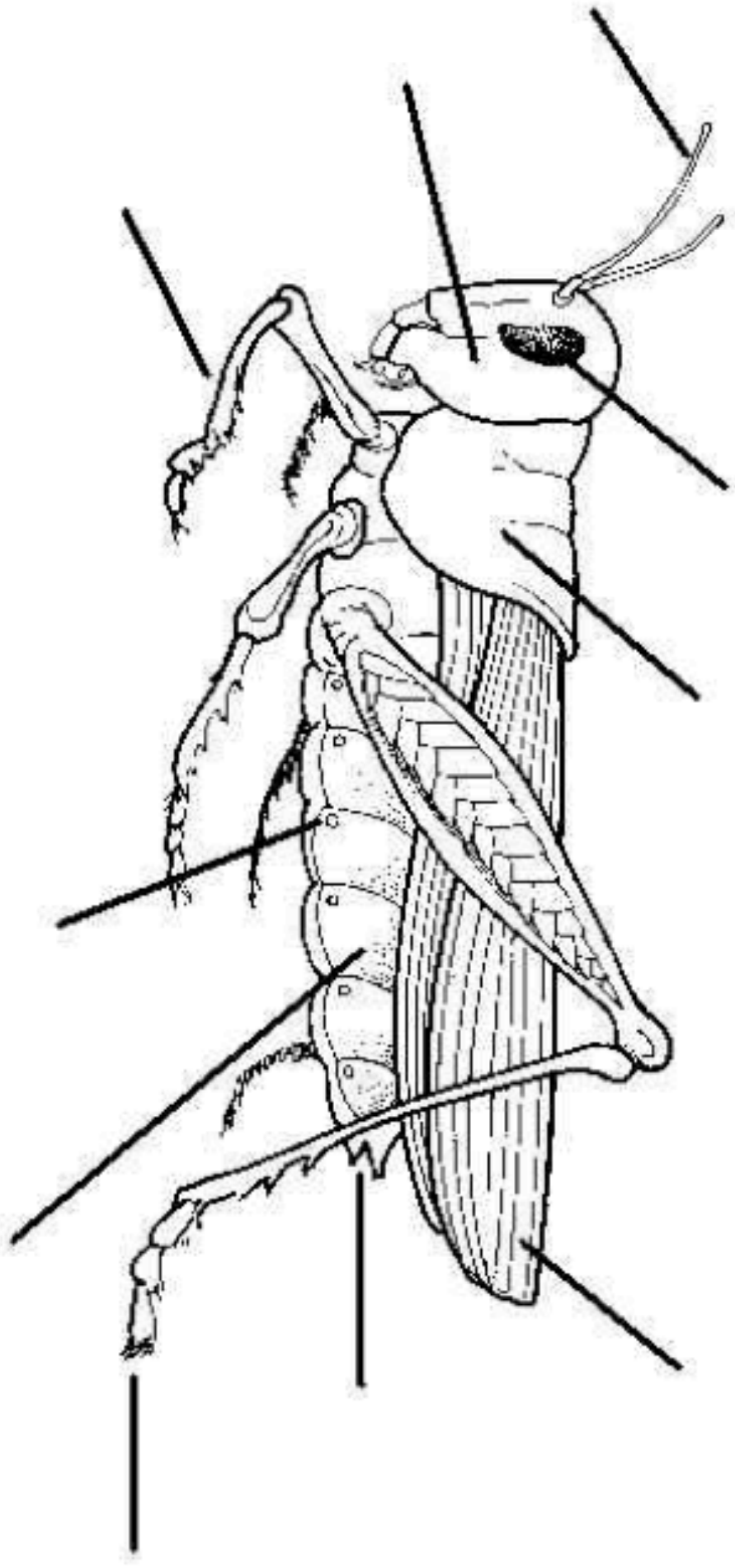
DID YOU KNOW?

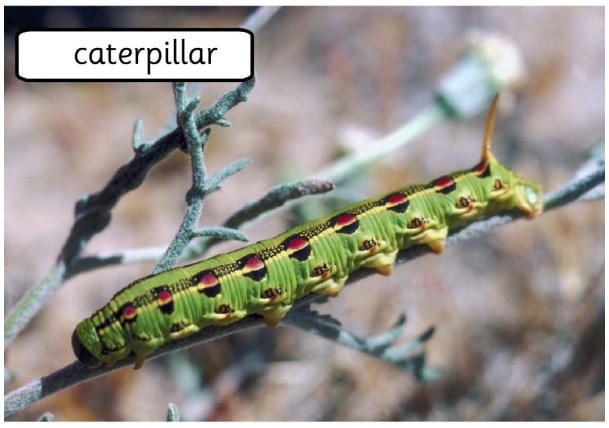
- Cockroaches have been on the earth for 50 million years.
- The Tarantula Hawk has the most painful bite for humans.

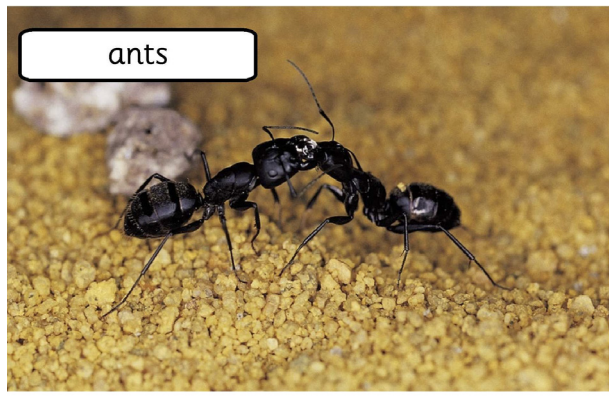
NUTRITION FACTS

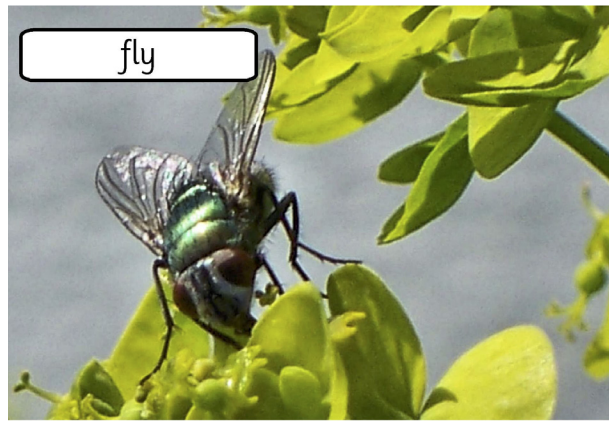
- Without the use of garden insects, pesticides would be used to control pest populations in gardens (Pesticide usage on food crops has been linked with a number of diseases such as cancer).

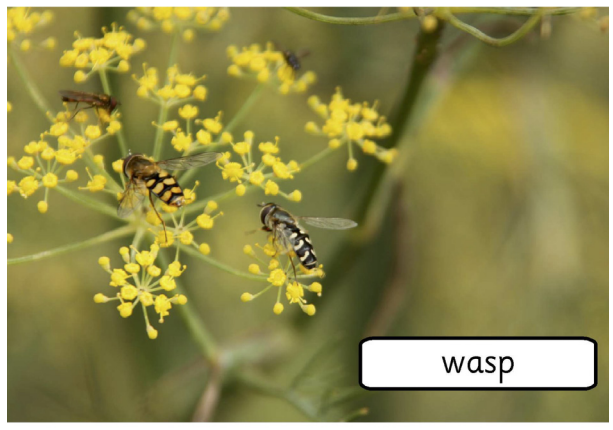


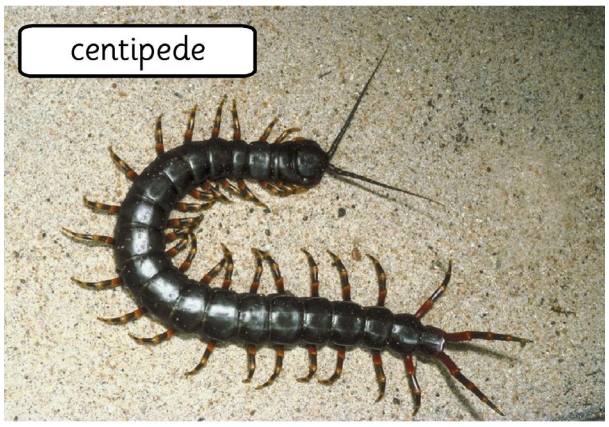


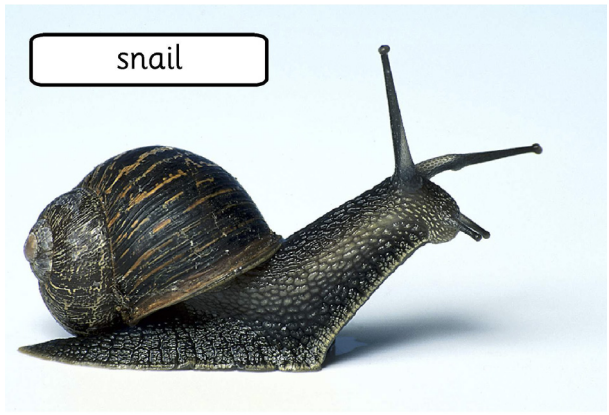


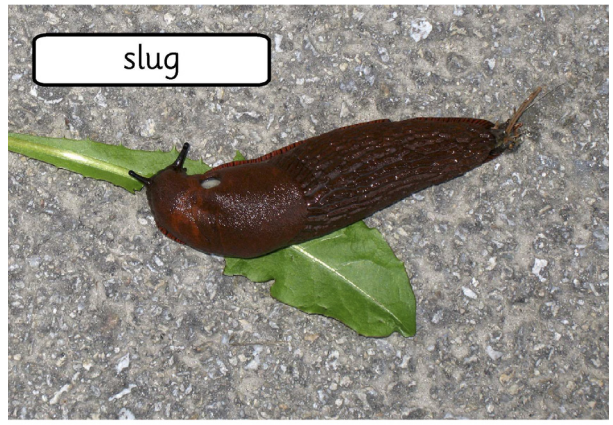






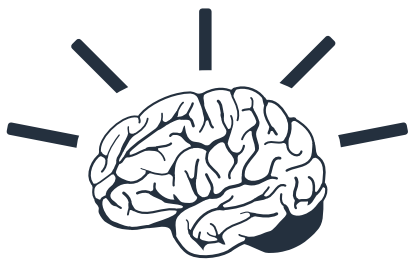






Lesson Three

Insects in the Garden



BRAIN BREAKS!

1. Seed Planter Students will squat down to dig a hole, stand up, squat down to plant the seed then stand up, squat down to cover the seed, squat down and water the seed.

2. Fruit/Veggie Talk Teacher will give class a color and students turn to a partner taking turns going back and forth naming a vegetable or fruit of that color, Partner “A” starts. Repeat until partners can no longer name fruits or vegetables of that color.

3. Apple Picker Students reach above their head alternating arms to pretend to pick apples from the apple tree. Teacher can time students for 10 sec. – 1 min asking students to count the number of apples they pick.

4. Syllable Snacks Students will work with a partner. Partner “A” will name a garden snack. Partner “B” will have to identify how many syllables are in the name of the snack. Students will repeat switching roles. Play as many rounds as possible in a given time frame.

5. Plant “Party” Students stand up pretending to be a plant. Teacher calls out part of plant (roots-feet, stem-legs, leaves-body, flowers-head). Students touch that part of body where that part of the plant would be located.

6. The Harvester Students bend down and pick crop, stand up to bundle it, then throw it over their shoulder. Repeat for as many rounds as possible in given time frame.

7. The Watering Can Students stand up and alternately move their hands across their bodies pretending to water their plants.

8. Insect Cycle Students will act out the life cycle of an insect. Egg- student is curled up on floor, Pupa- students crawl around, Larva- students stand up straight and still, Adult- students flap wings and fly.

9. Freeze Students walk/dance around room as teacher calls out vegetable names. Students have to freeze when teacher calls out a fruit.

10. Corn Shuffle Students bend down to pick the corn, then stand up to shuck the corn, eat the corn, then throw it over their shoulder into compost pile.

11. Earthworm Students lay on floor and do the earthworm shuffle by wiggling on the floor.

12. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Go back and forth repeating chant as long as desired.

13. Insect Talk Students will turn to a partner taking turns going back and forth naming a garden insect. Repeat until partners can no longer name insects.

OVERVIEW

Students will have an opportunity to observe a variety of insects in their natural habitat.

OBJECTIVE

- Students will identify insects and observe their behavior in the garden.

STANDARD

Nevada Standards

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.4, (2)4.8 Life Science

Next Generation Science Standards

2LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

TIME

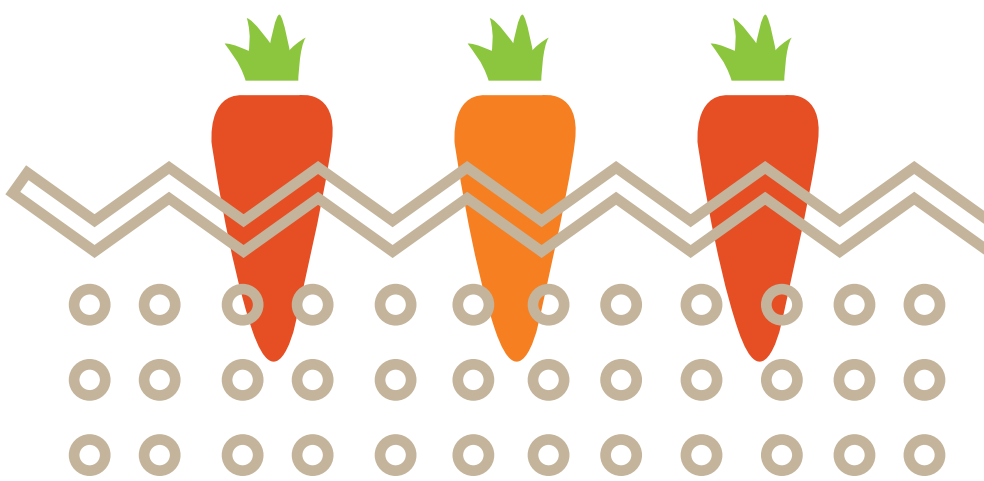
45-60 minutes

QUESTIONS

- What will we observe in the garden today?

MATERIALS

- Science notebooks
- An insect guide showing a variety of different garden insects
- Magnifying lenses
- Pencils



PROCEDURE

Class discussion: Teacher will say, *"We have been observing insects in the classroom. Today we are going to observe insects in their natural habitat. What insects do you think we'll see in the garden area? What are some things that you would like to find out about insects?"*

1. Teacher will make a list of student suggestions on the board.
2. Teacher will pass out the insect guide.
3. Students will go out into the garden with their partner.
4. Students will quietly move to designated areas in the garden to observe insects.
5. Students will use magnifying lenses to observe insects and their behaviors.
6. Students will record their findings in their science notebooks.
7. Teacher will allow 20 minutes for students to observe and record insects in the garden.
8. Class will regroup back in the classroom.

Closing Discussion: Teacher will have students name three things they observed in the garden. Teacher will ask, *"How were you able to identify insects from non-insects?"* Teacher will ask, *"Where did you find the majority of insects?"*

ASSESSMENT

Students will use the information to make observations in their science notebooks to create an insect guide for the garden. Students will include a map of the garden and where to find specific insects.

ADAPTATION

- Teacher should previously observe the garden to find where insects are plentiful.
- Teacher should create an insect trap in the garden by first digging a hole, then placing a plastic cup in the hole making it level with the ground. The next day, there should be small insects in the trap.
- Students can give tours of the garden and its insects by using the guides they created.

DIGGING DEEPER

- Students develop insect clue book or detective book: *Insect Detective*: this will be an insect guide for the class to use as a reference.
- What is the difference between an insect, an arachnid, a millipede, a crustacean and a centipede?
- Research an arthropod that lives in the soil.

DID YOU KNOW?

- There are more insects that are helpful than harmful in the world.

NUTRITION FACTS

- In 1996, the Food Quality and Protection Act (FQPA) was past to protect the nations food supplies from harmful levels of pesticide measures found on food.

ANIMALS IN DESERT GARDEN

Animal: Black Widow Spider (Latrodectus mactans)

- Identification
  - Red-colored hourglass design abdomen
  - Approx. 1.5 inches
  - Males: about ½ the size of female
  - Life span 1-3 years (wild)
  - Newly hatched: white or yellowish-white
- Habitat
  - Live in all 4 deserts of the American SW
  - Nocturnal
  - Generally solitary
  - Web: amorphous (cotton-ball)
- Safety Issues
  - One of the most venomous spider in North America
  - Can cause: muscle aches/nausea/paralysis of diaphragm (breathing difficulty)
  - Most people don't suffer serious damage/symptoms
  - If bitten: seek attention (try to catch spider for id purposes)
  - < 1% mortality rate
- Reason for existence in the garden
  - Preys: cockroaches/beetles/other arthropods
  - After ensnaring: small punctures-sucks out the liquids
  - Preyed upon by mud-dauber wasps
- Interesting facts/tidbits
  - Non-aggressive – bite in self-defense
  - Common misconception: females consume males after mating

Animal: Brown Recluse Spider (Loxosceles reclusa)

- Identification
  - Long thin legs
  - Violin shaped abdomen
  - Colors vary: light tan to dark brown
  - Non-aggressive
  - Nocturnal
- Habitat
  - One of three commons spider groups in US with venom (Black widow and Brown widow spider)
  - Solitary-reclusive: prefers undisturbed areas usually near floor
  - Indoors: closets/shoes/clutter
  - Outdoors: firewood piles/leaves/piles of rocks
- Safety Issues
  - Bite usually not life-threatening, but considered dangerous (Can cause severe tissue damage)
  - Might not feel bite at first (pain 6-8 hours later)
  - Bite resembles blister/pimple
- Reason for existence in the garden
  - Preys: pests in the garden (roaches/grasshoppers/crickets/etc.)
- Interesting facts/tidbits
  - As the name suggests, very shy
  - Most spiders have 8 eyes, but recluse has 6 (in pairs)

Animal: Wolf Spider

- Identification
  - Almost the size of a tarantula
  - Generally hairy black to brown to gray in color
- Habitat
  - Home set up away from heat
  - Nocturnal
- Safety Issues
  - Will bite if touched or threatened
  - Bite is not considered lethal, but causes pain/swelling
- Reason for existence in the garden
  - Preys: earwigs/ants/beetles/grasshoppers/crickets/Roaches/ and other spiders
- Interesting facts/tidbits
  - Courtship: male waves front legs to show his intension (If not, he might become the prey)
  - Then, begins drumming
  - During mating: female continues to hunt

Animal: Funnel Spiders

- Identification
  - Any spider that makes a funnel-shaped web
  - Most abundant in temperate grassland areas
  - Usually very shy, rarely straying from web
  - Live for only 1 year
- Habitat
  - Funnel web used to trap insects
  - Spider waits at the bottom of the funnel
  - After killing prey, wrap in silk and drag into the funnel
- Safety Issues
  - Be observant in your garden-don't bother
- Reason for existence in the garden
  - Preys on insects
- Interesting facts/tidbits
  - Mating occurs in late summer or early fall

Animal: Scorpions

- Identification
  - 8-legged venomous invertebrates (crab-like)
  - Belongs to the Arachnida class (related to spiders Mites, ticks
  - Extended body/segmented tail with telson (the sting)
  - Bark Scorpion: considered dangerous to humans
  - Light brown up to 3"
  - Pair of pincers
  - 4 pair of legs
  - Thought to live 10-15 years
- Habitat
  - Prefers warm/dry climates
  - Nocturnal
  - Hide under rocks/logs/cracks where nice and cool
  - Dig and hide in burrows
- Safety Issues
  - Most venomous scorpion in the US (bark scorpion)
  - Immobilize prey by stinging with pincers (dissolves tissues)
  - If bitten, seek medical attention
  - Can be deadly to children
  - Some able to regulate delivery of venom
- Reason for existence in the garden
  - Consume all kinds of insects/spiders/centipedes/scorpions
  - Larger scorpions will feed on lizards/snakes/mice

- Interesting facts/tidbits
  - Under UV light will look bright green
  - Very resilient: can be frozen for weeks with no ill effects
  - Male: dance with the female using pincers
  - Small scorpions stay on the mom's back 'til first molt

Animal: Rabbits

- Identification
  - Colors range from reddish brown to gray
  - Distinctive "cotton ball" tail
  - Breeding occurs from March through early fall
  - Life expectancy 2 years in the wild
- Habitat
  - Seek to live on fringes of open spaces
  - Can adapt to human habitats
  - Tend to browse at night looking for greens, etc.
  - Will re-ingest their own fecal pellets to increasing levels of vitamins and minerals
- Reason for existence in the garden
  - Vital for ecological balance in deserts
  - Owls, hawks, foxes, coyotes, bobcats and snakes feed on them
- Interesting facts/tidbits
  - Have keen eyesight and hearing
  - Danger: freeze – can achieve 18 mph when frightened
  - Excellent swimmers

Animal: Vinegaroon "Whip Scorpion"

- Identification
  - Large pincers
  - Whip like tail
  - No venom-practically harmless to humans
  - 1 ½ - 3 inches long
  - Nocturnal – poor vision
- Habitat
  - Like to hide in dark, damp places
  - Under rocks, logs, and other dark places
- Reason for existence in the garden
  - Effective predator of crickets /cockroaches
- Interesting facts/tidbits
  - Female carries the egg sac
  - After hatching, young ride on female's back
  - Due to poor vision, rely on vibrations
  - When threatened, secrete liquid that smells like vinegar
  - Able to swing their tail around like a whip
  - Defense: acidic vinegar spray

Animal: Mason Bees

- Identification
  - Slightly smaller than a honey bee
  - Shiny and dark blue in color
  - Usually active for 2 months mid-spring
  - Do not pollinate mid-summer vegetables
- Habitat
  - Cavities in wood (non-destructive)
  - Female will place a mud plug at the bottom of hole
  - Lays the egg then, places food in hole then seals cell with a thin mud plug
  - Can make mason bee home in wood
  - Mainly solitary bees
- Safety Issues
  - Gentle, will sting only if handled roughly or trapped under clothing
- Reason for existence in the garden
  - Pollinator of apples, cherries & other tree fruit
  - Visits a wide variety of flowers for source of energy, nectar and pollen
- Interesting facts/tidbits
  - Gentle, non-stinging
  - Valued because they are native and self-sustaining with minimal maintenance
  - Will fly 100-200 meters to find flowers
  - Does not produce honey

Animal: Honey Bees

- Identification
  - All bees are social and cooperative insects
  - Workers (females) forage for food, build and protect the hive, clean, circulate air by beating their wings, provides many other social functions
  - Queen: lay eggs (usually only 1 queen), regulates hive's activities by producing chemicals that guide behavior of other bees
  - Males: (drones) expelled from hive for winter due to lean times
- Habitat
  - Hive's inhabitants divided into 3 types
- Reason for existence in the garden
  - Pollinates
  - Provides honey and beeswax
- Interesting facts/tidbits
  - If queen dies, the workers will create a new queen with "royal jelly"
  - During the winter: cluster into a ball to conserve warmth/feed on stored honey and pollen

Animal: Carpenter Bee (Xylocopa virginica)

- Identification
  - Size of a small pecan
  - Metallic blue-black (female)
  - Light tan (male)
  - Hibernate in the winter
- Habitat
  - Wood (dead tree trunks)
  - They don't eat the wood just excavate
- Safety Issues
  - Relatively gentle – but female will sting if threatened
- Reason for existence in the garden
  - One of the most important pollinator of the flowering plants
- Interesting facts/tidbits
  - Will use their holes again

Animal: Pallid Bat (Myotis lucifugus)

- Identification
  - Weight: 20-35 grams
  - Lightest in color of Nevada bats (tan-white)
  - Nocturnal
- Habitat
  - Common in arid regions with rocky outcroppings especially near water
  - Occasionally roosts in caves, mines, piles of rocks and tree cavities
- Safety Issues
  - Garden pests can hear a bat up to 100 feet away
  - Loss of habitat
  - Don't use pesticides
  - Loss of bats: need for chemical pesticides
- Reason for existence in the garden
  - Pollinator
  - Preys on scorpions, centipedes, crickets
  - Can eat lizards and rodents
- Interesting facts/tidbits
  - Can 'walk' on the ground
  - 1 – 2 babies per group
  - Females hang upside down while giving birth
  - Native of S. Nevada

Animal: Little Brown Bat (Myotis lucifugus : 'mouse-eared)

- Identification
  - Especially associated with humans (often forming nursery colonies)
  - Medium size: 4" long with 10" wing span
  - Color: light-grey brown to buffy-brown
- Habitat
  - Feed near/around water (mainly aquatic insects)
  - Sometimes may find 1,000's in buildings, attics, and other man-made structures
  - Do hibernate
- Safety Issues
  - Garden pests can hear a bat up to 100 feet away
  - Loss of habitat
  - Don't use pesticides
  - Loss of bats: need for chemical pesticides
- Reason for existence in the garden
  - Preys on moths, spiders, cockroaches and other beetles
- Interesting facts/tidbits
  - Can consume well over 600 mosquito-like insects/hour
  - While flying, echolocation calls about 20 X per second
  - Nursing females may eat up to 110% body weight each night
  - Males may roost with females, but typically all males together
  - Gentle animals

Animal: California Leaf-nosed Bat (Macrotus californicus)

- Identification
  - Wing span: over 30 cm
  - Brown color
  - 'Pups' are born from May-July (usually 1 at a time)
  - Do not migrate or hibernate
- Habitat
  - Roost in caves, mines, buildings
  - Can also live in tunnels
  - Night roosts: open buildings, cellars, porches, rock shelters
- Safety Issues
  - Garden pests can hear a bat up to 100 feet away
  - Loss of habitat
  - Don't use pesticides
  - Loss of bats: need for chemical pesticides
- Reason for existence in the garden
  - Preys on: many garden pests

- Interesting facts/tidbits
  - Usually use their sense of sight instead of echolocation
  - Known for its great maneuverability
  - More silent than most bats
  - ‘Hangs around’ most of the time using 1 foot: the other foot used for scratching and grooming

Animal: Blister Beetle

- Identification
  - Vary in shape, size and color
  - More than 300 species in the USA
  - ½” long
- Reason for existence in the garden
  - Feed on plants in your garden (favors mesquite)
  - Some larva prey on grasshopper eggs
- Interesting facts/tidbits
  - Named for its ability to exude from joints a liquid that causes painful blisters on your skin.
  - Can be quite the imposter looking harmless
  - Some ‘triungulins’ pack themselves together in a mass to look and smell like a single female bee (invades the hive)
  - ‘Spanish fly’

Animal: Pinacate Beetle (‘Stink bug’, Clown Beetle)

- Identification
  - Pinacate comes from the Aztec pinacatl (black beetle)
  - ‘Stink bug’ from the secretion emitted from the insect’s rear end
  - ‘Clown bug’ from the fact it looks as though he stands on his head
  - Black to brown – smooth to rough
- Habitat
  - Active year round
- Interesting facts/tidbits
  - Most predators avoid him because of the ‘stink’
  - They sneak up on him
  - Find food by odor

Animal: Monarch Butterfly (Danaus plexippus)

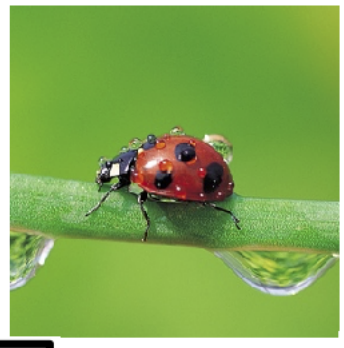
- Identification
  - Caterpillar banded w/yellow, black & white
  - Adult Orange & black pattern on wings
  - White spotted margins on wings
  - Wingspan: 3" – 4"
- Reason for existence in the garden
  - Pollination
- Interesting facts/tidbits
  - Called the "Milkweed Butterfly" due its preference for milkweed plants
  - Milkweed helps to cause butterfly's toxicity to birds
  - Epic migration – 4 generations

Animal: Painted Lady Butterfly

- Identification
  - Medium-sized
  - Wingspan: +/- 3"
  - Wings: white spots in the black forewing tips
- Habitat
  - Prefers aster, yarrow, buckweat
- Reason for existence in the garden
  - Larva feed on indigo bush, mallow and hollyhock
- Interesting facts/tidbits
  - Generally live 2-4 weeks

Bug Detectives

Take a look outside. Can you find these minibeasts?



☐ ladybird

☐ crane fly

☐ butterfly

☐ caterpillar

☐ fly

☐ beetle

☐ ant

☐ snail

☐ woodlouse

☐ spider

☐ worm

☐ bee

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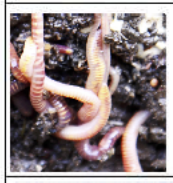
Bug Detectives

You are going on a bug hunt! Record how many minibeasts you find on the tally chart.

Animal	Tally
 ant	
 woodlouse	
 caterpillar	
 butterfly	
 beetle	
 spider	
 worm	
 fly	
 snail	
 ladybird	

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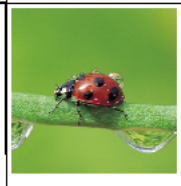
Bug Detectives

You are going on a bug hunt. Write or draw where you can find these bugs.

 ant	 woodlouse	 caterpillar
 beetle	 spider	 worm
 snail	 ladybird	 crane fly
 butterfly	 fly	 bee

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Insect Unit
Science & Culture
Printable Pack I

- This printable pack is **FREE** for non-profit use at home & in the classroom.

- When sharing, **PLEASE** link to the blog post where this printable was found.

- You may **NOT** sell or host these files as your own.

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Thank you & Enjoy!

Renae
at
http://everystarisdifferent.blogspot.com

Monarch Butterfly

Yellowjack Dragonfly

Panorpa Scorpionfly

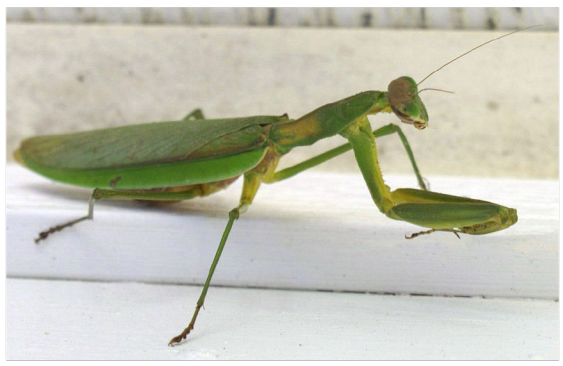
Goliath Beetle

Jewel Bug

Fire Ant

Paper Wasp

Bumblebee



Praying Mantis

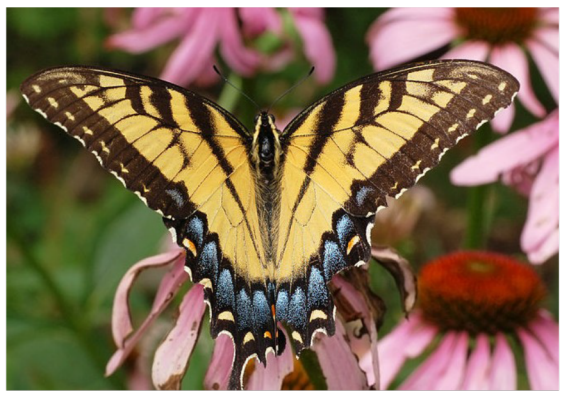
Hercules Beetle

Katydid

Grasshopper

Gypsy Moth

Ladybug



Tiger Swallowtail

Soldier Termite

Housefly

Spiny Flower Mantis

Bombardier Beetle

Golden Tortoise Beetle

Mosquito

Desert Locust

Common Earwig

Silkmoth

Green Lacewing

Firefly

Water Strider

Oleander Hawk Moth

European Honeybee

Assassin Bug

Created by Renae @ Every Star Is Different

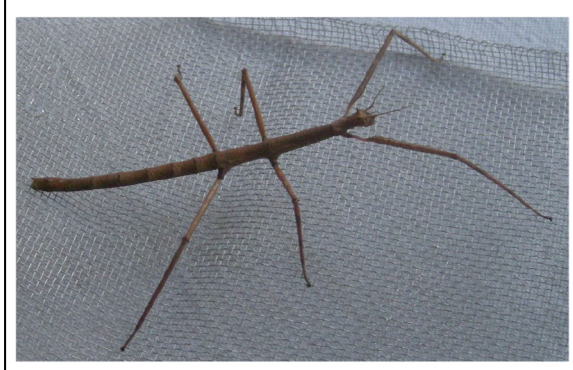
Violin Beetle

Leafcutter Ant

European Hornet

Coach-Horse Beetle

Winged Bulldog Ant



Walking Stick Insect

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22-Spot Ladybird

Aphid

Asparagus Beetle

Leaf Insect

Giant Water Bug

Dobsonfly

Silverfish

Horsefly

Eastern Billabong Fly

Flea

Luna Moth

Water Beetle

Dung Beetle

Stag Beetle

Centipede

Royal Starfish

Rusty Millipede

Tarantula

Scorpion

Blue Crab

Salamander

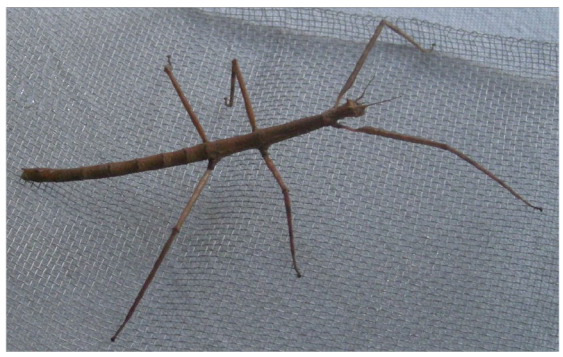
Krill

Daddy Long Legs

Hermit Crab

Goliath Beetle

Winged Bulldog Ant



Walking Stick

Mosquito

Violin Beetle

Green Lacewing

Created by Renae @ Every Star Is Different

Desert Locust

Panorpa Scorpionfly

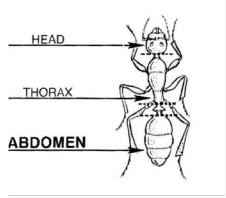
European Hornet

Stag Beetle

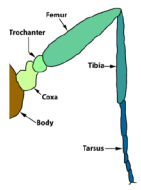
An Insect has:

2 Antennae

3 Body Segments



6 Legs



Insect

Not an Insect

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Egg

Larva

Pupa

Adult

Egg

Larva

Pupa

Adult

Egg

Larva

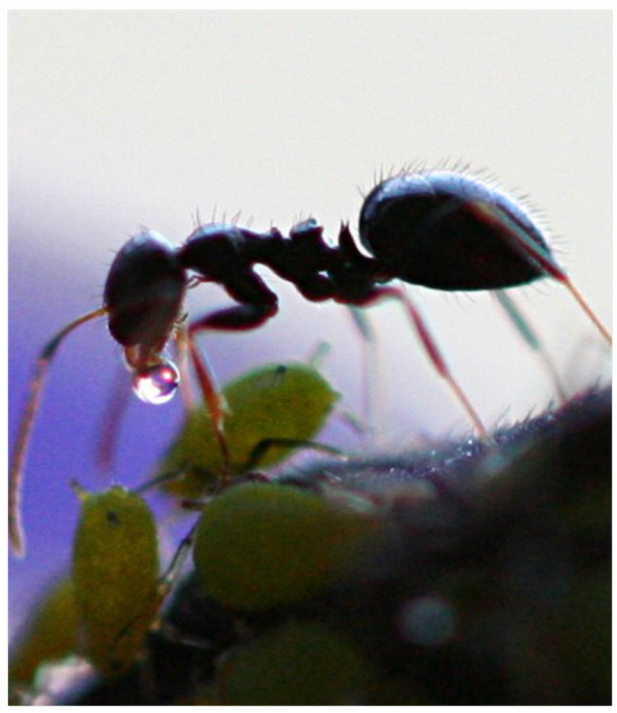
Pupa

Adult

Egg

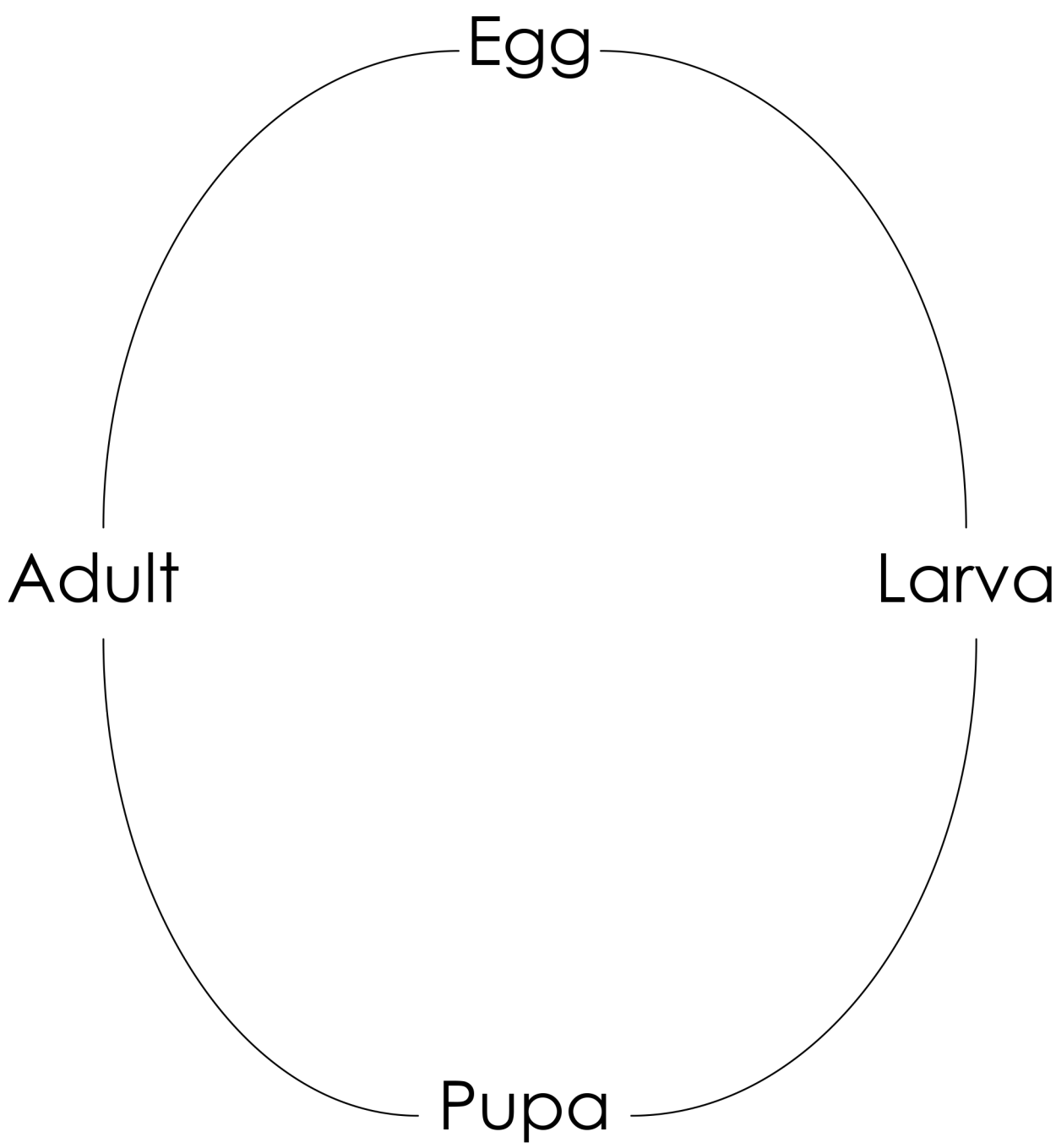
Larva

Pupa



Adult

Life Cycle of an Insect



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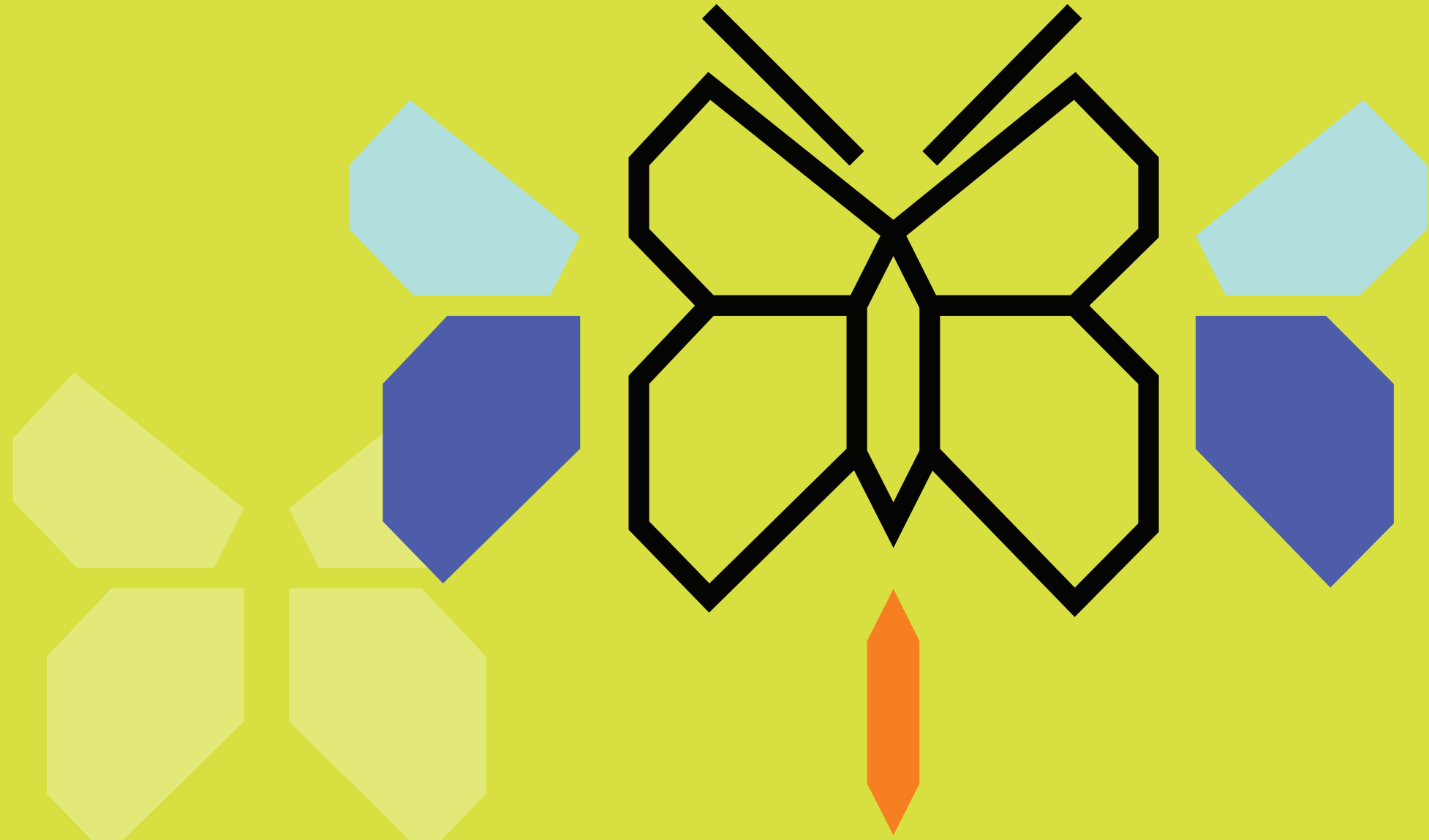
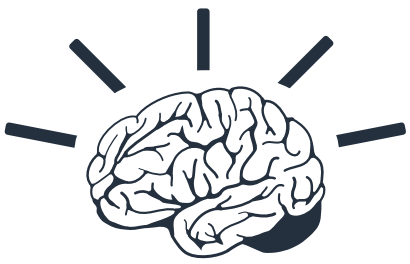
Lesson Four

Anatomy of an Insect





BRAIN BREAKS!

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2. Fruit/Veggie Talk Teacher will give class a color and students turn to a partner taking turns going back and forth naming a vegetable or fruit of that color, Partner “A” starts. Repeat until partners can no longer name fruits or vegetables of that color.

3. Apple Picker Students reach above their head alternating arms to pretend to pick apples from the apple tree. Teacher can time students for 10 sec. – 1 min asking students to count the number of apples they pick.

4. Syllable Snacks Students will work with a partner. Partner “A” will name a garden snack. Partner “B” will have to identify how many syllables are in the name of the snack. Students will repeat switching roles. Play as many rounds as possible in a given time frame.

5. Plant “Party” Students stand up pretending to be a plant. Teacher calls out part of plant (roots-feet, stem-legs, leaves-body, flowers-head). Students touch that part of body where that part of the plant would be located.

6. The Harvester Students bend down and pick crop, stand up to bundle it, then throw it over their shoulder. Repeat for as many rounds as possible in given time frame.

7. The Watering Can Students stand up and alternately move their hands across their bodies pretending to water their plants.

8. Insect Cycle Students will act out the life cycle of an insect. Egg- student is curled up on floor, Pupa- students crawl around, Larva- students stand up straight and still, Adult- students flap wings and fly.

9. Freeze Students walk/dance around room as teacher calls out vegetable names. Students have to freeze when teacher calls out a fruit.

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11. Earthworm Students lay on floor and do the earthworm shuffle by wiggling on the floor.

12. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Go back and forth repeating chant as long as desired.

13. Insect Talk Students will turn to a partner taking turns going back and forth naming a garden insect. Repeat until partners can no longer name insects.

OVERVIEW

The purpose of this lesson is for students to observe a variety of insects. Students will label and identify the parts of an insect.

OBJECTIVE

- Students will be able to identify and label the parts of an insect.

STANDARD

Nevada Standards

CCSS: ELA: W. 2.7, 2.8

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.4, (2)4.8 Life Science

Next Generation Science Standards

K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

TEACHER INFORMATION

An insect is an animal with the following characteristics:

- Belong to a group called arthropods (Arthropod means having limbs with many joints that bend in many directions).
  - Not all arthropods atre insects.
  - Spiders and centipedes are arthropods, but they are not insects.
- They have an exoskeleton (an external hard ‘shell’)
- Three body parts:
  - Head
  - Thorax
  - Abdomen
- 6 legs (3 pairs)
  - They have compound eyes (eyes with many lenses)
- Many have wings
- They use spiracles (openings on the sides of their abdomen) for breathing.

TIME

45-60 minutes

QUESTIONS

How are insects different from other bugs?

MATERIALS

- Science notebooks
- 4 types of live insects
- Insect anatomy black line master

PROCEDURE

1. Teacher will begin the lesson with a class discussion. Students will review with the following: **How are insects different than other bugs?**

2. Students will discuss the question with their shoulder buddy.

3. Teacher will write students' responses on the board.

4. Teacher will introduce the following vocabulary — antennae; a body divided into 3 parts (head, thorax, abdomen); 6 jointed legs; most have wings, usually 2 pairs and a hard outer body covering called the exoskeleton.

5. Teacher will display the definitions of each body part.

6. Students will record vocabulary and definitions in their science journals.

7. Students will divide one page in their science journals into fourths.

8. Students will label each section as: Station 1 (name of insect at that station) Station 2 (name of insect at that station) Station 3 (name of insect at that station) Station 4 (name of insect at that station)

9. Students will be divided into small groups and then go to their assigned stations.

10. Students will use the definitions given by the teacher to draw their own conclusions on how to label an insect correctly.

11. Students will observe, draw and label the parts of each insect in their science journal as they rotate through each station.

12. Students will rotate through each station.

13. Students should be given 10 minutes to observe, discuss, and record at each station.

14. Students will share and compare their drawings with their group.

15. Students will discuss the similarities and differences amongst the different insects.

16. Teacher will have students gather together for a group discussion.

17. Teacher will show students how to correctly label the parts of an insect.

18. Students will check and correct for accuracy.

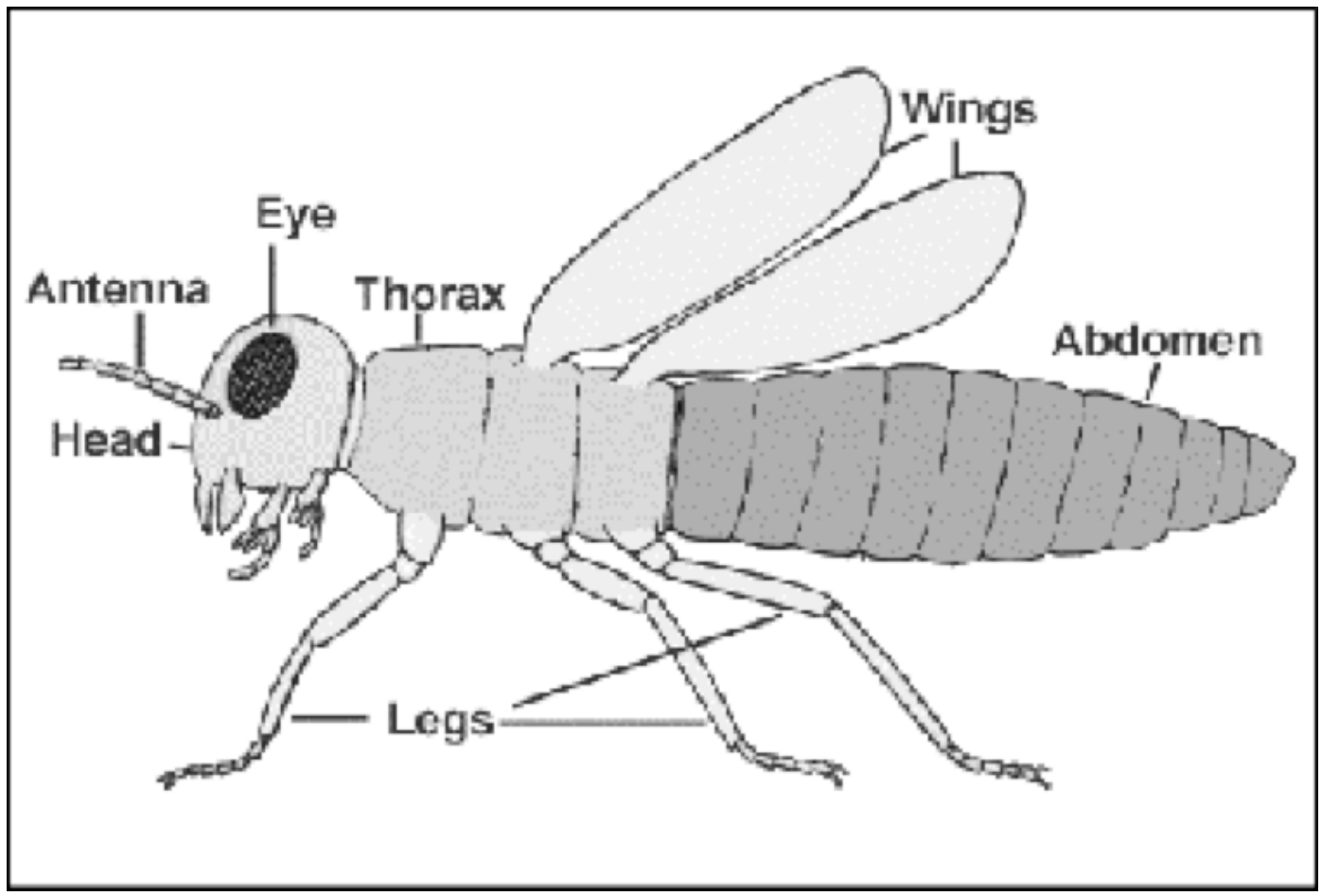
Closing Discussion: Ladybugs and Praying mantises are very different, however they are both categorized as insects. What do they have in common that makes them an insect? Explain.

ASSESSMENT

Students will label the parts of an insect on a black-line master.

ADAPTATION

Teacher should have at least 4 insects for students to observe.



From: http://www.kindermagic.com/TotallyBuggin/BB2_lesson_plans.htm

DIGGING DEEPER

- Build your own bug out of clay.
- Study the different types of mouthparts.
- What is the difference between a butterfly and a moth?
- Create a flip-book using the 3 parts of the insect. Each child will fold a piece of paper into 1/3's: the head in one section, the thorax in the middle section and the abdomen in the last section. See the example:

- Creative thinking encouraged!

DID YOU KNOW?

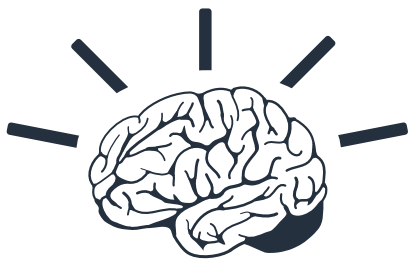
- Scientists estimate that there are between 5-6 million insects that we haven't even discovered yet!
- Insects breathe out of the sides of their bodies through holes called spiracles.

NUTRITION FACTS

- In some parts of the world, insects such as crickets, grasshoppers, ants, and beetles are eaten as food and seen as a good source of protein!

Lesson Five

Mouthparts of an Insect



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OVERVIEW

The purpose of this lesson is for students to understand that what an insect eats is directly correlated with *how* it eats. Students will be given an opportunity to eat various foods with the utensils provided that will simulate the mouth parts of insects. Through this exploration, students will identify which foods they can eat with their specific mouthparts.

OBJECTIVE

- Students will understand and identify the physical adaptations of a variety of insects to understand how insects eat and survive in their natural habitats.

STANDARD

Nevada Standards

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.1, (2)4.4-(2)4.7 Life Science

(2)4.8 Diversity of Life

Next Generation Science Standards

K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

TEACHER INFORMATION

There are 5 different structures of mouthparts in the insect world, depending on the collection and eating of food. The different parts of the insect mouth are: (From: http://www.amentsoc.org/insects/fact-files/mouthparts.html)

- Labrum: a cover, similar to an upper lip
- Mandibles: powerful cutting jaws
- Maxillae: 'pinchers'
- Labium: lower cover, similar to a lower lip
- Hypopharynx: similar to a 'tongue'

Some of the mouthparts modifications include (these modifications depend on the mode of collecting/eating food):

- Honey Bees
- Butterflies and Moths
- Diving Beetle Larvae
- True Bugs
- House Flies

TIME

2 60-minutes sessions

QUESTIONS

- What are some good things about insects?
- What are some things we don't like about insects?
- Have you ever seen an insect eat?

MATERIALS

- Pictures of insects with different types of mouths and mouthparts
- Pliers
- Syringes
- Wet sponges
- Drinking straws
- Food (i.e. lettuce or spinach, juice, red-colored water, cookies)
- Science notebooks

PROCEDURE

- Session 1-Matching Insect Mouth Parts

1. Teacher will pose the following questions: What are some good things we like about insects? (They pollinate plants. Butterflies drink nectar, etc.) What are some things we don't like about insects? (They bite you. Mosquitoes go after blood, etc.)

2. Teacher will say: *to understand and learn about insects we first have to discover what it eats and how and why it eats it.*

3. Teacher will pose the questions: Have you ever seen an insect eat? What types of things have you seen it eat?

4. Whole group will brainstorm foods that insects like to eat.

5. Teacher will create a class list on the board.

6. Teacher will pose the questions: Do all insects eat all of these? (Do grasshoppers drink nectar? Do butterflies eat leaves?)

7. Teacher will show the class the variety of utensils that will represent the different mouthparts.

8. Teacher will explain and define that given the different mouthparts, insects either chew, pierce, suck, sponge, and siphon.

9. Teacher will distribute trays with utensils and insect picture cards to each group in the classroom.

10. Teacher will give students the task to match the utensils with the correct insect mouths.

11. Students will work cooperatively in their groups and be prepared to justify their conclusions.

12. Students will record their predictions in their science journals to validate and make corrections to their predictions if needed from session 2.

▶ Session 2- Try To Eat Like an Insect

Suggestion- Teacher should label the food items before the lesson:
red water=blood or juice=nectar, cookie=picnic food; lettuce-leaf=plant leaf.

Teacher will provide straws to students.

1. Students will revisit what they discussed in session 1.

2. Teacher will provide each student with a set of utensils and a tray of labeled food items. Suggestion: Teacher should label the food items before the session: red water=blood or juice=nectar; cookie=picnic food; lettuce-leaf=plant leaf.

3. Teacher will encourage students to think about what insects really eat before allowing students to experiment with utensils and foods.

4. Working with their table, students will try to eat like an insect using the correct utensils. The only utensil that will not be shared are the straws. Each student will be given his or her own straw.

5. Students will use the pliers for tearing and chewing the leaves, straw for sucking the nectar, syringes for piercing the skin and drawing up the red liquid (blood), and the wet sponge for soaking the top of the cookie in order to break it down and suck it up.

6. Teacher will show students different mouthparts with the correct names.

7. Teacher will explain what each mouthpart does.

8. Teacher will create an anchor chart on the board.

9. Whole group will discuss what foods from the exploration can be eaten with the correct mouthparts. Teacher will ask the following questions: What problems did you encounter? (I couldn't use the pliers to drink the nectar). Based on what you already know about a butterfly, would it be able to chew and tear a leaf? Based on what you know about a beetle, could it drink the nectar of a flower?

10. Teacher will show a variety of insects.

11. Students will use the anchor chart and what they know about insect mouth parts to correctly match the correct mouth type to each insect picture.

12. Teacher will correct whole group.

13. Students will revisit their predictions from session 1 and make corrections if needed.

14. Students will create a chart in their journals. The chart will include the different mouth types, their function, and which insects have those types of mouth parts

ASSESSMENT

Student journals

ADAPTATION

- Based on the mouthparts of a specific insect, what can you conclude about their roles in the garden?
- How does what insects eat affect the stability of the garden? For example, "*If butterflies did not drink nectar they couldn't ……..?*"

DIGGING DEEPER

- Find evidence of bugs feeding in the garden.

DID YOU KNOW?

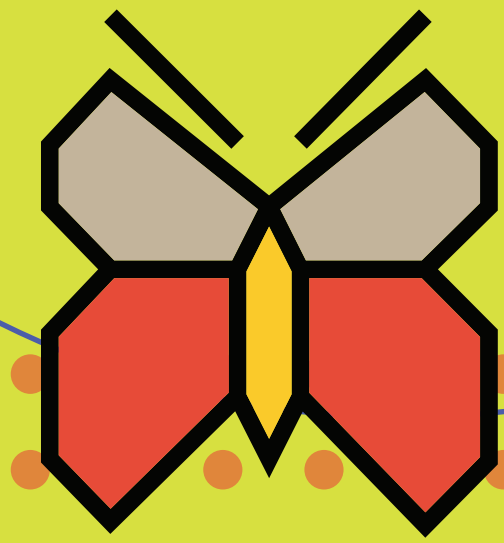
- There are 5 different types of mouthparts for insects.
- Lots of insects digest their food outside of their bodies.

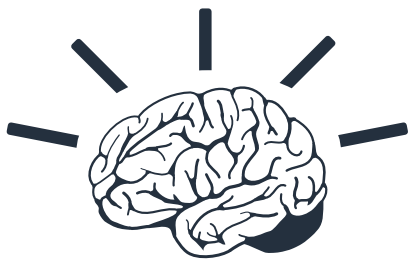
NUTRITION FACTS

- Humans, like insects, use different parts of their mouths (and teeth) to eat and food; our teeth, tongue, cheeks and saliva work together to break down our food into small and soft enough portions to be swallowed.

Lesson Six

Life Cycles-
Insect 1:Painted Lady Butterfly





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OVERVIEW

Students will observe the life cycles of a variety of insects and compare the stages of metamorphosis exhibited by each species.

OBJECTIVE

- Students will become familiar with the sequences that different types of insects exhibit, both simple and complex.
- Students will observe the different behaviors of insects at the different life cycle stages.

STANDARD

Nevada State Standards

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.1, (2)4.2, (2)4.4, (2)4.8 Life Science

Next Generation Science Standards

2-LS2-1 Events have causes that generate observable patterns.

2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

Interdependent Relationships in Ecosystems

Engineering Design

K-2-ETS1-1-1.3, 2-LS4-1

TEACHER INFORMATION

Butterflies go through what is called a 'complete metamorphosis'. This means that there are four stages: egg – larva – pupa – adult. The larva (caterpillar) stage is the period where most growth happens. It looks different from the adult. The adult and the larva typically do not eat the same type of food. For example, the caterpillar eats leaves while the adult butterfly feeds on nectar. This is wonderful in that they are not competing for the same food source. The pupa stage ('Chrysalis' in butterflies) is the stage where great transformations occur. One cannot actually see the transformation by looking at the pupa, but when this stage is complete, WOW!

TIME

60-minute session

QUESTIONS

- What is insect larva?
- How do you know something is an insect larva?

MATERIALS

- Butterfly larva (can be ordered through: www.insectlore.com)
- Science notebooks
- Butterfly cage
- Sugar water

PROCEDURE

1. Teacher will introduce the following vocabulary: chrysalis, pupa, butterfly, nectar, proboscis, larva, pupation.

2. Students will create a vocabulary chart in their science journals with the following categories organized into separate columns: word, definition, and example.

3. Students will record each word and its definition.

4. Students will leave the example column blank and fill in those spaces as they're observed.

5. Teacher will introduce the larva of a butterfly.

6. Teacher will ask: What is an insect larva? How do you know something is an insect larva?

7. Teacher will pass around the larva of a Painted Lady Butterfly.

8. Teacher will ask students what type of larva they think is in the jar?

9. Teacher will confirm what type of larva it is.

10. Teacher will explain to the students that each day for the next one to two weeks they will be making observations in their science notebooks. Their observations will include the following information: the behavior of the larvae; moltings; droppings; growth; and pupation.

11. Students will write their first observation of the Painted Lady Larvae.

12. Teacher will have the students observe the larva daily and include any changes that are observed.

13.Students will draw each stage and include as many observations as possible.

Closing: Once the adult emerges from the pupa, students will observe and record. Students will draw all stages of the butterfly's lifecycle. The whole group will discuss why it is called a lifecycle.

ASSESSMENT

Student observations

ADAPTATION

Students will observe different insects at different stages in the garden or classroom. Teacher will ask the following question; based on the behavior observed by the Painted Lady Butterfly: if you were observing a beneficial insect, at which stage do you think it would eat the most harmful insects?

Based on your knowledge of the Painted Lady Butterfly, at which stage is it most beneficial to the garden?

DIGGING DEEPER

- Research, compare and contrast a complete metamorphosis and an incomplete metamorphosis.
- What is a nymph?
- What does it mean for insects to overwinter?
- Explore the monarch butterfly migration route.

DID YOU KNOW?

- The weight of Monarch Butterflies overwintering on tree branches in Mexico can be so heavy that they actually break the branches of the tree.
- The Monarch Butterfly feeds on the poisonous milkweed plant which in turn makes the Monarch Butterfly poisonous.
- The Queen Alexandra Butterfly is the largest butterfly in the world – 1 foot wide and it lives in Papua, New Guinea.

GARDENER'S TIP

- If you plant milkweed in your garden, you will attract butterflies.

NUTRITION FACTS

- Eggs from some animals are edible (such as chickens, snakes, ostriches, ducks, frogs) and some are even considered a delicacy (such as fish eggs aka caviar).

egg

caterpillar

chrysalis

butterfly

eggs

larva

pupa

adult ladybug

eggs

larvae

pupae

adult ant

spawn

tadpole

froglet

adult frog

egg case

hatchlings

nymph

adult preying mantis

eggs

larva

pupa

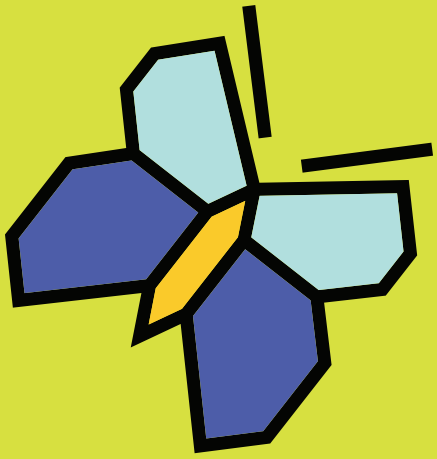
silkworm moth

eggs

mealworm (larva)

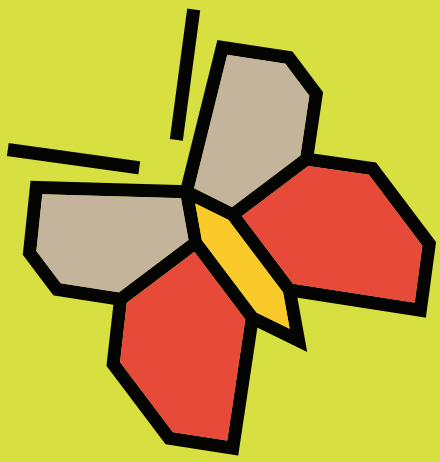
pupa

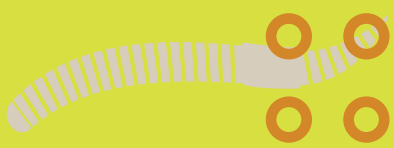
darkling beetle

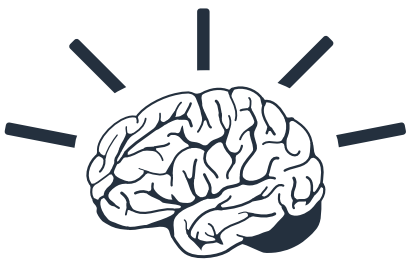


Lesson Seven

Introduction to Beneficial Insects







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OVERVIEW

Observe insects in the garden to understand how they are beneficial.

OBJECTIVE

- Students will learn how to encourage beneficial insects to the garden.

STANDARD

Nevada Standards

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.1, (2)4.2, (2)4.4, (2)4.8 Life Science

Next Generation Science Standards

2-LS2-1 Events have causes that generate observable patterns.

2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

TEACHER INFORMATION

Not all insects are harmful; in fact, the majority of insects are beneficial to humans. Some of the benefits we enjoy due to insects are:

- Pollination for the production of fruits and vegetables.
- Decomposition (wonderful insects breakdown waste).
- Silkworm Moth, Bombyx mori gives us luxurious silk.
- Insects are an integral part of the food chain by feeding birds and animals.
- We use insects for scientific studies (I. e. the Fruit Fly reproduces at such a rapid rate that scientists use it for the study of medicine and genetics).
- In the garden, many insects are beneficials by consuming the harmful insects that eat/damage our crops.
- Some of the beneficial insects in the garden include:
  - Ladybugs
  - Praying mantis
  - Parasitic wasps
  - Bees

TIME

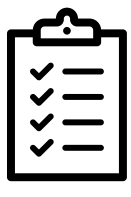
2 60-minute sessions

QUESTIONS

- What does it mean to be beneficial?

MATERIALS

- Science notebook
- Insect cards
- Informational books on insects



PROCEDURE

1. Teacher will introduce the term beneficial and record student responses.

2. Teacher will have students turn to their partner and have them tell their partner what is beneficial to them.

3. The whole class will brainstorm different things that are beneficial i.e. exercise, having a garden, going to school.

4. What are some benefits to having a garden?

5. Are there any benefits to having insects in the garden? Why or why not?

6. Teacher will introduce a variety of picture cards of insects and have students predict if they are beneficial or harmful. Teacher will have students justify their predictions.

7. Teacher will have students work in pairs to research an insect. (assigned or self-selected)

8. Students will read about their research insect to determine if their insect is beneficial and if so, why and how. Students will include evidence from their resources to support their findings.

9. Students will share their finding with their class.

ASSESSMENT

Student observations

ADAPTATION

- Teacher will need to go to their school or local library and gather a collection of books on different insects.
- In order to make the research easier for students, teacher can create a web on Inspiration and add hyperlinks of different beneficial insects.
- Students can also use www.NationalGeographicKids.com

PART 2

OVERVIEW

Students will design a ladybug habitat to illustrate and observe a true beneficials to the garden.

OBJECTIVE

- Students will learn how to encourage beneficials insects to the garden.

TEACHER INFORMATION

Many insects are beneficial in the garden and help by eating harmful insects that eat our plants. Ladybugs are an example of a beneficials. These beetles go through a complete metamorphosis. The most common food for both the larva and adult ladybug is the aphid. Aphids are harmful pests that suck the liquid from leaves. The ideal situation in a garden is to have a balance of insects which includes some harmful insects for beneficial to feed on but it is a delicate balance.

Beneficials - Insects that provide positive services such as pollination and pest control.

MATERIALS

- One large glass container with mesh cover
- Soil
- Seedlings including flowers and weeds.
- Ladybugs
- Science notebooks

QUESTION

- Can a weed be helpful in a garden? How?

Discussion: Start a class discussion about how it is sometimes good to have plants that you are not able to eat in your garden. In this activity we will take a look at one way weeds can sometimes help certain crops. We have learned that not all insects are pests in the garden, many help with pollination, help to de-compose dead things and help the soil, and some eat harmful insects. Ladybugs help by eating insects that damage crops. We will build a habitat to try to find out where ladybugs like to live and why they are called beneficials.

PROCEDURE

1. Prepare a habitat in the container with the students. Have students select a variety of seedlings and seeds to plant. Be sure to have some weeds so the ladybugs have a variety of plants to choose from. Allow a few weeks of growth before adding ladybugs and aphids to the habitat.

2. Have students make a prediction in their science notebooks to what the ladybugs will eat.

3. Before you show the ladybugs, be sure to gather aphids for the ladybugs to eat. Distribute them around the habitat so they are not just in one location.

4. Release a great amount of ladybugs in the habitat. After one day have the students observe and record their observations and any changes in their science notebooks.

5. After several days of observation discuss commonalities of what students observed and record. What were the findings?

6. As a class, release the ladybugs into the garden and predict which plants they will most likely move to. Have students observe the ladybugs new homes.

ASSESSMENT

- Did the ladybugs seem to prefer some of the plants more than others? Why?
- Was there a food source on the plants they preferred? Which did they like better, flowers or weeds? Why?
- Predict what would happen if there were not any aphids in the garden.

DIGGING DEEPER

- Have students research a particular beneficial insect to report to the class.
- Research how silk is made.
- Research ways that scientists have used insects to create something (i. e. fireflies: how they create light, praying mantis: stealth flying methods).
- What attracts beneficial insects to the garden?

DID YOU KNOW?

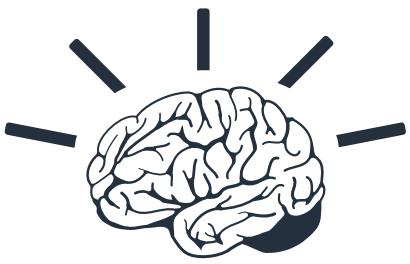
- There are more beetles than any other type of insect.
- Ants will herd aphids and 'milk' them for their honeydew.

NUTRITION FACTS

- Many of our agricultural crops like apples, cherries, blueberries, melons, etc. would not be able to grow without insect pollinators.

Lesson Eight

Spiders-Follow the Web



BRAIN BREAKS!

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2. Fruit/Veggie Talk Teacher will give class a color and students turn to a partner taking turns going back and forth naming a vegetable or fruit of that color, Partner "A" starts. Repeat until partners can no longer name fruits or vegetables of that color.

3. Apple Picker Students reach above their head alternating arms to pretend to pick apples from the apple tree. Teacher can time students for 10 sec. – 1 min asking students to count the number of apples they pick.

4. Syllable Snacks Students will work with a partner. Partner "A" will name a garden snack. Partner "B" will have to identify how many syllables are in the name of the snack. Students will repeat switching roles. Play as many rounds as possible in a given time frame.

5. Plant "Party" Students stand up pretending to be a plant. Teacher calls out part of plant (roots-feet, stem-legs, leaves-body, flowers-head). Students touch that part of body where that part of the plant would be located.

6. The Harvester Students bend down and pick crop, stand up to bundle it, then throw it over their shoulder. Repeat for as many rounds as possible in given time frame.

7. The Watering Can Students stand up and alternately move their hands across their bodies pretending to water their plants.

8. Insect Cycle Students will act out the life cycle of an insect. Egg- student is curled up on floor, Pupa- students crawl around, Larva- students stand up straight and still, Adult- students flap wings and fly.

9. Freeze Students walk/dance around room as teacher calls out vegetable names. Students have to freeze when teacher calls out a fruit.

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11. Earthworm Students lay on floor and do the earthworm shuffle by wiggling on the floor.

12. Plant Part Finger Hop Students touch thumb to thumb, pointer to pointer, middle to middle, ring to ring, pinkie to pinkie as they say the plant part finger hop chant (seeds, roots, stems, leaves, flowers). Go back and forth repeating chant as long as desired.

13. Insect Talk Students will turn to a partner taking turns going back and forth naming a garden insect. Repeat until partners can no longer name insects.

OVERVIEW

The purpose of this lesson is to increase students' understanding of spiders and how they are more often helpful than harmful in a garden environment.

OBJECTIVES

- To observe and record evidence of the distinctions between insects and spiders.
- To gain knowledge of spiders (arachnids) and their positive contribution as a carnivore in the garden.

STANDARDS

Nevada State Standards

(2)1.1-(2)1.4 Scientific Inquiry Science Inquiry

(2)1.5-(2)1.9 Science Technology, and Society

(2).4.2-4 Life Science

(2).4.8 Diversity of Life

Next Generation Standards:

K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

TEACHER INFORMATION

There are close to 40,000 different species of spiders. All spiders have eight jointed legs and a two-part body (cephalothorax and abdomen). Most spiders live only a year with the exception of the tarantula which may live up to 30 years. Spiders do not get stuck in their own webs. They give off an oily substance at the tip of each leg which keeps them from getting stuck. Spiders are carnivores that use their webs to snare insects and other small animals that may be harmful to the garden. The most common spiders found in the Mohave Desert are the black widow, brown recluse, the funnel spider and the tarantula. (See information sheet.)

Spiders are not actually insects, they belong to the group of arthropods called Arachnids. Insects have six legs and spiders have eight legs. Spiders also have only two body regions, a cephalothorax and an abdomen. Insects have three body regions a head, thorax and an abdomen along with wings and an antennae. Spiders also have six unique organs beneath their abdomen called spinnerets. Spinnerets allow the spiders to produce silk during their entire life cycle.

Spiders have a special mouthpart that has chelicera or jaws and fangs. Most spiders are venomous but they are harmless to humans except the black widow and the brown recluse. Most spiders cannot get their mouth open wide enough to break your skin. Venom is used to paralyze the spiders prey. Keep in mind one thing you are very large and the spiders are usually trying to get out of your way.

Females lay their eggs in the fall. As nature has it the female dies after she lays the egg mass. Most of the time the eggs do not hatch until spring, sometimes the hatchlings will stay protected in the egg masses until spring. In the spring the spiderlings must find a new home and move from their overwintering site. They do this by a process called ballooning. They cast a single thread of silk into the air and fly away to a new home.

Spiders are very beneficial in the garden. They eat many insects including aphids, caterpillars, cucumber beetles, flies, grasshoppers, leafhoppers, plant bugs, and thrips. There are over 3,800 species of spiders in America, that is a lot of helping fangs!

How do you encourage spiders to come stay in your garden? Plant tall plants for spiders to cast their webs on. Flowers also encourage spiders in the garden. Plant cover crops late in the summer so the spiders can have a site to overwinter their egg masses. Leaving a small portion of the garden mulched, for moisture, cover and this will create a place for the spiders to lay their eggs as well. A great way to encourage spiders to stay in your garden is to plant a beneficial insect border or row. Plant this in the spring for beneficial insects and do not till it under. Spiders can lay their egg masses in this area and thrive there. This will encourage your beneficial insect population as well and you will be killing two birds with one stone.

A few things to remember about using spiders as a biological pest control in your garden. They are very sensitive to sprays, so remember even organic controls effect beneficials and spiders. Secondly, they are non selective, so they will catch bees and butterflies from time to time. It is their nature, don't be frightened. When something flies into their web they can not say "oh, I think I will let you go!." With the nature of web spinners bugs must come to the spider, not the spider to the bug. So keep this in mind. Spiders will not control large outbreaks of pests as you will not have large populations of them in your garden. The idea is to have a healthy balance in your garden and spiders should be there as part of a healthy ecosystem along with other beneficial insects.

TIME

45-60 minute session

QUESTION

- Are spiders helpful or harmful in our garden?

MATERIALS

- Science Notebooks

PROCEDURES

1. Students will go out to the garden to find a spider to observe. Students may work in pairs. Finding a spider shouldn't be difficult. They are usually everywhere. Since most spiders build webs it may be easier to look for a web first and then find the spider who built it.

2. After finding a spider, have students carefully draw, label and describe it and its web in their notebooks.

3. Items to include:

- Number of legs
- Color
- Number of eyes
- Description of the web (blob, tangle, funnel, hammock, spiral)
- Is there anything in the web
- Is the spider's head down or up

Closing: Have students discuss their findings in a pair share type format. After sharing, record students' observations as a class and discuss the opening question: Are spiders harmful or helpful in the garden? What evidence do you have to support your answer?

ASSESSMENT

Have students compare and contrast a spider with an insect. Have students draw and label both an insect and a spider to show their level of understanding.

ADAPTATIONS

Read Diary of a Spider. Students will need to have knowledge of spiders to understand the jokes. This is an excellent book to read to students that have just learned about spiders.

DIGGING DEEPER

- Have students research, compare and contrast the Brown Recluse Spider and the Wolf Spider.
- Research the various types of webs spiders weave to catch their prey.
- How does a spider create a web?

DID YOU KNOW?

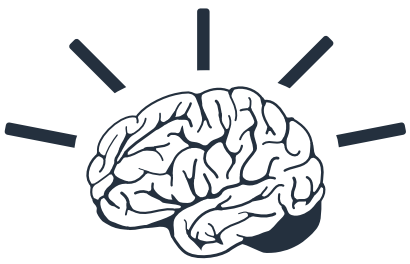
- Some Tarantulas can be as large as a small dinner plate.
- The smallest Tarantula is smaller than the head of a pin.
- There are approximately 40,000 different kinds of spiders.

NUTRITION FACTS

- Spiders provide a natural way to prevent pests from destroying our crops and from using harmful pesticides to kill pests.

Lesson Nine

Pollinators



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OVERVIEW

Students will explore how important insects are to the pollination process.

OBJECTIVE

- Students will understand the pollination process.
- Students will realize how important insects are to the pollination process and the food we eat.

STANDARD

Nevada Standards

(2)1.1-(2)1.4 Science Inquiry

(2)1.5-(2)1.9 Science, Technology, and Society

(2)4.4, (2)4.8 Life Science

Next Generation Science Standards

2-LS2-2 The shape and stability of structures of natural and designed objects are related to their functions.

TEACHER INFORMATION

Pollination is the process of pollen from the stamen (male part of the flower consisting of the filament and the anther) finding its way to the pistil (female part of the flower consisting of the stigma) and traveling down to reach the egg. Pollination must happen for flowering plants to reproduce. Wind, water, bees, butterflies, other insects, and various animals can transfer pollen to other flowers. The majority of flowering plants depend on insects for pollination.

Flowers have created many ways to attract insects' attention:

- Color: this is a pollinators' first impression of a flower
  - Bees prefer: yellow, blue, purple
  - Butterflies prefer: red, orange, yellow, pink
  - Flies prefer: green, lime, white, cream
- Scents: this is second only to the color of the flower to encourage insects to visit them. Insects are more sensitive to smells than humans.
  - Sweet Scent: butterflies, bees, wasps, moths
  - Rancid Scent: flies and beetles
- 'Bee Guides': these aids entice the insects to pollinate the flower.
  - Colored stripes
  - Spots
  - Markings
  - Many flowers have a glow surrounding the nectaries (place where nectar is found on the flower)

- Flower Shapes: the shape of the flower determines what kind of pollinator can visit.
  - The way the flower grows
  - Number of flowers
  - Size and shape of the individual/group of flowers
  - Bowl-shaped flowers:
    - This is the oldest form of flower
    - Think of sunflowers, poppies, and cactus flowers
    - Attract many types of insects
- Trumpet and Bell-shaped flowers:
  - The width and the angle the flower is growing at determines the kinds of pollinators that will visit.
    - Upward (Phlox) flowers attract butterflies
    - Outward (Daffodil) flowers attract low flying bees
    - Medium-sized bell and drooping flowers (Foxglove) attract bees and other insects – these insects also use these types of flowers for protection
    - Thin-tubular (Penstemon) flowers attract hummingbirds since they generally are too small for bees

TIME

45-60 minute session

QUESTIONS

Why are flowers different shapes, sizes and colors?

MATERIALS

- Science journals
- Pencils
- Markers/crayons
- Magnifying glasses
- Drinking glasses: a small glass and a larger glass
- Small plates
- A test tube or something similar (a tube-like vessel)

PROCEDURES:

1. Have the students answer the question in their notebook.

2. A discussion of the students' answers can be within small groups or the whole group.

3. Garden Observation Time: Students take their journals and magnifying glasses with them. Then they go out to the garden to observe the different shapes, sizes and colors of the flowers.

   - First: ask the students to find the one flower they notice right away. Discuss why as a whole group or in small groups.
   - Second: ask students to observe any activity around the flowers and to document them.
   - Ask students to observe several different flowers in the garden to see if there are any insects nearby.

4. Come back into the class and have students share their observations within a small group or as a whole group.

   - Teacher will record the answers on the board.

5. Show students the various shapes of dishes explaining that there is nectar on the bottom of each. Ask students to decide which insects would go to each flower and why.

http://pollinator.org/nappc/index.html

ASSESSMENT

Participation and Science Journal entries

ADAPTATIONS

Have students design a flower to attract a certain type of insect.

Source: https://utah.agclassroom.org/teachercenter/index.cfm?controller=main&action=lpsearch&lpID=464&searchGrade.gradeID=6&searchSub.subjectID=2

DIGGING DEEPER

- What would it take to be a beekeeper?
- How do bees communicate to others in their colony?
- Research, compare and contrast solitary bees and colony bees.
- How did Killer Bees arrive in the United States?
- What flowers are self-pollinated?

DID YOU KNOW?

- Bees that live in colonies (hives) have a highly developed social order.
- The shape, color and fragrance of a flower determine what kind of animal will pollinate it.
- Not all flowers need to be pollinated in order to produce a fruit. Some are self-pollinated.

NUTRITION FACTS

- If pollinators were unable to pollinate flowers, the plants could not produce fruits or vegetables (such as green beans, pumpkins, peas, corn, tomatoes, cucumbers, squash etc.).

PLANT POLLINATOR ATTRACTORS

PLANTS WITH BERRIES/FRUIT

- Arctostaphylus sp. | Manzanita
- Ferocactus cylindraceus | Barrel Cactus
- Lycium sp. | Wolfberry
- Opuntia basilaris | Beavertail Cactus
- Opuntia sp. | Prickly Pear
- Quercus sp. | Oak
- Rhus trilobata | Squawbush
- Rosa woodsii | Wood's Rose
- Vitis sp. | Grape
- Ziziphus obtusifolia | Greythorn

HUMMINGBIRD ATTRACTORS

Native

- Aquilegia sp. | ColumbineFerocactus cylindraceus | Barrel Cactus
- Chilopsis linearis | Desert Willow
- Loblia cardinalis | CardinalFlower
- Salvia sp. | Sage

Desert Southwest

- Campsis radicans | Trumpet Vine
- Lonicera sp. | Huneysuckle
- Monarda didyma | Bee Balm

BUTTERFLY ATTRACTORS

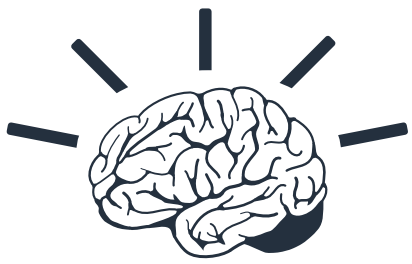
- Achillea sp. | Yarrow
- Asclepias sp. | Milkweed
- Buddleja sp. | Butterfly Bush
- Eriogonum sp. | Buckwheat

NURSERIES WHO CARRY THESE PLANT SPECIES:

- High Country Gardens (mail order)
- Plants of the Southwest (seed and plants, mail order)
- Springs Preserve (plants)
- Mountain States Wholesale Nursery (plants)
- Great Basin Natives (plants)
- Nevada Division of Forestry (plants)

Lesson Ten

Camouflage



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OVERVIEW

The students will create 3-D insect models to blend into the garden habitat.

OBJECTIVES

- Students will observe and describe insects' camouflage techniques in their different habitats.
- Students will be able to create an insect that will be protected by their color or shape in their natural environment.
- Each student will write a description of an insect's camouflage and explain how size, shape, and color help insects survive.

STANDARDS

Nevada State Standards

(2)1.1-(2)1.4 Scientific Inquiry Science Inquiry

(2)1.5-(2)1.9 Science Technology, and Society

(2)4.4 , (2)4.8 Life Science

Next Generation Standards:

K-2-ETS1-2 The shape and stability of structures of natural and designed objects are related to their functions.

TEACHER INFORMATION

Color is important in the insect world. To insects, color can be a matter of life and death. There are three basic ways that insects use color to stay alive: as camouflage; as a warning to predators; and to imitate other insects (called mimicry).

Many insects have both shape and color adaptations that allow them to blend into their surroundings or habitat. Others use color as a warning. In the insect world, the colors black and yellow or black and orange send a warning message to predators. The warning is that the insect tastes bad, or that it can bite or sting or that is poisonous. Some insects use color to mimic other insects. Some harmless insects are thus able to escape predators because they look or act like insects that are poisonous.

TIME

45-60 minute session

QUESTION

- Is anyone wearing clothing that would make them blend into the environment?
- Is anyone wearing clothes that would make them stand out?
- What types of environments do insects live in?
- What colors would help them hide in their environments?
- What colors would help them stand out in their environments?

MATERIALS

- Modeling clay
- Straws
- Cardboard
- Pipe cleaners
- Craft sticks (aka popsicle sticks)
- Insect resources
- Science Notebooks

PROCEDURES

1. As a class, study information about insect camouflage

2. Look closely at the way insects blend in with their habitats.

3. Look at a variety of insect habitats in the classroom and out in the garden. Some disguises are so detailed that the only way to detect whether there is an insect is by their movement.

4. Discuss each insect in its habitat as you look through resources.

5. Have students choose an insect to create that uses camouflage to avoid its predators. Explain that each student is to create a clay model of the insect they chose.

6. Have students' research actual insects and create lifelike models. They can use any of the craft materials supplied.

7. Make sure to review insect characteristics and body parts to insure that students accurately create their model. Encourage creativity and attention to detail.

8. When students have completed their insects, take them out to the garden to test out their camouflage in the garden. Each student should select an area where his or her insect would best survive.

9. Assign groups of hunters to look for insects.

10. Have students carefully gather the student-designed insects as they find them and come back to a designated spot in the garden. Give groups 5-10 minutes to search for hidden insects.

11. After the search, ask the insect creators if all insects have been found.

12. Ask the creators of any undiscovered insects to point out where they are hidden. Keep the hard-to-find insects separate from the others.

Closing Questions:

- Why were some insects easy to find?
- Why were some more difficult to find?
- If you had been a predator looking for food, which insects would have survived?
- Do you think color or shape helped them to survive?

ASSESSMENT

Evaluate the students' models for creativity and accuracy. Have each student write an explanation of his or her insect's adaptations. Ask each student to identify the parts of the insect that help it to blend in with its habitat. Make sure students discuss size, shape, and color when writing about their insects' adaptations.

ADAPTATIONS

Create a "Bug Museum" in class to showcase creations in their habitats. Challenge students to create dioramas that show their insects in their natural habitats.

DIGGING DEEPER

- How do some insects mimic others?
- Do all insects have some sort of camouflage they use?
- What is the most common way insects use camouflage?
- How does the Praying Mantis change colors?

DID YOU KNOW?

- When viewed from the side, caterpillars appear flat instead of round.
- Predators are also looking for the shadows of their prey.
- Some insects mimic the look of dead leaves in order to camouflage themselves.

NUTRITION FACTS

- Even with using crop protection products and natural pest control measures, 20-40% of potential food production is still lost every year to pests.