

ACR Bouverie Preserve - Independent Learning Center Lesson (updated July 2017)

Objective: To provide a hands-on experience that develops the skills of observation, comparison and communication through self-directed investigation.

Kit contents: A Lesson Plan, a Teacher Directions card (this is an abbreviated lesson plan that a teacher can quickly refer to), copies of the Clues and Questions Information sheet (give one copy to the teacher), 7 Clue and Question tent cards, 8 magnifying glasses, specimens in baggies and plastic boxes which include: 3 cones, 3 feathers, a collection of insects/spiders/scorpions, an oak gall, a cross-section of a tree trunk, 3 rocks and lichen on a twig.

Kit set-up: Set out the Clue and Question tent cards, leaving space between each one, and place the specimens in front of their relevant card, along with a magnifying glass.

OPTION: You may choose to have students write down their responses to the questions. If that's the case make sure they have a blank piece of paper (from the classroom) and have them bring a pencil to the table.

Introduction/Observation

Say: *“Today you’re going to be science detectives! Scientists and detectives really examine things they’re not sure about or perhaps have never seen before. Today you’ll be using magnifying glasses so you can see the smallest details.”*

“On the table are 7 items that can be found at the Bouverie Preserve. There is a clue and question for each item for you to think about. It doesn’t matter where you start. Just spread out and make sure you rotate around the table until you’ve had a chance to see each item. Don’t forget to use the magnifying glasses to look closely at the specimens.”

OPTION: You may choose to have the students work in pairs.

Group Discussion

This is an opportunity for students to share what they’ve observed. Make sure to leave time (at least 5 minutes) at the end. It’s okay if they haven’t been able to look at all 7 items.

Ask: *“Who would like to share something about the cones?”* Continue until the students have responded to as many questions as time allows. Refer to the Clues and Questions Information sheet for more background information (in italic) about each item, if needed.

Here are more prompts that provide another approach to the discussion:

Ask: *“What did you see today that you’d like to learn more about? What’s something that surprised you? What’s something new that you learned?”*

If you run out of time remind them that they can save any questions for their docent on the day of the field trip.

OPTION: Discussion can be led by the teacher later in the day with the whole class. Make sure the teacher is left with a copy of the Clues and Questions Information sheet.

Clues and Questions Information

(Additional background information for docents and teachers is provided in italic)

1. CONES

CLUE: A cone is a hard, dry fruit of an evergreen tree that contains seeds.

QUESTION: How are these cones different? How are they alike?

Douglas fir - Unlike other fir trees, the cones hang down rather than standing up on the branch and they drop to the ground intact. When you see these unique cones on the ground, you know that a Douglas Fir is nearby. Redwood - A coast redwood tree cone is one of the smallest cones, from the tallest tree. You can see how the scales are fused together, creating a spiral pattern in the cone. Knobcone Pine - These cones are sealed with a hard resin that requires fire to open them. An unburned cone can remain closed for up to 50 years, even after its host trees has died.

2. FEATHERS

CLUE: Birds have different kinds of feathers that have different uses.

QUESTION: Look closely at these 3 very different feathers. Which feather would be used for flying? Warmth? Color?

Birds have small feathers called down which are small, soft and keep them warm and give them shape. Some feathers provide color. Males use their colorful feathers to attract females. The wing feather here is long, stiff and straight.

3. INSECTS

CLUE: Insects have 6 legs.

QUESTION: Take a good look at these creatures. Which ones are insects?

There are more than a million types of insects in the world. There are more kinds of insects than all the other kinds of animals put together. Insects are divided into groups. The most common groups are beetles, butterflies and moths, ants, bees, wasps and flies.

4. OAK GALL

CLUE: Oak galls are caused by wasps that lay their eggs on oak leaves. The leaf reacts by forming the gall around the egg to protect it. Wasps grow inside and eventually tunnel their way out.

QUESTION: Can you find where the wasp came out?

Oak galls are caused by chemicals injected by the larva of certain kinds of gall wasps. The adult female wasp lays single eggs in developing leaf buds. The wasp larvae feed on the gall tissue resulting from their secretions. Small galls only have one larva, but larger galls may contain as many as 30.

5. TREE RINGS

CLUE: Each ring shows one year of growth of the tree.

QUESTION: How old was this tree?

Every growth season a tree adds a new layer of wood to its trunk. Each ring has two parts – a wide, light part and a narrow, dark part. Wide rings indicate good conditions for growth - plenty of nutrients, water and sunshine. Narrow rings often indicate less favorable conditions -drought, cold, insect damage, disease, competition and lack of nutrients.

6. LICHEN

CLUE: Lichen is made up of two tiny living things: a fungus and an alga. Lichen comes in many different shapes and colors and can be found on rocks and trees.

QUESTION: How many different kinds do you see on this twig?

The alga produces food, and the fungus gathers water. This type of relationship is called symbiosis. Lichen may be gray-green, orange and brown. It can be fuzzy, flat, lacey and crusty. Some lichen looks leafy and hang down in strands. It grows on stones, tree trunks and dead wood. There are approximately 15,000 different species. Lace Lichen is the name of California's state lichen and can be found at Bouverie.

7. ROCKS

CLUE: The shape and color rocks are different depending on how they were formed and where they were found.

QUESTION: How are these rocks different? How are they alike?

The volcanic rocks had air/gasses trapped in them when they were formed. As the rock cooled the gasses escaped, leaving the holes now visible. The black rock is obsidian. It was formed by molten lava that cooled so rapidly that crystals didn't get a chance to form. Obsidian is a volcanic glass with a smooth and uniform structure. The round rocks are from the creek where, over time flowing water made them smoother.