Garden Lesson G6-12

Flower Discovery

Communication

Students collaborate in pairs to chose flowers from the garden, then draw and write about them. They discuss each other's work, share inferences about the functions of observed structures in the flowers and ask questions of each other and the larger group.

Sustainability

The garden classroom is a unique habitat within a city: an ecosystem for pollinators and plant diversity that provides the opportunity for students to tap into their inherent curiosity about the natural world.

Nourishment

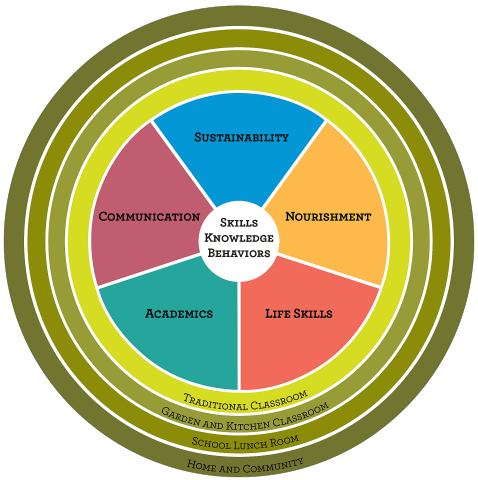
Students have the opportunity to sample oxalis and taste nectar from flowers in the garden.

Life Skills

Students practice drawing what they see, sharpen their skills of observation and notice and appreciate beauty around them.

Academics

This lesson fulfills Next Generation Science Standards for structure and function; Common Core Standards for integrating information presented in different media; following a multistep procedure; collaborative discussion; interpreting information; speaking and listening; language; and acquiring words and phrases.



Garden Lesson #12
Grade 6 Spring Rotation
G6-12

Flower Discovery Abstract

Summary

In this 6th grade science lesson, students take on the roles of young scientists as they explore and study flowers. They learn about and practice scientific drawing, label and explain flowers' reproductive **structures**, ask questions, share ideas and discuss their findings.

Objectives

After this lesson, students will be able to:

- Name the **structures** of a flower
- Draw what they see
- Make an **inference** of the **function** of flower **structures**

Assessments

During this lesson, students will:

- Describe and name flower **structures**
- Explore flowers in the garden, create a scientific drawing and label the parts of a flower using a key
- Share their **inferences** in pairs, small groups and the entire class

Communication is strengthened by group discussion, collaboration with a partner, drawing and writing about students' own observations. ***Sustainability*** is highlighted by the unique ecosystem and habitat offered by the garden classroom. ***Nourishment*** is offered by opportunities to snack on oxalis flowers and taste nectar from other flowers in the garden. ***Life Skills*** are sharpened as students draw what they observe, and notice and appreciate beauty around them.

Academics fulfill Next Generation Science Standards for **structure** and **function**; Common Core State Standards for integrating information presented in different media; following a multistep procedure; collaborative discussion; interpreting information; speaking and listening; language; and acquiring words and phrases See **Connections to *Academic* Standards** below for details.

Edible Schoolyard curriculum emphasizes developing community and personal stewardship, along with skills that will help students navigate different situations throughout their lives; beginning to use **scientific measuring tools**; and using **observation and awareness**.

This lesson follows the BEETLES Project's *Learning Cycle* (Invitation-> Exploration -> Concept Invention -> Application -> Reflection) and uses their *Discussion Routines* (Think-Pair-Share, Whip-Around). All are highlighted in *Green** with an asterisk for easy identification. See the documents BEETLES_Discussion_Routines.pdf and BEETLES_Learning_Cycle.pdf included in **Resources** below for more information. Games and activities from other sources are also identified in *Green*, without an asterisk.

Connections to *Academic* Standards
Next Generation Science Standards, Middle School
Disciplinary Core Ideas:

- LS1.A: Structure and Function
  - In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.
  - Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

Crosscutting Concepts:

- Structure and Function
  - The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)
  - Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.
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Science and Engineering Practices:

- MS-ESS3 Earth and Human Activity, Science and Engineering Practices, Asking Questions and Defining Problems: Asking questions and defining problems in grades 6–8 builds on grades K–5 experiences and progresses to specifying relationships between variables, clarify arguments and models.
    - Ask questions to identify and clarify evidence of an argument. (MS-ESS3–5)

Common Core State Standards, English Language Arts and Literacy, Grade 6

- RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
- RST.6.3 Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.
- SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on *grade 6 topics, texts, and issues,* building on others' ideas and expressing their own clearly.
    - SL.6.1.b Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed.
    - SL.6.1.c Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion.
    - SL.6.1.d Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.
- SL.6.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.
- SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.
- SL.6.6 Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate. (See grade 6 Language standards 1 and 3 on page 53 for specific expectations.)
- L.6.1 Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.
    - L.6.1.a Ensure that pronouns are in the proper case (subjective, objective, possessive).
    - L.6.1.b Use all pronouns, including intensive pronouns (e.g., *myself, ourselves*) correctly.
    - L.6.1.c Recognize and correct inappropriate shifts in pronoun number and person.
    - L.6.1.d Recognize and correct vague pronouns (i.e., ones with unclear or ambiguous antecedents).
- L.6.3 Use knowledge of language and its conventions when writing, speaking, reading, or listening.
    - L.6.3.a Vary sentence patterns for meaning, reader/ listener interest, and style.
    - L.6.3.b Maintain consistency in style and tone.

- L.6.6 Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Connections to *Edible Schoolyard* Standards
Edible Schoolyard 3.0
In the Edible Schoolyard Program

- 1.0 Students work with each other and teachers to develop community and personal stewardship, along with skills that will help them navigate different situations throughout their lives.
- 1.1.1 – 1.3.12 This lesson fulfills all Edible Schoolyard Program standards, numbers 1.1.1 through 1.3.12. See ***The Edible Schoolyard Berkeley Standards*** for details.

In the Garden Classroom, Grade 6

- Tools 1.2 Identify, begin to use and care for **scientific measuring tools** in the garden.
- Concepts 3.7 Use **observation and awareness** to explore, investigate and be inquisitive learners in the garden. The garden classroom provides the opportunity for students to tap into their inherent curiosity about the natural world, observe patterns and connections and understand cause and effect.

Garden Lesson #12
Grade 6 Spring Rotation
G6-12

Flower Discovery Lesson

Materials

- Structure and Functions Visual Aid
- G6-12 Flower Discovery Key
- G6-12 Student Cross-Pollinating questions
- G6-12 Small Circle *Think-Pair-Share** questions
- Hand Lenses
- Pencils
- Clipboards
- Blank paper
- Fresh flowers growing in the garden for drawing

Before You Begin

- Create the Structure and Functions Visual Aid
- Copy the Flower Discovery Key and put out with clipboards and blank paper for each student
- Copy G6-12 Student Cross-Pollinating questions for each adult leading a group
- Copy G6-12 Small Circle *Think-Pair-Share** questions for each adult leading a group
- Sharpen pencils
- Ensure there are enough flowering plants in the garden

Timeline Overview

Total Duration: 90 minutes

1. *Invitation** (10 minutes)
2. *Exploration** (15 minutes)
3. *Exploration** (10 minutes)
4. *Concept Invention** (35 minutes)
5. *Application** (10 minutes)
6. *Reflection** (10 minutes)

Procedures

At the Opening Circle

1. *Invitation**: (10 minutes)
   Welcome students and introduce this Flower Discovery lesson as an opportunity for them to learn how flowering plants reproduce by studying real flowers.
   - **a.** Explain that today they will spend the entire class on a guided exploration of flowers, primarily looking at their **structures** and **functions**.
   - **b.** Ask students if they know what the words **structure** and **function** mean?
   - **c.** Have students share responses and then introduce the Visual Aid.
     - **i.** Have a different student volunteer read each definition.
   - **d.** Divide students into groups and send each group out to a different part of the garden with an adult to lead them.

In the Field (60 minutes total)

2. *Exploration**: (15 minutes)
   Introduce studying flowers scientifically.
   - **a.** Explain that their focus of study will be flowers in the garden.
     - **i.** *We're going to explore and study flowers like scientists do.*
     - **ii.** *To think like scientists, we need to know some background information about this ecosystem before we begin.*
   - **b.** Orient students to this unique garden ecosystem using *Think-Pair-Share** or *Walk & Talk** with general questions, some specific to the ecosystem and a review of what **structures** and **functions** are.
     - **i.** *What is a **structure**?*
     - **ii.** *What is a **function**?*

3. *Exploration**: (10 minutes)
   Students look at different flowers and select one to draw.
   - **a.** Divide students into pairs.
   - **b.** Introduce sketching and recording information as a scientific tool and explain that looking at **structures** and how they **function** is something scientists do.
     - **i.** *In pairs, you'll have 5 minutes to explore this area and observe as many flowers as you can.*
       1) *We will not be picking the flowers, but studying the appearance of their **structures** instead.*

2) *The goal during exploration time is to be gentle with these plants and to explore as many different kinds as possible, then choose a favorite.*
3) *Choose your favorite flower as a team of two.*

ii. Explain that each person will then make their own scientific drawing of the flower, recording as many observations and questions as possible, like a scientist.

1) *You will have about 15 minutes to study the flower, draw and take notes.*
2) *In this type of drawing noticing things accurately and writing them down is more important than making a pretty picture.*
3) *Sometimes a drawing will help show what you noticed, sometimes words will communicate it better. Use both in your study.*

iii. Invite students to grab a clipboard, pencil and blank paper now or in 5 minutes, after their exploration.

c. Give out hand lenses.

d. Facilitate student exploration by circulating and offering ideas when needed, allow students five minutes to explore.

4. ***Concept Invention****: (35 minutes)

Students draw flowers and discuss their findings.

a. After 5 minutes of exploration, inform students it is time to choose their flowers and begin drawing.

b. Remind students that each pair chooses one flower to focus on.

i. Make sure each student has a clipboard, pencil and blank paper.

ii. Each student records observations by writing and drawing.

iii. Give them about 15 minutes to write and draw.

iv. While they are drawing, assign each half of a student pair to a different group for ***The Swap***; one will be *Student A*, the other *Student B*.

c. Call students back to explain how ***The Swap*** will work.

i. The *A* team stays with their flower to share findings, while the *B* team circulates among *A* students, like a pollinator.

ii. Let the student scientists know they'll be discussing their discoveries and questions, not just lecturing each other on what they found.

iii. Post the G6-12 Cross-Pollinating questions and read them aloud to help students dive deeper into discovering each other's flowers.

1) Person A will share observations, questions and ideas from their investigation and then ask the B person what they think.

a) *Do you think I have all the **structures** I could draw on my scientific drawing? If not, what more could I add?*

b) *Did anything about my flower remind you of your flower?*

2) Person B asks clarifying questions to the person with flowers (person A).

a) *Does your flower have_____? (name a **structure: sepals, petals, stamen, pistil**)*

b) *How is it represented in your drawing?*

c) *What did you notice about this **structure**? What to you think the **function** is?*

d) *What do you wonder about your flower?*

3) Begin *The Swap* with *B* students circulating and instructors participating.

a. After 5 minutes, call for the group's attention and ask pairs to switch roles.

i. This time *B* group members stay with their flower while *A* members circulate.

2. *Application**: (10 minutes)

Students discuss the **structures** or **functions** they noticed.

a. Bring students back together as a group and have them break into pairs.

b. Ask them to use the *Think-Pair-Share** process using the Small Circle TPS questions.

i. *What do you notice about the flowers in the garden?*

ii. *What are some plant **structures** that help them survive here?*

iii. To use *Think-Pair-Share**:

1) Think - Give students an interesting broad question to think or write about briefly.

2) Pair - Pair students, and ask them to discuss the question(s) with their partner.

3) Share - Students share their discussion ideas with another pair of students or the instructor leads a whole group discussion about the topic.

c. Have students circle up and discuss their findings as a group.

At the Closing Circle (10 minutes)

3. *Reflection**:

a. Have students share observations, questions and **inferences** about the **structures** they observed and **functions** they inferred.

b. Collect worksheets and drawings from students and hand them in to their classroom teacher.

Vocabulary

Structure
Function
Inference
Petal
Pistil
Stamen
Sepal

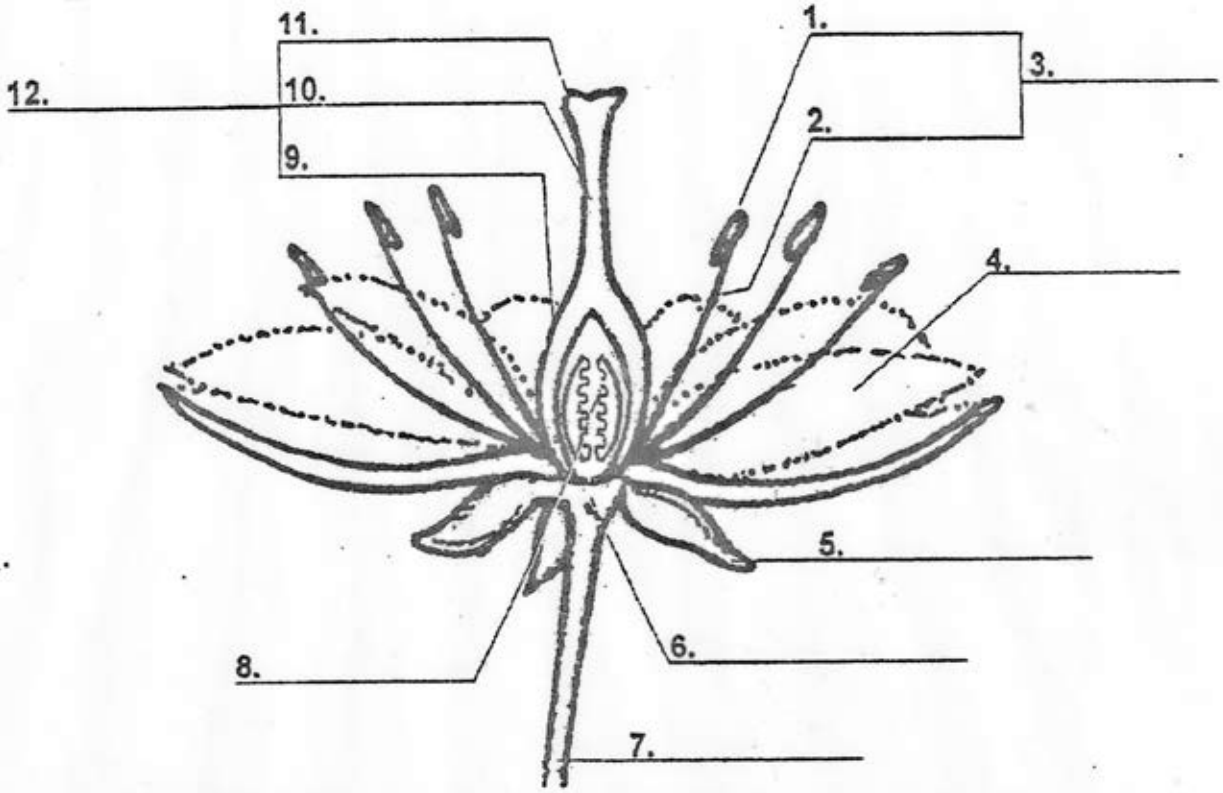
Contributors
All lessons at the Edible Schoolyard Berkeley are developed in collaboration with the teachers and staff of the Edible Schoolyard and Martin Luther King Jr. Middle School.

Resources
G6-12_Flower_Discovery_Key.pdf
G6-12_Student_Cross-Pollinating.pdf
G6-12_Small_Circle_TPS.pdf
BEETLES_Learing_Cycle.pdf (See lesson G6-0)
BEETLES_Discussion_Routines.pdf (See lesson G6-1)

FLOWER ANATOMY SHEET

Using the following words, label the structures (parts) of the flower.

stigma	petal	ovule
anther	style	pistil
filament	receptacle	stamen
pedicel	ovary	sepal



Using the definitions below, label the structures of the flower with the letter matching their function.

A. Specially colored to attract potential pollinators
B. thick and waxy modified leaves which act as protection for the developing flower
C. female organ of a flower
D. sticky surface at the top of the pistil; it traps and holds pollen
E. tube-like structure that holds up the stigma
F. when fertilized becomes a seed
G. when fertilized becomes the fruit
H. the pollen-bearing part of the stamen
I. the stalk that holds the anther
J. male organ of a flower
K. part of the stem from where flower organs grow
L. the stalk bearing a flower

Person with the flower shares their observations, questions, and ideas and asks the visiting person:

- *"Do you think I have all the structures I could draw on my scientific drawing? If not, what more could I add?"*
- *"Did anything about my flower remind you of your flower?"*

Visiting person asks clarifying questions to the person with flowers:

- *"Does your flower have_____?" (name a structure: sepals, petals, stamen, pistil)*
- *"How is it represented in your drawing?"*
- *"What did you notice about this structure? What do you think the function is?"*
- *"What do you wonder about your flower?"*

What do you notice about the flowers in the garden?

What are some plant structures that help them survive here?