

Bio/Diversity Project
Lesson Title: Basic Plant Anatomy/Morphology and Classification

Teacher: Gricelda Meraz
Grade Level: *6th*
Time: *80 minutes*

AZ State Science Standard:	<p><i>6.L2U1.13</i></p> <ul style="list-style-type: none"> • <i>Develop and use models to demonstrate the interdependence of organisms and their environment including biotic and abiotic factors</i>
Content Objective: Math, Reading, Science, Writing, Other:	<ul style="list-style-type: none"> • <i>Students will learn the defining characteristics of plants</i> • <i>Students will be able to explain how pollination impacts plants.</i> • <i>Students will use teamwork and problem solving to complete activities.</i>
Language Objective: (Optional)	N/A
Scientist of the Week:	<ul style="list-style-type: none"> • <i>Gloria Degrandi-Hoffman</i> • <i>Research Leader of the USDA's Carl Hayden Bee Research Center (CHBRC) in Tucson, AZ</i> • <i>They conduct research to optimize the health of honey bee colonies, through improved nutrition and control of Varroa mites in order to maximize production of honey bee pollinated crops.</i>

Vocabulary		Materials		
Provide a bulleted, alphabetized list of words that students will hear, speak, write, and/or read about in the lesson. These words are integral to developing content understanding: <ul style="list-style-type: none"> • Anther • Filament • Stamen • Style • Ovary 		Provide a bulleted list of relevant materials for the lesson. <ul style="list-style-type: none"> • Donuts (powdered and plain) • Napkins • Plates • Pressed flowers • Handouts • Gallery walk Pictures 		
Seasonality: No specific seasonality required				
<i>Monsoons</i> July-Sept.	<i>Autumn</i> Oct.-Nov.	<i>Winter</i> Dec.- Feb.	<i>Spring</i> Mar.-Apr.	<i>Dry Summer</i> May-June
Guiding Questions:				
<ul style="list-style-type: none"> • How does variation among individuals in a population affect overall survival? 				



- How do the physical structures and functions of plants and pollinators allow them to meet their needs?

Engagement/Introductory Activity:

This is what you will do to get the students engaged in and excited about the topic of the lesson! It should also provide an opportunity for you to get an idea of what they do (and do not) already know, and the assumptions that they have going into the lesson.

- Show video of a bacteria reproducing. Have students describe what they notice and jot down differences between how the bacteria reproduce and how people reproduce.
<https://www.youtube.com/watch?v=DY9DNWcqxI4> (start playing at 40s).
 - The bacteria in the video are reproducing asexually (1 parent, offspring are identical to parent), while people reproduce sexually (2 parents, offspring are genetically different from parent). Are plants more similar to bacteria or people in how they reproduce?

Exploratory Activity:

Provide step-by-step instructions on what the students will do to in this activity to gain new skills and/or knowledge. Attach worksheets, PowerPoints, video links, or other material used to this section, or reference it here and then attach it to the lesson plan when you have completed it.

- What do you already know about how plants reproduce?
- The first crucial step for most plant reproduction is pollination.
 - Have students do the Donut Pollination activity.

Explain:

What questions or prompts will you use to get students to explain their observations or to explain what the outcomes of the activity that they participated in were? This should provide an opportunity for students to communicate their new understandings, as well as to articulate what they still do not understand.

- After bees and insects inadvertently pick up pollen, when they fly to a different flower, what happens?
 - Show students a diagram of plant reproductive anatomy. Which parts do you think are male? Which parts do you think are female? Have students label their own diagrams.
 - Show students Flowering Plant Life Cycle Diagram
- Show pollination between 2 flowers: take the pollen from the anther of one flower and put it on the stigma of another flower.
 - How do you think the sperm in the pollen can fertilize the egg, which is contained in the ovule?
 - ❖ When the pollen, which contains the male gametes (sperm) lands on the stigma, it travels down the pollen tube down to the ovule, where it fertilizes the female gametes (eggs). The fertilized egg(s) now becomes the seed(s) and the ovaries become the fruit—the eshy meat protects the developing seeds! Dissect the ower and show students the path the pollen takes. Have students trace the path of the pollen and label where fertilization happens on their diagrams.
 - ❖ **Optional: Have your students dissect flowers of their own!**

Extension Activity/Questions:

This section provides an opportunity for students to connect the knowledge that they have gained to other contexts – can they take what they learned and logically expand upon it, or apply it to alternate situations? Provide one or two additional ideas for activities that students can use to expand upon the new knowledge that they have gained.

- How do pollinators know which flowers to go to? What strategies do flowers have to attract the most pollinators?
 - Flowers can be particular colors or give off particular scents to attract pollinators, or grow in a shape that fits with the pollinator (i.e. hibiscus and hummingbird)
 - Students will participate in the Plant-Pollinator Stories gallery walk, filling out the template in their notebook as they go.

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Planta	Polinizador	¿Qué hace la planta para asegurarse de que su polinizador la poliniza (forma, color, olor u otra cosa)?	¿Cómo se ha adaptado el polinizador para asegurarse de que recibe suficiente néctar (es decir, visita las flores en un momento exacto, tiene una parte del cuerpo que tiene una forma particular)?

- Which plant-pollinator relationships do you think is most interesting? Why?

Evaluation Activity:

How will you evaluate whether or not the students have achieved the learning objective(s) of the lesson?

- How does pollination work? What happens after pollination?
- How does the pollinator benefit by pollination? How does the plant benefit?
- Students will complete this as an exit ticket in their notebook

Adapted From:

http://www.garfieldconservatory.org/staging/wp-content/uploads/2018/02/R_SCHOOLS18_Pollination_LessonPlan.pdf

Nombre:

Fecha:

Lab Activity:

Polinización de donuts

En esta actividad, serás un polinizador. ¡En lugar de polinizar flores, polinizarás donuts!

Materials:

- 1 donut en polvo
- 2 platos (1 para cada donut)
- 1 donut simple

Direcciones:

Paso 1: asegúrese de tener una dona en polvo y una dona simple frente a usted.

Paso 2: pon las manos detrás de la espalda.

Paso 3: ¡Muerde tu donut en polvo sin usar tus manos!

Paso 4: sin limpiarte la boca, dale un mordisco a tu dona simple ... ¡todavía no uses tus manos!

Paso 5: ¡Mira tu donut simple! ¿Que pasó?

Preguntas:

1. ¿Qué observas sobre tu donut simple?

2. Comparemos este ejercicio con la forma en que funciona la polinización real con insectos y aves. ¡Dibuja líneas para que coincida lo que sucede en la polinización real con lo que sucedió en esta actividad de donas!

- | | |
|-------------------------------------------------------|----------------------------------------|
| a. Pollen | e. ¡Tú! |
| b. Polinizador | f. La dona en polvo |
| c. La primera flor visitada por el polinizador | g. La simple dona |
| d. La segunda flor visitada por el polinizador | h. El polvo de la dona en polvo |

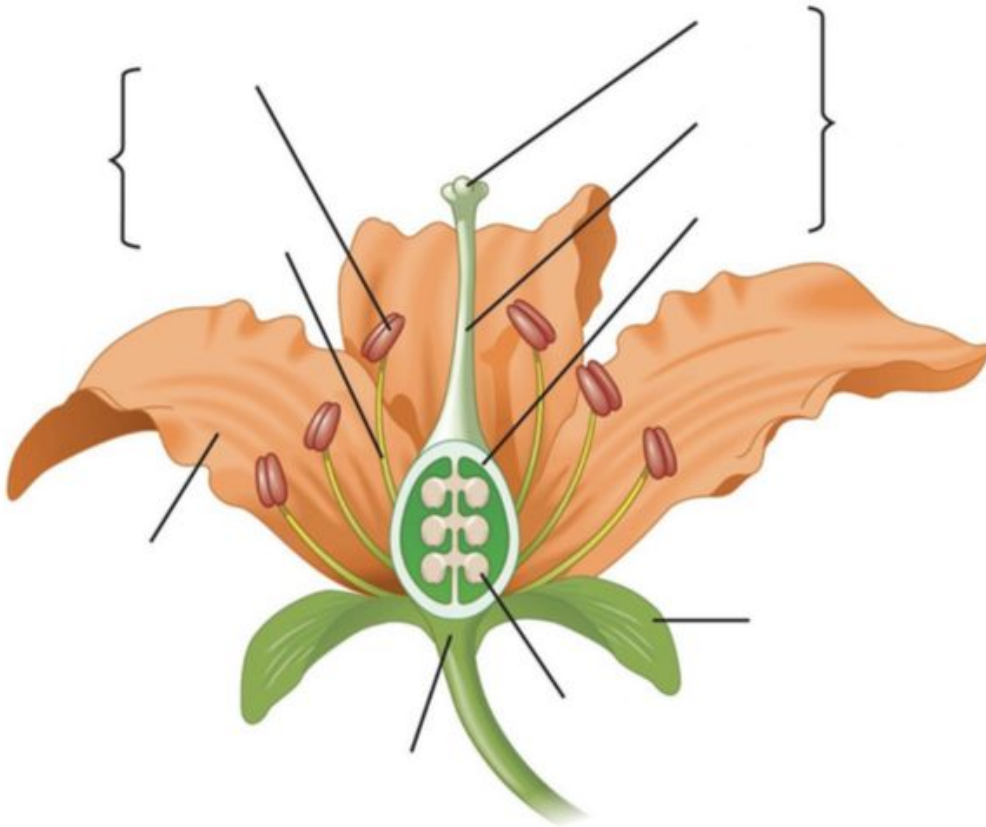
3. ¿Por qué los polinizadores visitan a los propietarios? (Sugerencia: ¡no es para que puedan recoger el polen para extenderse a otras flores!)

Nombre: _____

Fecha: _____

Partes de una flor

¡Etiqueta el diagrama a continuación y luego escribe lo que sucede en cada parte de la planta!



- Estambe: _____
- Anthera: _____
- Filamento: _____
- Carpelo: _____
- Estigma: _____
- Estilo (Tubo de polen): _____
- Ovario: _____
- Ovulos: _____
- Petalo: _____
- Sepalo: _____
- Receptacle: _____

Senna Covesii



Desert Senna is a sort of shrub like wildflower that can grow up to 2 feet tall, making it another good option as an understory plant in a native wildlife landscape or pollinator garden. It's a perennial, although it is short lived. Desert Senna as well as other native sennas are a favorite food plant of the Cloudless Sulpher (*Phoebis sennae*) and the young caterpillars can often be seen eating the leaves. The Desert Senna flowers also provide pollen for bees and nectar for butterflies. These plants all have anthers that release their pollen only through small pores at the anther tips. Certain native bees such as Carpenter bees, *Anthophora* Digger bees and others turn themselves into tuning forks and sonicate the pollen from these flowers.

Aloysia gratissima



Beebrush is seriously tough shrub that can handle some of the toughest environmental conditions. A medium to large shrub, it's vanilla scented white flowers attract many pollinators and it's dense foliage creates shelter for small birds and lizards.

Rosary Babybonnets



This plant greets the spring with a profusion of red and white pea shaped blooms in March and April. Carpenter and bumble bees love to visit these blooms while cardinals and pyrrhuloxia love to perch on the tall branches. While not common in landscapes around town, this plant is becoming more and more popular and can usually be found at most native plant nurseries. This plant can grow up to 20 feet tall.

Velvetpod Mimosa



A favorite of butterflies, Velvetpod Mimosa is the perfect shrub to add a splash of color to any backyard garden, however you'll want to be mindful of where you place this shrub because some varieties come armed with cat claw like thorns. Velvetpod Mimosa doesn't just attract pollinators, it's also a favorite of birds including quail, who enjoy feeding on the seed.

Passionflower Vine



Passionflower are some of the most interesting plants around. Some varieties are carnivorous while others smell strongly of mothballs. There are many passion flower varieties available to the home gardener, and all are larval host plants to various fritillary butterflies. Plants can be stripped entirely over the course of a season and still come back strong next year.