ECO-SCHOOLS USA
NATIONAL WILDLIFE FEDERATION
FOUNDATION FOR ENVIRONMENTAL EDUCATION

The Monarch Mission

Empowering Students to Improve Habitat for Monarchs

A SCIENCE TEKS-ALIGNED AND ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS) CURRICULUM FOR GRADES PK-5

La Misión Monarca

Capacitar a los estudiantes para mejorar el hábitat de las mariposas monarca

PROGRAMA CURRICULAR DISEÑADO CON BASE A ELPS Y SCIENCE TEKS, PARA LOS GRADOS DE PREESCOLAR A QUINTO GRADO

Green STEM
Eco-Schools USA
NATIONAL WILDLIFE FEDERATION

LEGO Community Fund U.S.

The English Language Proficiency Standards (ELPS) are part of the state-required curriculum, the Texas Essential Knowledge and Skills (TEKS) for K-12.

Las Normas de Capacidad de Hablar el Idioma Inglés (ELPS por sus siglas en Inglés) son parte de los requisitos curriculares del Estado, conocidos como Conocimiento y Habilidades Esenciales en Texas (TEKS por sus siglas en Inglés) para los grados de Kindergarten a Grado 12.

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A TEKS-aligned curriculum for Grades PK-5

National Wildlife Federation

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The Monarch Mission

The mission of the National Wildlife Federation is to inspire Americans to protect wildlife and natural resources for our children's future. The National Wildlife Federation has been a leader in developing high quality educational programs focused on the observation and study of nature, Earth systems and wildlife to advance science learning for nearly 50 years. Combined, our PK-12 programs now reach 15,000 schools, approximately 7.5 million students and thousands of educators every year. For more about the National Wildlife Federation visit, www.nwf.org.

The LEGO Community Fund U.S. (LCFUS) mission is to inspire and develop builders of tomorrow to reach their potential by support programs benefitting children 0-14, primarily in the areas of learning, creativity or creative problem solving. We will support programs in the U.S. communities where the LEGO Group operates, and will give preferences to programs benefitting disadvantaged children.

Contact us with questions at ecoschoolsus@nwf.org

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ROBERTO CARLOS ROMAN | UNSPLASH

Introduction

For many of us, one of our fondest memories of elementary school is observing monarch butterflies in the classroom and learning about metamorphosis as these remarkable creatures transformed from caterpillars to butterflies right in front of our eyes. As educators, many of you have probably used the monarch butterfly to teach about life cycles and migration. But this iconic species is in trouble and like many of our pollinator species is in decline.

These brilliant orange and black butterflies are among the most easily recognizable of the butterfly species. Their migration takes them as far north as Canada and, during the winter months, as far south as Mexico City. A single monarch can travel hundreds to thousands of miles. Monarchs are truly spectacular migrants, because the butterflies know the correct direction to migrate even though they have never made the journey before.

They follow an internal "compass" that points them in the right direction each spring and fall. The monarch migration is one of the greatest natural phenomena in one of the greatest natural phenomena in the insect world.

But it is this migration and the habitat the monarch depends upon during this journey that has resulted in the species decline. It was in 2014, when biologists and the US Fish and Wildlife Service became concerned about the monarch butterfly's population numbers. According to scientists, the continent's monarch population has declined by more than 80 percent from its average during the past two decades—and by more than 90 percent from its peak of nearly one billion butterflies in the mid-1990s.

WHY IS THE MONARCH BUTTERFLY IN DECLINE?

In the last 30 years, the migratory monarch butterfly population has drastically declined. Thirty years ago, the yearly count of the migratory monarch butterfly in their overwintering grounds (Mexico and California) were in the millions. By 2014, steep declines in the population of the eastern and western overwintering monarchs became a serious concern to scientists who raised their voices to request the protection of the species. In December of 2020, the U.S. Fish and Wildlife Service determined that the monarch indeed requires protection, but its formal listing under the Endangered Species Act is precluded due to other priorities. The U.S. Fish and Wildlife Service will review the monarch status yearly until a final decision is made. Unfortunately, the monarch numbers continue to decline, and during the winter of 2021, the western monarch population count was of 1,914 monarchs -over 99% decline.

The reason for the precipitous decline is due to habitat loss and fragmentation, use of pesticides, and climate change. The accelerated conversion of the U.S. native short and tall grass prairie habitat to crop production has had an adverse impact by limiting the availability of food sources (native nectar plants and native milkweeds - the sole host monarch plant). These native plants have also been eradicated and/or severely degraded in many areas across the U.S. due to the overuse of pesticides by commercial agriculture and conventional gardening practices in suburban and urban areas. Climate change has intensified weather events which also impacts the monarch populations during the breeding season, their migration, and overwintering time. To save this iconic species, we need all hands-on deck for a massive habitat restoration campaign to help create native, monarch-friendly habitat (with a diverse mix of native nectar and native milkweed plants).

WHAT IS THE NATIONAL WILDLIFE FEDERATION AND OUR PARTNERS DOING TO HELP?

The National Wildlife Federation (NWF) recognizes the increased need for native milkweed to restore monarch habitat across large landscapes, suburban and urban gardens. Because, the lack of native milkweed is a limiting factor for the monarch butterfly, localized efforts to increase the supply of native milkweed is critical. This is especially important in Texas where the butterflies make their first stop after overwintering in Mexico before starting the annual migration north. Without sufficient habitat and milkweed in this region, the migration of the monarch stops. On a national level, NWF and U.S. Fish and Wildlife Service and many other partners have joined forces to help protect the monarch by working to bring back native milkweed and nectar producing plants that the species rely upon for breeding and feeding along its migratory route.

NATIONAL WILDLIFE FEDERATION

HOW CAN SCHOOLS HELP MONARCH BUTTERFLIES?

As monarchs lose more and more habitat on agricultural lands, backyards have become increasingly important. As part of a larger effort to protect pollinators, NWF and the U.S. Fish and Wildlife Service recently signed an agreement, calling on citizens to help monarchs by cultivating milkweed and native nectar plants. With a long history of creating habitat for wildlife, National Wildlife Federation believes that individuals, schools and whole communities can play a key role in helping monarchs recover.

Studying pollinators and the monarch butterfly gives students the opportunity to become engaged in and empowered to help solve a current and tangible 'real-life' environmental problem. The monarch butterfly is a species that students can have a direct positive impact on; a species they see in their schoolyards, backyards and at their local parks. The study of the monarch butterfly also lends itself beautifully to project-based learning. Students learn the importance of pollinators, develop plans, and implement effective solutions—such as creating monarch gardens with native nectar and milkweed (host) plants—that can make a significant difference for the species.

DIANA MCMILLAN

HERE'S HOW YOUR SCHOOLS CAN PLAY A ROLE IN THIS NATIONWIDE MONARCH-RECOVERY EFFORT:

Create a NWF Schoolyard Habitat®.
Now with 9,600 participating schools, is the single largest school garden program in America. It supports school and educator efforts to develop wildlife and ecosystem education programs directly on the school grounds and provides children with opportunities to learn in outdoor classrooms. Schools can also participate in **NWF's Eco-schools USA program** and explore the Schoolyard Habitat pathway earning additional recognition and awards for your work. (www.eco-schoolsusa.org)

Plant milkweeds native to your region.
Because they coevolved with your region's wildlife, native milkweeds are best. Sources of native milkweeds include Monarch Watch's Milkweed Market and the Xerces Society's Milkweed Seed Finder.

Cultivate native nectar plants.
Nectar sources are especially important during spring and fall when monarchs migrate and need to fuel their flights, which can reach 3,000 miles during fall. Sources for native nectar plants include the Lady Bird Johnson Wildflower Center's Native Plant Database and regional planting guides published by the Pollinator Partnership.

Avoid pesticides use.
In particular, steer clear of systemic insecticides such as neonicotinoids. These are taken up by plants' vascular systems, leaving caterpillars and butterflies that feed on leaves, nectar and pollen exposed to the poison long after it has been applied. A new study provides evidence that milkweed leaves treated with one neonicotinoid, Imidacloprid, kill monarch caterpillars that eat them.

Get your students involved in community science (see Appendix A).
Biologists need volunteers to help study monarchs and students are great scientists. Programs such as Monarch Watch, the Monarch Larva Monitoring Project, and Journey North are great programs to involve your students in real science and support in helping monarchs.

ISABEL ORTIZ SOTO AT THE MANUEL RODRÍGUEZ VIZCARRA KINDERGARTEN IN MEXICO

About Monarch Mission

The lessons and activities that are part of The Monarch Mission, Empowering Students to Improve Monarch Habitat were created to complement your NWF Eco-Schools USA and Schoolyard Habitat® work and to accompany the construction of your school's Monarch Recovery Gardens and monarch observations. The curriculum is only one component to the overall experience. The Monarch Recovery Gardens project is not a short-term learning project. It is a long-term learning experience that will allow students to:

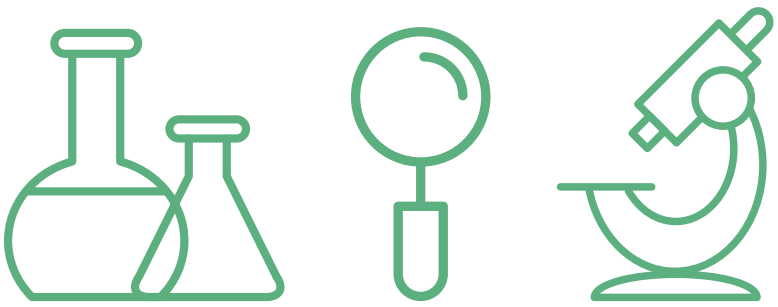
- Increase the available habitat needs of the monarch, subsequently leading to an increase in monarch numbers,
- Provide a variety of field experiences for students, allowing them to apply new learning and practice critical science, engineering and 21st century skills,
- Build awareness in the community about a national environmental issue, while providing local solutions that can help bring them together, resulting in positive impacts for pollinator species, specifically the monarch butterfly.

Each of the lessons and activities were designed starting with the Texas Essential Knowledge and Skills Standards (TEKS) for the following grade bands, PK-2, 3-5, 6-8 and 9-12.

Access additional grade bands at this link https://www.nwf.org/Eco-Schools-USA/Resources/Curriculum/Monarch-Mission

AS LESSONS AND ACTIVITIES WERE DEVELOPED FROM THE TEKS WE FOCUSED ON FOUR KEY COMPONENTS:

- **Project-Based Learning:** using Monarch Recovery Gardens as the focus for place- and project-based, learning experiences.
- **Green STEM:** Using the natural world as the lens in which to integrate:
  - Science content,
  - Technology via web-based applications and online digital publishing tools,
  - Engineering to create models, to demonstrate change over time and to solve design challenges to creating sustainable monarch habitat, and
  - Math to develop equations, measure plant growth, project progress, change over time and the rate of population growth/decline.
- **Interdisciplinary Instruction:** a scientifically literate student is able to communicate about topics in science and understand the historical value or nature of an issue and to use art to drive creativity and innovation.
- **Bilingual Strategies:** To support students in the native language with the purpose of facilitating the lessons for a full comprehension. The strategies presented in this curriculum are to promote vocabulary, language and comprehension according to the English Language Proficiency Standards (ELPS) and Science Texas Essential Knowledge and Skills (TEKS). The components are: cognates, sentence stems, graphic organizers, and diagrams.



SAM DESANTO

What is Community Science?

Community science is the inclusion of members of the general public in data collection for research. Community scientists make observations and record ecological and environmental data. Over the years, community science has also been known as civic science, volunteer monitoring, crowd-sourced science, public participation in scientific research, participatory action research, and citizen science.

DIVERSITY, EQUITY, AND INCLUSION

Volunteer activities that provide data for research has often been called “citizen science”. . However, the term “citizen” may imply, for some, that citizenship is required to become a citizen scientist, thus limiting its inclusiveness in science. The National Wildlife Federation’s commitment to diversity, equity, and inclusion (DEI) compels us to modify our language; as such, we now refer to this unique and valuable volunteer activity as “community science”, which is considered a more inclusive phrase. The National Wildlife Federation invites all community members interested in science and the natural environment—regardless of race, ethnicity, religion, or education—to volunteer in any of our conservation programs that require community scientists.

COMMUNITY SCIENCE AND MONARCH CONSERVATION

Monarch conservation and community science have a long history. Thanks to community science, the eastern monarch overwintering area was discovered in the mid 70's. Almost 20 years earlier, community science helped to start tracking the monarch migratory routes through the very first monarch tagging program, directed by Dr. Fred Urquhart. Public interest in volunteering for monarch-related data collection grew when the monarch populations drastically declined in the mid 90's. Now more than ever, it is imperative for all of us to understand the monarch's ecology, biology, and the factors that are threatening its survival. And thanks to community scientists, we have been able to start finding answers to these questions. Community science has also contributed to increase the quality and veracity of research data, and has helped collect data that, for a single research team of ten, might have taken years in the field.

GOALS AND OBJECTIVES IN THE CLASSROOM

The goal of community science in the classroom is to inspire all the students to learn about science and to experience the role of a scientist. Through discovering new things and increasing their own knowledge of the world, students will create a meaningful connection between scientific facts they learn in the classroom and the collection of data that support those facts. Student participation in community science is a powerful way for them to learn that their contributions to the ongoing monarch research are valuable, and that they can be future monarch scientists and monarch stewards.

Students will make use of a number of skills such as collecting and analyzing data, interpreting results, making new discoveries, and developing and solving complex problems. According to the National Science Foundation, the components of community science are knowledge, engagement, skills, attitudes, and behaviors. This elevates the science learning environment for students in the classroom.

VALIDITY AND SUCCESS

For elementary grade level students, the Journey North's Monarch Butterfly Migration Project is a great place to start. According to its creators, Journey North is "a global study of wildlife migration and seasonal change." Most students are familiar with this species, and it is easy to participate in the project. With the appropriate building blocks, even kindergartners can ask questions about data and data collection in space and time, a critical skill to develop a scientific frame of mind. Students can track the migration of the monarchs during the fall and the spring, as well as reporting monarch sightings during the non-migratory season –summer. By observing and collecting data, they learn about animal behavior and adaptations as well as the life cycle of the monarch butterfly, which are key topics in life science.

Students at a school in San Antonio, TX have emerged as community scientists. They decided to help the monarch butterfly population in its annual migration after participating in the Journey North Symbolic Migration. They learned about students, just like them, but in Mexico, that are also learning about the monarch butterfly and protecting its habitat.

With a new Monarch Heroes Schoolyard Habitat in place, students began to share their observations of adult monarchs, eggs, chrysalides and caterpillars on the Journey North website. They also began to collect data for iNaturalist, documenting monarchs and other wildlife that visited their school gardens and neighborhoods through their own collection project. They organized a bioblitz and with the help of their peers, parents, teachers, and community, students began to discover how building a habitat for the monarch butterfly also benefits many other wildlife species, too.

When the students heard that scientists are trying to understand more about the butterfly and its migration, they learned how to net monarch butterflies, tag them with a tiny sticker, and release them, so that scientists with Monarch Watch could see that the butterflies visited their school garden. The joy and wonder of this project have motivated the students to use the knowledge they have gained about the benefit of native milkweed and nectar plants to engage their neighborhood community in building habitat in their own backyards and community spaces.

Community science helps students and families to understand that science is a way of thinking about the world that involves observing, questioning, analyzing, revising and collaborating. It exposes students to learning opportunities relevant to the real world and allows integration of inquiry into the teaching of content. Children learn science by actually doing science.

Check out the following community science programs and platforms:

- Learn how to tag Monarch butterflies during the fall migration at Monarch Watch. https://www.monarchwatch.org/
- Record sightings of the Monarch butterfly at all stages of the life cycle and follow their unique migration with journey north maps. https://journeynorth.org/
- Join a social network of citizens, scientists and biologists built on the concept of mapping and sharing observations of biodiversity across the globe. https://www.inaturalist.org/
- Use the SEEK app (powered by iNaturalist) to identify plants, wildlife and fungi and earn badges while you learn about the organisms around you. https://www.inaturalist.org/pages/seek_app

REBECA QUIÑONEZ-PIÑÓN
NWF's Senior Manager of Climate Resilient Habitats

MARGARET WORRELL

Monarch Conservation is a Cultural Issue too*

Followed by Spanish version, Seguido por la version en Espanol

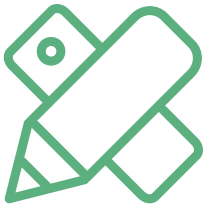
Conservationists from Mexico, the U.S., and Canada are working tirelessly to save the migratory monarch butterflies. But monarchs are a special part of the Mexican culture, too-and saving the monarchs also means preserving their important place in Latine heritage. One reason monarchs are important to cultural conservation is because of their historic connection to the Mexican holiday Dia de Los Muertos (Day of the Dead).

MONARCH BUTTERFLIES AND DIA DE LOS MUERTOS

After making their long migration journey south during the fall, all eastern and some western migratory monarchs arrive at their overwintering sites in South-Central Mexico. Dia de Los Muertos (Day of the Dead), celebrated on November pt and 2nd, amazingly coincides with the arrival of monarchs in Mexico. During this holiday, families set up ofrendas (home altars to honor their loved ones who passed), often using monarchthemed items to decorate the ofrendas.

***NWF Blog**, published on November 2, 2021, updated on April 14, 2022.
Link: https://blog.nwf.org/2021/10/monarch-conservation-is-a-cultural-issue-too/

MONARCH MIGRATION: A SYMBOLIC JOURNEY



Monarchs have an internal “compass” that points them in the right direction to migrate, even though the individuals have never made the journey before. Every year, the fourth and sometimes the fifth generation of the migratory monarch travel over 3,000 miles to reach the overwintering grounds. The monarch migration is recognized worldwide as one of the greatest phenomena in the natural world!

The journey monarchs make is symbolic to many people within Latine cultures, since monarchs fly across borders and call many locations home through the generations just like people. This story of transnational migration, adaptability, and community is special, and one that resonates with many individuals and has become a symbol of immigration, many times expressed through art.

For all their majesty, monarchs are in danger. Threats like native habitat loss, climate change, and heavy use of pesticides have influenced monarchs’ population decline. You can protect monarchs by planting native milkweed, the only larval host plant for the monarch, and native nectar plants that bloom throughout the seasons, for monarchs to feed on in the breeding grounds and during their migration journey.

Article written by:

REBECA QUIÑONEZ-PIÑÓN
NWF’s Senior Manager of Climate Resilient Habitats

And

KASANDRA RICHARDSON
NWF’s Manager of Equity and Justice Communications

Check out the following information about the Day of the Dead to create an Altar:

- **The Meaning of the Altar:** https://artsandculture.google.com/story/_QUBc671RPvBIQQ
- **Dia de Muertos, una tradicion muy viva:** https://news.un.org/es/story/2019/10/1464731
- **Otomi Altar at the Anthropological Museum:** https://www.inah.gob.mx/boletines/2832-altar-de-muertos-otomi-en-el-museo-nacional-de-antropologia
- **Mazahua Altar:** culturamazahuasfp123.blogspot.com/p/blog-page_34.html
- **More Than Monarchs:** Understanding Traditions Linked to Monarch Butterflies: https://monarchjointventure.org/blog/more-than-monarchs-understandingtraditions-linked-to-monarch-butterflies
- **The Arrival in Mexico and Mexican Traditions:** https://journeynorth.org/tm/monarch/DiaMuertosTG.html

MARGARET WORRELL

La Conservación de la Mariposa Monarca También es un Problema Cultural*

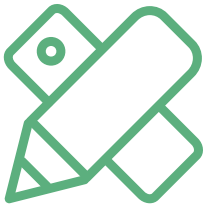
Los conservacionistas de México, Estados Unidos y Canadá están trabajando sin descanso para salvar a la población migratoria de las mariposas monarca. Las monarcas son una especie que forma parte de la cultura mexicana. Salvar a las monarcas también significa preservar su importante lugar en la herencia Latina. Una de las razones par las que las monarcas son importantes para la conservación cultural es par su conexión histórica con la festividad mexicana del Día de las Muertos.

LAS MONARCAS V EL DÍA DE LOS MUERTOS

Después de su largo viaje en el otoño para migrar al sur, todas las monarcas migratorias del este y algunas del oeste llegan a los sitios de invernación en México, entre los Estados de Mexico y Michoacán. El día de los muertos, celebrado el 1 y 2 de noviembre, coincide de manera sorprendente con la llegada de las monarcas a los sitios de invernación. Para la celebración del día de los muertos, las familias mexicanas instalan ofrendas en sus hogares (altares para honrar a sus seres queridos que fallecieron), ya menudo utilizan artículos con tonos y figuras de la mariposa monarca para decorar las ofrendas.

***Blog de NWF**, publicado el 2 de noviembre, 2021, actualizado y traducido al Español el 14 de abril, 2022.
Link: https://blog.nwf.org/2021/10/monarch-conservation-is-a-cultural-issue-too/

MIGRACION DE LA MARIPOSA MONARCA



Las monarcas tienen una característica-"brújula" interna-que les ayuda a determinar la dirección correcta para migrar, aunque nunca antes hayan hecho el viaje. Cada año, la cuarta y, a veces, la quinta generación de la monarca migra mas de 3,000 millas para llegar a los sitios de invernación en México. ¡La migración de la mariposa monarca es reconocida mundialmente como uno de los mayores fenómenos del mundo natural!

Durante su larga migración, las mariposas monarcas cruzan fronteras y llaman hogar a muches lugares a través a través de generaciones, al igual que muchas personas que migran de su país natal a otros países. Y por esta razón, la migración de las mariposas monarcas tiene un sentido muy significativo entre las culturas Latinas. Esta historia de migración transnacional, adaptabilidad y sentido de comunidad es especial y resuena en muchas personas y se ha convertido en un símbolo de la inmigración, muchas veces expresado a través del arte.

Las monarcas están en peligro debido a muches factores. La pérdida de hábitat natural, el cambio climático y el uso intensive de pesticidas han influido en la disminución de la población de mariposas monarca. Tú puedes proteger a las monarcas plantando algodoncillo native (del género Asclepias), la única planta hospedadora de larvas de la monarca, y plantas nectaríferas, nativas en tu ecorregión. Es ideal si es posible plantar diferentes especies de plantas nectaríferas que florecen en diferentes estaciones a lo largo del año, para que las monarcas se alimenten en las áreas de reproducción y durante su viaje de migración.

Artículo escrito por:

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Y

KASANDRA RICHARDSON
NWF's Manager of Equity and Justice Communications

Aprende cómo puedes crear una Ofrenda del Día de Los Muertos:

- **El Significado del Altar:** https://artsandculture.google.com/story/_QUBc67lRPvBIQQ
- **Dia de Muertos, una tradición muy viva:** https://news.un.org/es/story /2019/10/1464731
- **Altar Otomí en el Museo Nacional de Antropología:** https://www.inah.gob.mx/boletines/2832-altar-de-muertos-otomi-en-el-museo-nacional-de-antropologia
- **Altar Mazahua:** culturamazahuasfp123.blogspot.com/p/blog-page_34.html
- **Más que Monarcas: Entendiendo las Dimensiones Culturales Ligadas a la Mariposa Monarca:** https://monarchjointventure.org/blog/more-than-monarchs-understanding-traditions-linked-to-monarch-butterflies
- **Su Arrivo a México y las Tradiciones Mexicanas:** https://journeynorth.org/tm/monarch/DiaMuertosTG.html

PRE K

Gardens: Habitat for the Monarch Butterfly

BACKGROUND

Pollinators are animals that move from plant to plant while searching for protein-rich pollen or high-energy nectar to eat. As they go, they are dusted by pollen and move it to the next flower, fertilizing the plant and allowing it to reproduce and form seeds, berries, fruits and other plant foods that form the foundation of the food chain for other species – including humans. Pollinators play a critical role in the food supply for wildlife and people!

Brilliant orange-and-black monarchs are among the most easily recognizable of the butterfly species that call the Americas home. Monarchs, like all butterflies, change their diet as they develop. During the caterpillar stage, they live exclusively on milkweed plants. Milkweeds are wildflowers in the genus *Asclepias*.

THE PROBLEM

- The North American monarch population has declined by more than 90 percent in the past two decades. This is due to decline in summer breeding habitat in the U.S. and decline in winter habitat in Mexico.
- One-third of the monarch's summer breeding habitat has been destroyed, largely in the Midwest. Expansion of row crop agriculture and, to a less extent, development have destroyed 90 percent of our nation's native grassland ecosystems, on which monarchs depend. Milkweed, the only host plant for monarch caterpillars, has declined in the U.S. due to overuse of herbicides by commercial agriculture and conventional gardening practices in suburban and urban areas.
- Monarch overwintering sites are under threat, especially in Mexico where the forests used by monarchs are under logging pressure.
- Monarchs are being directly killed by insecticides both as adult butterflies and as caterpillars, in agricultural, suburban and urban landscapes.

A TRANSFORMATIVE SOLUTION

- Instill a conservation ethic in students through stewardship and education.
- Find support in the school community and outside the school community, administrators, grounds and facilities staff, parents, academia, local non-profits and community businesses.
- Remove invasive plant species.
- Identify the four main elements of habitat.
- Create, build and maintain monarch habitat using native milkweed and nectar plants.
  - Regional specific, native milkweed and nectar plant varieties, https://www.nwf.org/Garden-for-Wildlife/About/Native-Plants/Milkweed
  - National Wildlife Federation's Native Plant Finder https://www.nwf.org/nativeplantfinder/
- Use monarch habitat for interdisciplinary learning experiences and invite the community to engage in monarch community science, contributing to the pool of scientific data scientists use to draw conclusions about the species.

Activity 1

Sorting in the Garden
Clasificando en el Jardín

MATERIALS

- Sorting trays – 1 per student or student pair
- Nature items – a collection per student or pair

PREPARATION

Either take students on a nature collection walk or you can collect natural items found in the schoolyard. Items can include, rocks, soils, leaves, twigs, pine cones, tree bark, etc. Place items in a reusable box or plastic bag to use during the sorting activity.

WHAT TO DO

1. Take students outside, either to the garden area or another place in the schoolyard.
2. Pass out sorting trays and collected natural items.
3. Ask students to sort their objects by:
   - Shape | Texture | Color

   After each sort, talk about the "why" behind their sorting decisions, and provide students the opportunity to share their sort with the class.

TAKE A PICTURE OF STUDENTS WITH THEIR COMPLETED TRAYS AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
PK4.VI.A.1, PK4.VI.C.1

MATH
PK3.V.E.1
PK4.V.E.1

See Appendix G-1 for full descriptions of TEKS.

NOTES

SORTING IN THE GARDEN | CLASIFICANDO EN EL JARDÍN

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

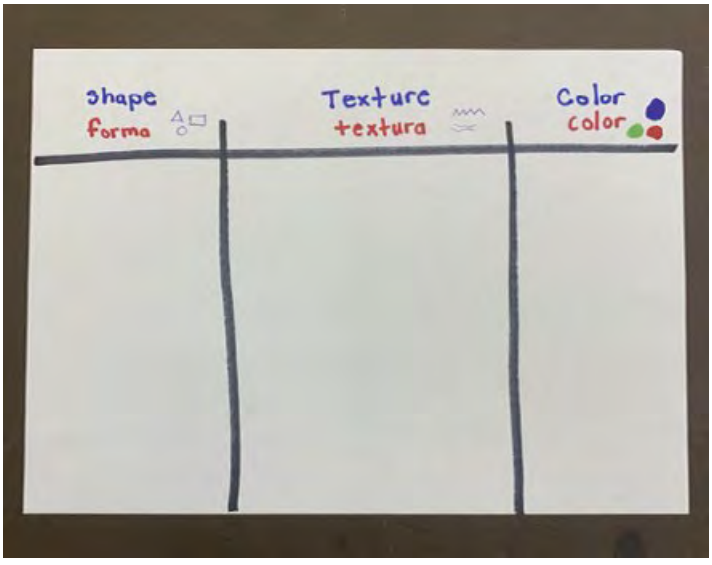
COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

investigation	investigación
observe	observar
describe	describir
rock	roca

BILINGUAL STRATEGIES

Sorting items by their properties. Use a T-chart to demonstrate to students how to sort items using vocabulary. This strategy will help English Language Learners (Ells) to understand the meaning of the activity. Another strategy is "Turn and Talk with a partner". This strategy will help Ells to rehearse what they are going to say in front of the class and feel confident when they speak. Ells at this age are in the stages of pre-production and early production of language development and need teacher prompts.



T CHART EXAMPLE. PICTURE BY: VANESSA MONTELONGO

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

VOCABULARY	VOCABULARIO
rocks	rocas
soil	tierra
leaves	hojas
twigs	leña meduda
pine cones	piñones
tree bark	corteza de arbol

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Activity 1- Before collecting the natural items, show Ells how to sort by shape, texture and color. With a piece of chalk, write a three-line chart on the concrete:

Shape | Texture | Color

While writing the words say them aloud. Ask students to bring three items each and then help them to sort each item by shape, then by texture, and finally by color. For step three, before students share with the class, give Ell students a chance to talk with a partner about why they sorted the item the way they did. Listen to student conversations and guide them if they need help.

NOTEBOOK | LIBRO DE NOTAS:

Have students explore outside with an English speaking partner to practice their speaking skills. Next, students can pick items that they found outside, draw and write the color, size and texture in their journals. Students can use their science word wall for reference. Also, students can use the worksheet below to write words and practice spelling.

SORTING IN THE GARDEN | CLASIFICANDO EN EL JARDÍN

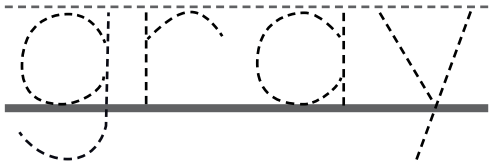
Journal Sheet

Guiding Questions/Sentence Stems

Students trace the word

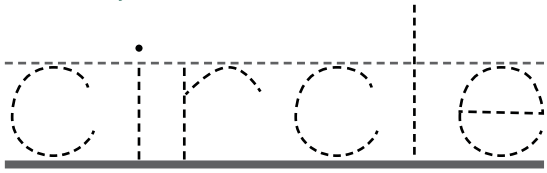
What color is the rock?

The rock is



What shape is the rock?

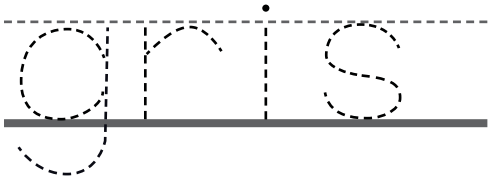
The shape of the rock is a



El estudiante traza la palabra

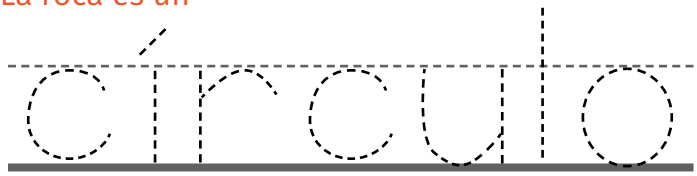
¿De qué color es la roca?

La roca es de color



¿De qué forma es la roca?

La roca es un



Activity 2

Science Tools – Observing Plant Parts
Herramientas de Ciencias - Observando las Partes de la Planta

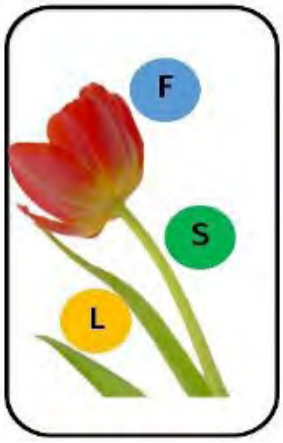
TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
PK4.VI.A.1, PK4.VI.A.3, PK4.VI.B.1

See Appendix G-1 for full descriptions of TEKS.

MATERIALS

- Sorting trays – 1 per student or student pair
- Magnifying loupes or glasses – 1 per student
- Field scope (optional) – 1 per 4 students
- Color dot stickers in 3 different colors – 1 set per student or student pair
- Plant parts handout



PREPARATION

Gather enough flowering plants to supply one per student. You will also want to have an example plant, one that is not touched by the students.

WHAT TO DO

1. Pass out sorting tray with flower and hand lens/loupe to each student or pair.
2. Allow students a minute to explore.
3. Ask students if they can identify the stem, leaves and petals. Then together, identify the three parts.
4. Ask students to use their hand lens/loupe to look closely at each part. Focus on only one part at a time.
   - For example, let's look at the stem first. Ask students to identify the sound "stem" starts with and write that letter on their handout. Then ask them to draw the stem as they see it through their hand lens or fieldscope. Do this for the remaining plant parts.
5. Now conduct an informal assessment asking students to use the sticker to identify the plant part. Each student will receive three colored stickers, one with an "S" on it, one with a "L" on it and one with a "F" on it. One at a time ask students to place, for example the yellow sticker with an "F" on it next to the flower on their sorting tray. Do this for the remaining plant parts

TAKE A PICTURE OF STUDENTS WITH THEIR COMPLETED TRAYS AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

SCIENCE TOOLS – OBSERVING PLANT PARTS
HERRAMIENTAS DE CIENCIAS - OBSERVANDO LAS PARTES DE LA PLANTA

Bilingual Strategies

Essential Strategies for Teaching in a

Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

plant	planta
flower	flor
explore	explorar
identify	identificar
loupe	lupa

BILINGUAL STRATEGIES

Use a flower diagram. This will help them learn vocabulary and learn the parts of the plant using the visual sense. Also show students how to say the word ***leaf*** in singular and plural (***leaves***). ELLs have trouble with these kinds of words because in Spanish the singular word changes with an "s" or "es" at the end to make it plural.

VOCABULARY	VOCABULARIO
flower	flor
plant	planta
stem	tallo
leaves	hojas

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
3.B

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Have students trace the words before cutting and pasting on the flower diagram. To teach the word leaf and leaves, show students one leaf and then many leaves and repeat the words as you show them the objects.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate words and the vocabulary words at the beginning of the lesson in their journals. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for the students to get started writing and speaking in complete sentences. Students can fill out the piece of paper and paste it into their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever he or she feels more comfortable with. Teachers can decide what language students will write depending on the Bilingual model or the students' English level.

SCIENCE TOOLS – OBSERVING PLANT PARTS
HERRAMIENTAS DE CIENCIAS - OBSERVANDO LAS PARTES DE LA PLANTA

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner, refer to the anchor chart, the wall of cognates, or the teacher can write the answer for the student to model writing.

What letter does the word STEM start with?

The word **STEM** starts with the letter_____.

What letter does the word LEAF end with?

The word **LEAF** ends with the letter _____.

Instrucciones

El estudiante puede trabajar con un compañero, referirse a los anclajes gráficos, a la pared de cognados o la maestra puede escribir la respuesta del alumno para modelar la escritura.

¿Con qué letra empieza la palabra TALLO?

La palabra **TALLO** empieza con la letra_____.

¿Con qué letra termina la palabra HOJAS ?

La palabra **HOJAS** termina con la letra _____.

Activity 3

How Does the Garden Feel?
Observing Physical Properties
¿Cómo Se Siente el Jardín?
Observando Propiedades Fisica

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

PK4.VI.A.1, PK4.VI.A.3, PK4.VI.C.1

See Appendix G-1 for full descriptions of TEKS.

MATERIALS

- Sorting trays – 1 per student or student pair
- Magnifying loupes for glasses – 1 per student

PREPARATION

Students will be looking more closely at natural items in the garden or on the school grounds, such as, rocks and pebbles, grasses, plants, trees, soil, etc. While not ideal, but in order to save time, you may want to collect some items for students to observe rather than allowing them to collect their own. Take this opportunity to go over field safety, such as not throwing objects and not eating, putting any objects in the mouth, nose or ears.

WHAT TO DO

1. Take students outside to the garden and provide them with a sorting tray and a magnifying glass or loupe.
2. Students will be making observations of things found in nature. Explain we use our senses to make observations. We look at an object, we feel an object and so on. Start with something they know, such as their hand. Together, allow students to express what they see, feel, hear and smell.
3. Go through this same observation exercise with them as many of the items from the list below that time and attention span allow.
   - Soil
   - Grass
   - Leaves
   - Pebbles/rocks
   - Bark
   - Flowers
   - Twigs

TAKE CANDID PICTURES OF STUDENTS USING THEIR OBSERVATION SKILLS AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

HOW DOES THE GARDEN FEEL? OBSERVING PHYSICAL PROPERTIES
¿CÓMO SE SIENTE EL JARDÍN? OBSERVANDO PROPIEDADES FISICA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

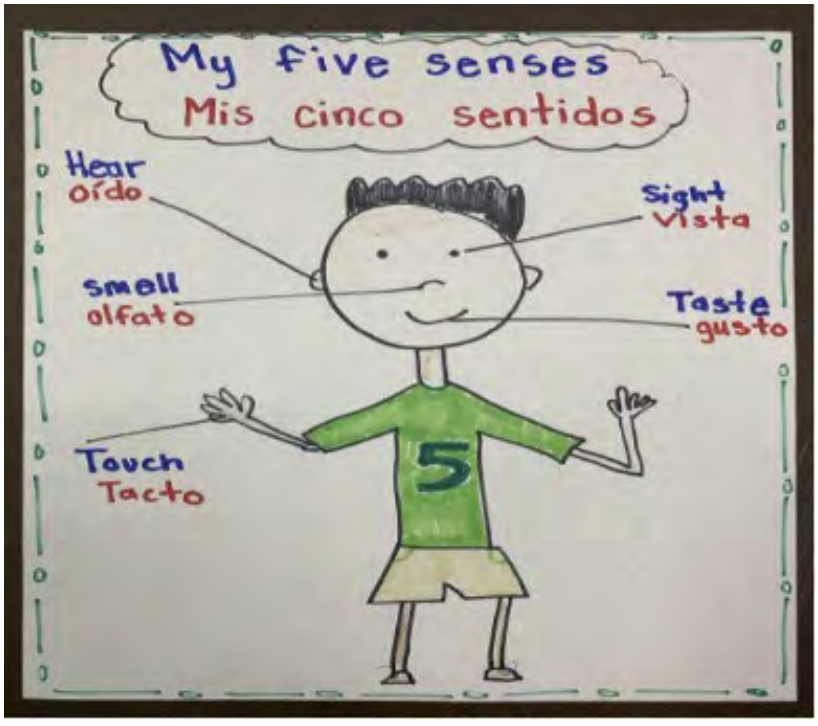
COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word)

plant	planta
rock	roca
explore	explorar
identify	identificar
loupe	lupa

BILINGUAL STRATEGIES

Create the following anchor chart to explain to students their five senses. Explain to them that they will be using their 5 senses when observing their natural environment.



ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
3.B

See Appendix H-1 for full descriptions of ELPS.

NOTES

VOCABULARY	VOCABULARIO
soil	tierra
grass	cesped
leaves	hojas
pebbles	guijarros
rock	roca
bark	corteza de arbol
flowers	flores
twigs	leña a menudo
Five senses	cinco sentidos
hear	oído
smell	olfato
touch	tacto
sight	vista
taste	gusto

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students complete the following in their journals. Students can refer to the anchor chart used for this lesson.

HOW DOES THE GARDEN FEEL? OBSERVING PHYSICAL PROPERTIES
¿CÓMO SE SIENTE EL JARDÍN? OBSERVANDO PROPIEDADES FISICA

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner, refer to the anchor chart, the wall of cognates, or the teacher can write the answer for the student to model writing.

What letter does the word **SIGHTS** start with?

The word **SIGHT** starts with the letter_____.

What letter does the word **HEAR** end with?

The word **HEAR** ends with the letter _____.

Instrucciones

El estudiante puede trabajar con un compañero, referirse a los anclajes gráficos, a la pared de cognados o la maestra puede escribir la respuesta del alumno para modelar la escritura.

¿Con qué letra empieza la palabra **VISTA**?

La palabra **VISTA** empieza con la letra_____.

¿Con qué letra termina la palabra **OÍDO**?

La palabra **OÍDO** termina con la letra _____.

Activity 4

Color Mixing – What Makes Green?

Mezclando Color - ¿Qué Hace Verde?

MATERIALS

- Color mixing handout – 1 per student
- Pencil
- 3 paint brushes per student
- Blue and yellow paint

PREPARATION

Provide students with expectations during painting activities.

WHAT TO DO

1. Provide students with the color mixing handout.
2. Students will first trace the word green and then practice writing the word on their own.
3. Next students will use paintbrush 1 to color circle 1 blue, then paintbrush 2 to color circle 2 yellow and last use paintbrush 3 to add a little blue paint and a little yellow paint to circle 3, mixing the colors together to make green.
4. Take a walk to the garden or around the schoolyard and let students point out everything that is green. You can also take this opportunity to practice making observations and/or pointing out that students are making observations by looking for objects in nature that are green.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.A.1

FINE ARTS DOMAIN
PK4.VIII.A.1

See Appendix G-1 for full descriptions of TEKS.

NOTES

COLOR MIXING – WHAT MAKES GREEN?
MEZCLANDO COLOR - ¿QUÉ HACE VERDE?

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

observe	**observar**
explore	**explorar**
identify	**identificar**
color	**color**

BILINGUAL STRATEGIES

As students go and observe outside for green objects in the garden, pair students with a native English speaker and a Spanish speaker. Encourage students to say:

I see a green _____.

Have them use the sentence stem every time they see a green object.

Spanish:

Yo veo un/una _____ verde.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

VOCABULARY	VOCABULARIO
mixing	mezclando
blue	azul
yellow	amarillo
green	verde
grass	cesped
tree	arbol
leaf	hoja
plant	planta
flower	flor
insect	insecto

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

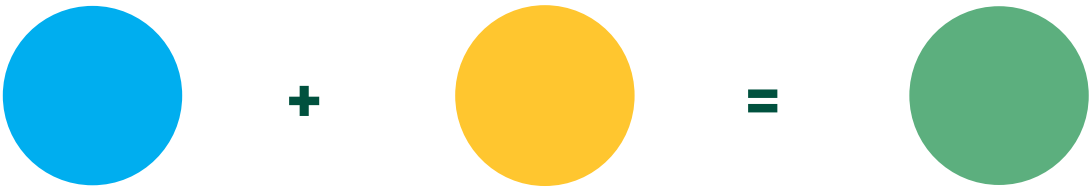
NOTEBOOK | LIBRO DE NOTAS:

Students can paste the worksheet into their journal once it is complete.

Color Mixing– What Makes Green?
Mezclando Colores – ¿Que Hace Verde?

green verde

green verde



blue
azul

yellow
amarillo

green
verde

Activity 5

Soil Science - Temperature
Ciencias de Suelo - Temperatura

MATERIALS

- Digital soil thermometer
- Standard soil thermometer
- Timer
- Hand-held white board with white board marker

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE

PK4.VI.A.3, PK4.VI.A.4, PK4.VI.C.1, PK4.VI.C.2, PK4.VI.C.3

MATH

PK3.V.A.5

PK4.V.A.5

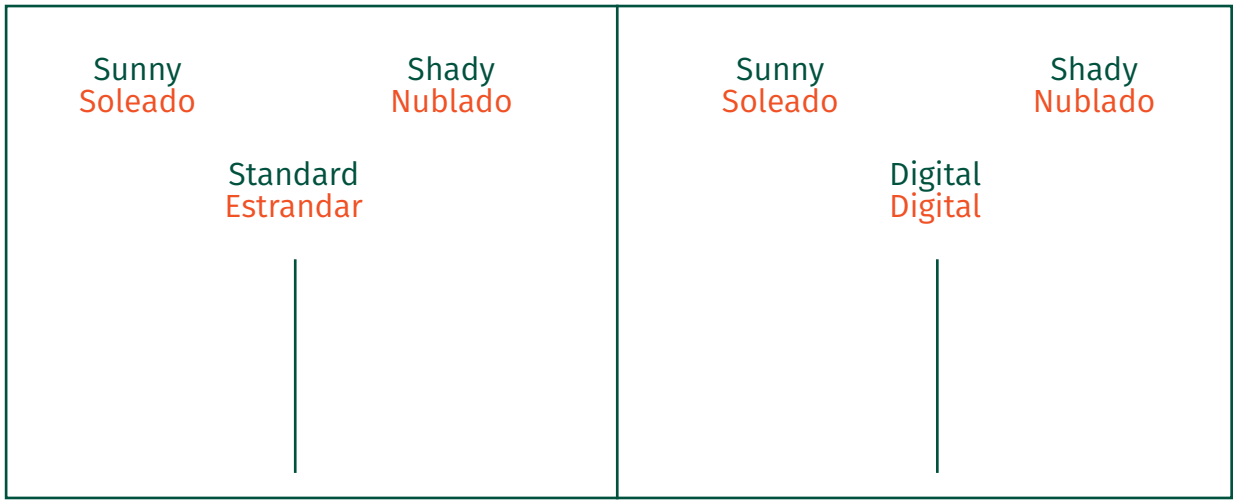
See Appendix G-1 for full descriptions of TEKS.

PREPARATION

It's important each student gets the opportunity to use the science equipment. While it is a privilege, it is necessary that students begin to build comfort with simple science equipment starting at a young age. To allow each student an opportunity to use the equipment it is recommended you go outside twice a day, morning and afternoon, with 2 sets of thermometers, 2 standard and 2 digital for as many days as is required for every student to use the thermometers.

Mark each soil thermometer 5cm from the dial with a sharpie. The thermometer should not be inserted into the soil past this mark.

Set up your white board to take outside as seen below.



WHAT TO DO

1. Provide students with the expectations for handling both the standard and digital soil thermometers.
2. Take students out to the garden (having preselected a shady and sunny location) Insert one standard thermometer according to the specifications above, in a sunny location and the other in a shady location and start the timer for 5 minutes.
3. While the timer is going, record the degrees in Fahrenheit, in the sun and in the shade with the digital thermometer. Record the numbers on your white board.
4. When the timer goes off, record the standard soil thermometer's temperature in Fahrenheit on your white board.
5. Sit with the students in a sandy(ish) area. Say the temperature aloud, asking your students to repeat, for example if the soil temperature is 55° F, students will repeat the entire phrase, "fifty-five degrees Fahrenheit". Next have the students practice writing 55 in the sand around them. If there are no areas on the school grounds where students can have this tactile experience, go back to the classroom and practice writing the numbers another way.
6. Talk with the students about why the degrees are different in the sun than they are in the shade. If they struggle with an answer, have some students stand in the sun and others stand in the shade and describe how they feel. This may help them begin to make a connection between the sun's rays and heat.
7. Next talk to students about why taking the soil temperature is important. The soil temperatures in the designated garden area must be of a certain temperature range to support the healthy establishment of the plants that are planted. If the ground is still too cold, then plants will not survive.

TAKE CANDID PICTURES OF STUDENTS USING THEIR OBSERVATION SKILLS AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

ENGINEERING OPTION

Students will be working to create a monarch garden in the schoolyard. Let them use LEGOs or natural materials from the schoolyard to make a model of the garden they would like to make for monarch butterflies.

SOIL SCIENCE - TEMPERATURE | CIENCIAS DE SUELO - TEMPERATURA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

thermometer	**termómetro**
insert	**insertar**
digital	**digital**
temperature	**temperatura**

BILINGUAL STRATEGIES

Pair students with a native English speaker and a Spanish speaker as they observe the weather. Encourage the students to use the following sentence stem as they make their observation:

Today is _____ degrees.

It is _____ outside.

It feels _____ outside.

Spanish:

Hoy está a ____ grados.

Afuera está _____.

Afuera hace _____.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

VOCABULARY	VOCABULARIO
sunny	soleado
cloudy	nublado
thermometer	termometro
degrees	grados
Fahrenheit	farenheit
temperature	temperatura
digital	digital
standard	estandar
timer	temporizador

INSTRUCTIONS:

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Using the same format as what is on the white board, students write the number/degrees in their journals

PRE K

Getting to Know Monarch Butterflies

BACKGROUND

Students are building content knowledge so that they are better able to design, build, study and maintain a Monarch Recovery Garden. Monarchs are among the most easily recognizable of the butterfly species which call the Americas home. Monarch butterflies are bright orange with black and white markings. The body of the monarch is black. The head has a set of antennae. From the thorax come the wings, and are mostly orange with black veins running throughout. The outer edge of the wings has a thick black border. Within the black border are white spots. The white spots can range in size and they decorate the wings. At the upper corner of the top set of wings are orange spots. The underside of the monarch butterflies' wings can be seen when the butterfly is at rest or when it is feeding on a flower. Instead of bright orange, the underside is more drab and orange-brown.

Males and females can be told apart by looking at the top of their hind wings. Males have a black spot at the center of each hind wing, while the females do not. While the spots on males were once thought to be scent glands, they are actually vestigial and no longer serve that purpose. This is not the case for all butterfly species.

Size: Monarch butterflies have a wingspan of 3 ½ to 4 inches in length and weigh on average of 500 mg or 0.5g (about .02 oz.).

Lifespan: Most monarch butterflies do not live more than a few weeks. There are about four generations born each spring and summer and most of the offspring do not live beyond five weeks. The lone exception is the last generation born at the end of the summer.

The last generation of each year is the over-wintering generation that must make the journey back to Mexico. Rather than breeding immediately, the over-wintering monarchs fly back to Mexico and stay there until the following spring. In the early spring, they fly north to the southern United States and breed.

Over-wintering monarch butterflies can live between 8 and 9 months.

Activity 1

Parts of a Butterfly | Las Partes de La Mariposa

MATERIALS

- Handout – *Roll a Butterfly* (consider laminating)
- Dice – 1 per student
- Green construction paper – ½ page per student

PREPARATION

For this activity you will want to decide how you will have students create their butterfly. Here are some suggestions:

- Drawing
- Natural objects, like pebbles and small twigs
- Manipulatives
- Paper cut-outs that can be glued together

You may want to sort the parts into envelopes, trays, etc. to make for easier distribution.

WHAT TO DO

1. Give each student a dice and a copy of the *Roll a Butterfly* handout and a green half sheet of construction paper.
2. Explain they will be rolling the dice to get each of the parts of the butterfly, head, thorax, abdomen, antennae, and both wings.
3. After each roll you will give each student the part they rolled. Students are to place their butterfly part onto the green construction paper.
4. If a student rolls and lands on a part they already have they must wait till the next group rolls to see if they get a part of the butterfly they need.
5. As students begin to complete their butterfly, have them help you give other students their butterfly parts.

TAKE PICTURES OF THE STUDENTS WHILE THEY WORK AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

NOTE: Be sure to say the name of each part of the butterfly as they are given out and encourage students to do the same.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.B.1

MATH
PK4.V.A.5

FINE ARTS DOMAIN
PK4.VIII.A.1

See Appendix G-1 for full descriptions of TEKS.

PARTS OF A BUTTERFLY | LAS PARTES DE LA MARIPOSA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

thorax	tórax
abdomen	abdomen
antennae	antena

BILINGUAL STRATEGIES

Students work in cooperative groups to complete the parts of a butterfly. Encourage students to use the following sentence stems as they pass the dice:

I rolled a ____(have students count the dots.) It is the _____ (part of butterfly).

Spanish:

Yo rode un ____(have students count the dots.) Es la/el/las _____ (part of the butterfly).

VOCABULARY	VOCABULARIO
butterfly	mariposa
head	cabeza
thorax	tórax
abdomen	abdomen
antennae	antena
left wings	alas izquierdas
right wings	alas derechas

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS:

Go over the cognate list with students with the following repetitions:

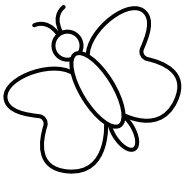
1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

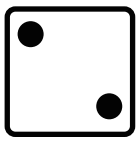
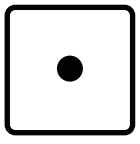
NOTEBOOK | LIBRO DE NOTAS:

Students can draw a butterfly in their journal and label the parts of the butterfly. Students can use the butterfly that they created for their reference.

PARTS OF A BUTTERFLY | LAS PARTES DE LA MARIPOSA

Roll A Butterfly | Rueda Una Mariposa



		head | cabeza
		thorax | torax
		abdomen | abdomen
		antennae | antena
		left wings | alas izquierdas
		right wings | alas derechas

For more creative learning ideas check out www.makinglearningfun.com

Activity 2

The Monarch Life Cycle
El Ciclo de la Vida de la Monarca

MATERIALS

- Life Cycle coloring sheet
- Crayons
- Scissors
- Glue stick
- Stapler
- 3 inches wide X 24 inches long strip of green construction paper

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.B.2

MATH
PK3.V.E.3
PK4.V.E.3

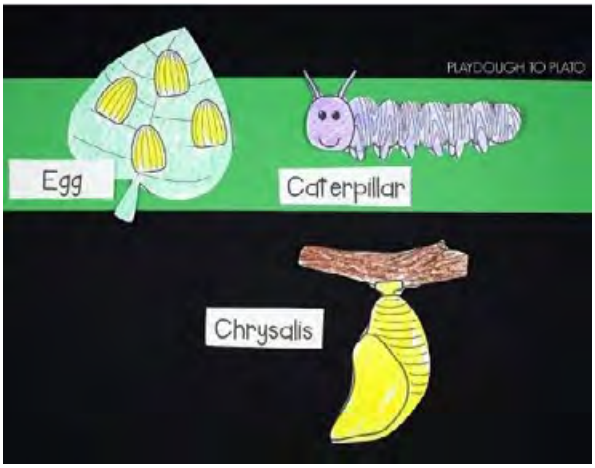
FINE ARTS DOMAIN
PK4.VIII.A.1

See Appendix G-1 for full descriptions of TEKS.

PREPARATION

This activity is adapted from Playdough to Plato, The STEM Laboratory, https://www.playdoughtoplato.com/butterfly-life-cycle-hats/.

To make the headband, staple together the ends of two 3x12 straps to make it just the right length.



WHAT TO DO

1. Read, National Geographic's easy reader, *Caterpillar to Butterfly*, or one of the other suggestions focused on the monarch butterfly's life cycle. For Spanish read "La oruga muy hambrienta", By Eric Carle or watch the following video; https://www.youtube.com/watch?v=cUQYjdb49GI
2. Pass out the green headband strips and have students write their names on one side.
3. Have students get out the following crayons, Green, Black, Orange, Yellow, then pass out the *Life Cycle* coloring sheet.
4. Students will then cut out the words and each colored image (the best they can).
5. Throw scraps in the recycle bin before continuing. Ask students to place their life cycle parts in the correct order. When students have their order correct, give them a glue stick to begin pasting each life cycle stage to their green headband strip.

TAKE A GROUP PICTURE OF THE STUDENTS WITH THEIR HATS ON AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

THE MONARCH LIFE CYCLE | EL CICLO DE LA VIDA DE LA MONARCA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word)

cycle	**ciclo**
order	**orden**
correct	**correcto**
chrysalis	**crisalida**

BILINGUAL STRATEGIES

Have students work in pairs with a native English speaker and a native Spanish speaker (each student will make their own hat). Encourage the students to say the following sentence stems:

English:	Spanish:
First is the egg.	Primero es el huevo.
Next is the caterpillar.	Después de la oruga.
Then the chrysalis.	Y luego la crisálida.
Last the butterfly.	Al final es la mariposa.

VOCABULARY	VOCABULARIO
life cycle	**ciclo de vida**
butterfly	**mariposa**
egg	**huevo**
caterpillar	**oruga**
chrysalis	**crisálida**

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS:

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can draw a life cycle of butterflies using their hat as a reference.

THE MONARCH LIFE CYCLE | EL CICLO DE LA VIDA DE LA MONARCA

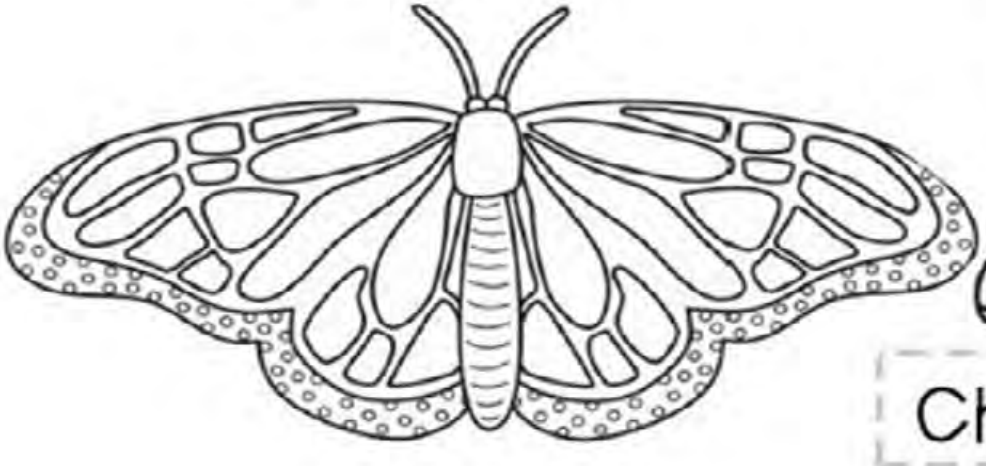
NAME _____

life cycle hat

Egg

Caterpillar

Chrysalis

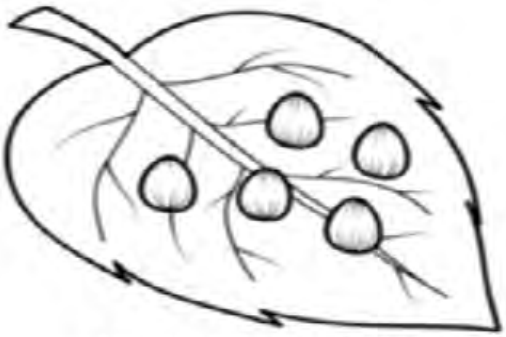


Butterfly

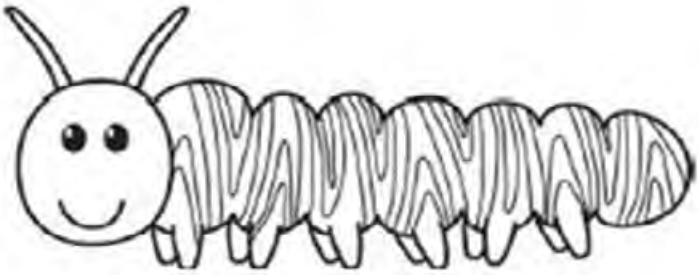
THE MONARCH LIFE CYCLE | EL CICLO DE LA VIDA DE LA MONARCA

Nombre:_____

Gorro de ciclo de vida



huevo



oruga

mariposa

crisálida

Activity 3

Color Mixing – What Makes Orange?
Mezclando Colores - ¿Qué Hace Anaranjado?

MATERIALS

- Color mixing handout – 1 per student
- Pencil
- 3 paint brushes per student
- Red and Yellow paint

PREPARATION

Provide students with expectations during painting activities.

WHAT TO DO

1. Provide students with the color mixing handout.
2. Students will first trace the word orange and then practice writing the word on their own.
3. Next students will use paintbrush 1 to color circle 1 red, then paintbrush 2 to color circle 2 yellow and last use paintbrush 3 to add a little red paint and a little yellow paint to circle 3, mixing the colors together to make orange.
4. Take a walk to the garden or around the schoolyard and let students hunt for orange objects. You can also take this opportunity to practice making observations and/or pointing out that students are making observations by looking for objects in nature that are orange.
5. Hang up dried student work on your weekly student learning mural in the hall.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.A.1

FINE ARTS DOMAIN
PK4.VIII.A.1

See Appendix G-1 for full descriptions of TEKS.

NOTES

COLOR MIXING – WHAT MAKES ORANGE?
MEZCLANDO COLORES – ¿QUÉ HACE ANARANJADO?

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

observation	observación
mixing	mezclando

BILINGUAL STRATEGIES

As students go outside and observe for orange objects in the garden, pair students with a native English speaker and a Spanish speaker. Encourage students to say:

I see an orange_____. (Have them use the sentence stem every time they see an orange object.)

Spanish:

Yo veo un/una _____ anaranjado.

VOCABULARY	VOCABULARIO
mixing	mezclando
red	rojo
yellow	amarillo
orange	anaranjado

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can use crayons to mix colors in their journal, they can also use the word wall for reference to write the names of the colors that they make.

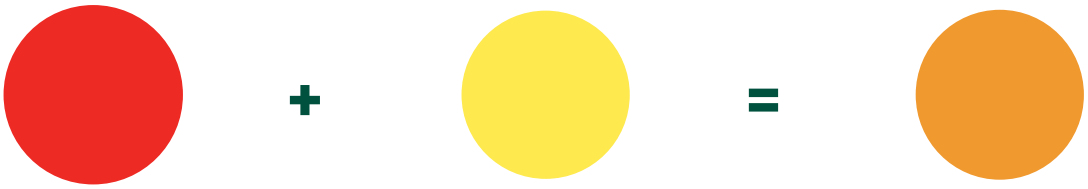
Color Mixing - What Makes Orange?
Mezclando Colores – ¿Que Hace Anaranjado?

orange

orange

anaranjado

anaranjado



red
rojo

yellow
amarillo

orange
anaranjado

Activity 4

LEGO - Symmetry | LEGO - Simetría

MATERIALS

- Butterfly Symmetry handout
- LEGOs or other manipulatives
- Book, *Looking at Nature: What is Symmetry in Nature?*, Bobbie Kalman

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.B.1

MATH
PK3.V.E.3
PK4.V.E.3

See Appendix G-1 for full descriptions of TEKS.

PREPARATION

This activity is adapted from Fun at Home with Kids', Learning Symmetry with LEGOs and Butterflies, http://www.funathomewithkids.com/2014/06/learning-symmetry-with-legos-and.html

You may want to enlarge the symmetry handout and trace onto poster board, providing students with a larger surface area to work with.

Organize 2 identical trays of LEGOs or manipulatives per student. This will help students process the activity.

WHAT TO DO

1. Read *Looking at Nature: What is Symmetry in Nature?*
   For Spanish you can have the students watch the following video; https://www.youtube.com/watch?v=MtY-ZOwkROE.
2. Pass out the Butterfly Symmetry handout along with either two trays of LEGOs or manipulatives per student; one tray for the LEFT and one for the RIGHT.
3. Ask students to only make a design on the LEFT side of the butterfly.
4. Once all students have completed the LEFT side, instruct students to fill in the RIGHT side making it look exactly the same as the LEFT, or symmetrical to the LEFT.

TAKE PICTURES OF THE STUDENTS WITH THEIR WORK AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

LEGO - SYMMETRY | LEGO - SIMETRÍA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

manipulatives	**manipulativos**
symmetry	**simetría**

BILINGUAL STRATEGIES

Pair students with a native English speaker and a native Spanish speaker and encourage the students to say the following sentence stems:

My butterfly has symmetry because_____. (By this time you have explained to students what symmetry is. Model for the students why the butterfly is symmetrical.)

Spanish: Mi mariposa tiene simetría porque _____.

VOCABULARY	VOCABULARIO
symmetry	**simetría**
same	**igual**
butterfly	**mariposa**

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

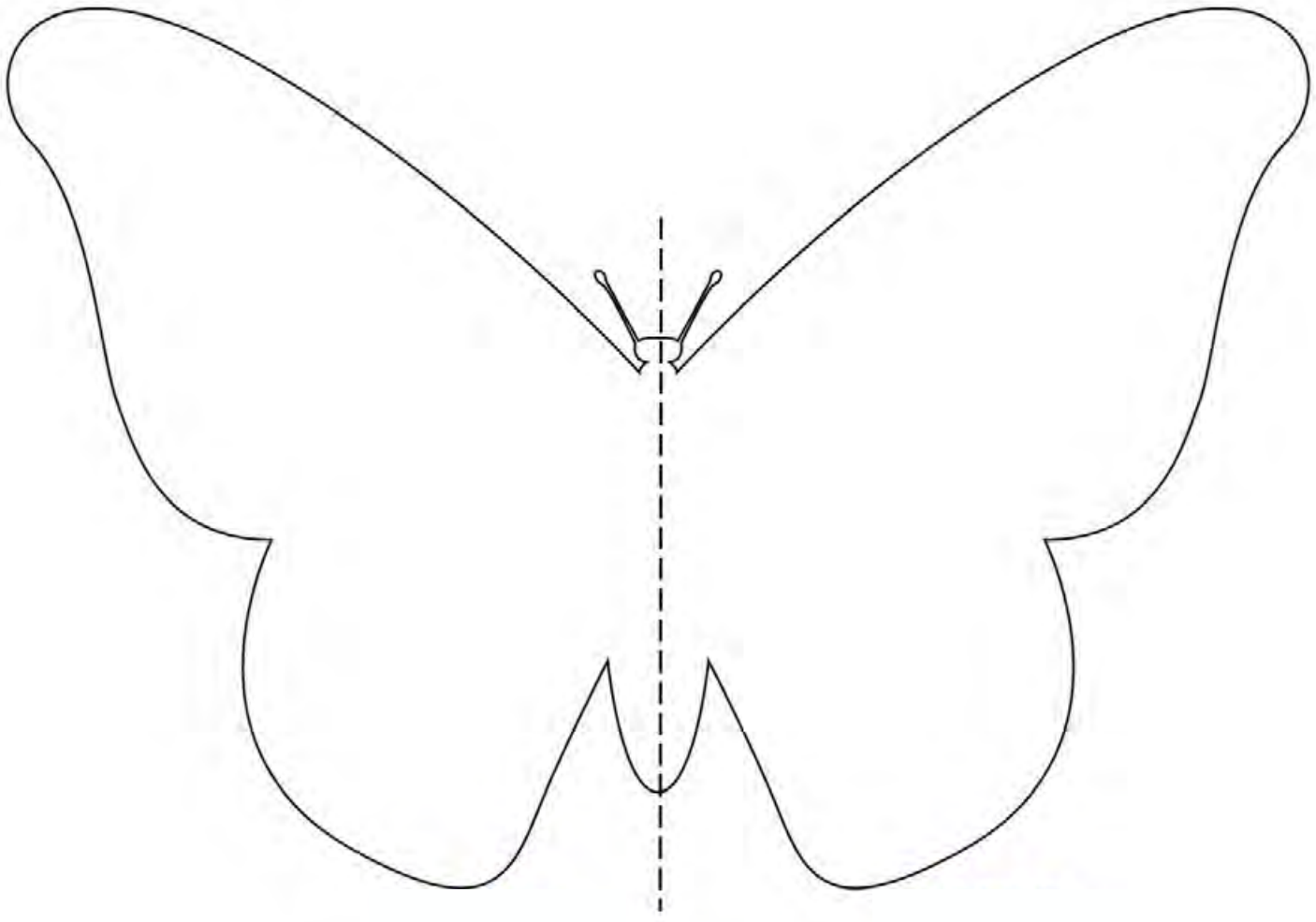
See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students fold paper in their journal in half and only draw on one side. They can draw on the other side to make it symmetrical. Have students title their entry "Simetría."

Symmetry | Simetría



Left
Izquierda

Right
Derecha

timvandevall.com

PRE K

Monarch Migration – A Unique Journey

BACKGROUND

Over-wintering monarch butterflies in Mexico begin to make the journey north to the United States in early spring. Soon after they leave Mexico, pairs of monarchs mate. As they reach the southern United States, females will look for available milkweed plants to lay eggs.

The eggs hatch after approximately four days. The caterpillars are small, and they grow many times their initial size over a two-week period. The caterpillars feed on the available milkweed plant. When they get big enough, each caterpillar forms a chrysalis and goes through metamorphosis.

The chrysalis protects the monarch as it is going through the major developmental change of turning from a caterpillar to a butterfly. The chrysalis is green with yellow spots. After another two-week period, an adult butterfly will emerge from the chrysalis.

The adult monarchs continue the journey north that was left unfinished by their parents. Each year, about three to five generations will be born to continue migrating north. Most monarch butterflies do not live more than a few weeks. It is only the last generation, born in late summer that will live for several months and migrate back to Mexico to start the cycle over again.

The last generation of each year is the over-wintering generation. Rather than breeding immediately, the over-wintering monarchs stay in Mexico until the following spring. In the early spring, they fly north to the southern United States and breed. Over-wintering monarch butterflies can live upwards of eight months.

Monarch Butterfly. Annual Cycle of Reproduction and Migration | Mariposa Monarca. Ciclo Anual de Reproducción y Migración

Fall migration, fourth generation
Migración de otoño, cuarta generación

Spring migration, first & second generation
Migración de primavera, primera y segunda generación

Summer breeding areas, third & fourth generation
Áreas de reproducción, tercera y cuarta generación

Spring breeding areas, first & second generation
Áreas de reproducción, primera y segunda generación

Overwintering areas, fourth generation
Áreas de invernadero, cuarta generación

Rocky Mountains
Montañas Rocosas

Activity 1

What's the Weather? Observing Weather During the Monarch Migration

¿Qué es el Clima? Observación del Clima Durante la Migración de la Monarca

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE

PK4.VI.A.3, PK4.VI.C.1, PK4.VI.C.2, PK4.VI.C.3

MATH

PK3.V.E.2

PK4.V.E.2

See Appendix G-1 for full descriptions of TEKS.

MATERIALS

- Daily access to Journey North's Monarch Migration maps for the current season, https://maps.journeynorth.org/maps
- Daily access to your location's weather data, https://www.wunderground.com/
- Handout: Today's Clouds – 1 per student
- 1-Digital outdoor thermometer
- 1-Rain gauge – properly mounted in the schoolyard (use the directions from CoCoRaHS, https://www.ndsu.edu/fileadmin/ndsco/documents/Information_Packet.pdf), to purchase, https://goo.gl/vZKjWz
- Handout: *This Week's Weather* – 1 per student
- Large Cotton Balls – 5 per student
- Pencil
- Glue stick

PREPARATION

The following observations should be conducted during either fall or spring migration, or both. Make plans accordingly. Besides making daily observations during migration season, you can follow the migration at Journey North, https://maps.journeynorth.org/map/?map=monarch-peak-migration&year=2021

WHAT TO DO

1. Students will have a data sheet to record temperature and precipitation for the week. At the same time every day, students will collect the following data:
   - Temperature in degrees Fahrenheit
   - Precipitation in inches
   - Circle other weather indicators as noted on the handout

2. Choose one day of the week to collect cloud data. Use the handout, *Today's Clouds,* and let students make observations of the clouds. Next use the cloud chart to choose which type of cloud they see. Then give students cotton balls and a glue stick to make the clouds they see in the sky on their data sheet.
3. **Suggestion:** keep student's work from the week and make a science notebook to share with parents/guardians during a conference, open house or other school event.

TAKE PICTURES OF THE STUDENTS WHILE THEY ARE COLLECTING DATA AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

WHAT'S THE WEATHER? OBSERVING WEATHER DURING THE MONARCH MIGRATION | ¿QUÉ ES EL CLIMA? OBSERVACIÓN DEL CLIMA DURANTE LA MIGRACIÓN DE LA MONARCA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

temperature	**temperatura**
migration	**migración**
precipitation	**precipitación**

BILINGUAL STRATEGIES

These activities will take place throughout the migration season. Assign a pair of students (English native speaker, Spanish native speaker) every week to monitor the weather and to complete the chart. Provide students with sentences stems to present to the entire class.

English:

Today is _____.

It is _____ degrees Fahrenheit outside.

It feels _____.

It is _____(raining, dry, snowing).

The ground feels_____.

Spanish:

Hoy es _____.

Hoy está a _____ grados fahrenheit.

Se siente _____ afuera.

Está _____(lloviendo, seco, nevando).

El suelo se siente _____.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

VOCABULARY	VOCABULARIO
weather	clima
temperature	temperatura
fahrenheit	fahrenheit
precipitation	precipitación
inches	pulgadas
cloud	nube
hot	caliente
warm	cálido
cool	fresco
cold	frío
dry	seco
wet	mojado

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Keep students' work from the week in their science journal to share with parents/guardians during a conference, open house or other school event.

WHAT'S THE WEATHER? OBSERVING WEATHER DURING THE MONARCH MIGRATION
¿QUÉ ES EL CLIMA? OBSERVACIÓN DEL CLIMA DURANTE LA MIGRACIÓN DE LA MONARCA

This Week's Weather, Part 1
El Clima de Esta Semana, Parte 1

NAME | NOMBRE: _____

THIS WEEK'S DATES | LAS FECHAS DE ESTA SEMANA:

	Monday Lunes	Tuesday Martes	Wednesday Miércoles	Thursday Jueves	Friday Viernes
Temperature Temperatura	°F	°F	°F	°F	°F
Cloud Cover Cubierto de nubes					
How Do You Feel Outside? ¿Cómo se siente afuera?	hot | caliente warm | cálido cool | fresco cold | frío	hot | caliente warm | cálido cool | fresco cold | frío	hot | caliente warm | cálido cool | fresco cold | frío	hot | caliente warm | cálido cool | fresco cold | frío	hot | caliente warm | cálido cool | fresco cold | frío

WHAT'S THE WEATHER? OBSERVING WEATHER DURING THE MONARCH MIGRATION
¿QUÉ ES EL CLIMA? OBSERVACIÓN DEL CLIMA DURANTE LA MIGRACIÓN DE LA MONARCA

This Week's Weather, Part 2
El Clima de Esta Semana, Parte 2

NAME | NOMBRE: _____

THIS WEEK'S DATES | LAS FECHAS DE ESTA SEMANA:

	Monday Lunes	Tuesday Martes	Wednesday Miércoles	Thursday Jueves	Friday Viernes
Precipitation Precipitación	°F	°F	°F	°F	°F
Precipitation Type Tipo de precipitación					
How Does the Ground Feel? ¿Cómo se siente el suelo?	wet | mojado dry | seco	wet | mojado dry | seco	wet | mojado dry | seco	wet | mojado dry | seco	wet | mojado dry | seco

weather

clima

WHAT'S THE WEATHER? OBSERVING WEATHER DURING THE MONARCH MIGRATION
¿QUÉ ES EL CLIMA? OBSERVACIÓN DEL CLIMA DURANTE LA MIGRACIÓN DE LA MONARCA

Today's Clouds | Las Nubes de Hoy

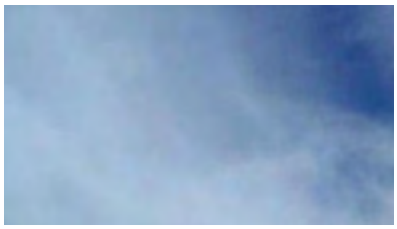
NAME | NOMBRE: _____

Stratocumulus | Estratocúmulos

Stratus | Estrato

Cumulus | Cúmulo

Cirrus | Cirro



Cirrostratus | Cirrostrato

Cirrocumulus | Cirrocúmulo

Altocumulus | Altocúmulo

Altostratus | Altostrato

Color a blue circle, next to cloud types you see in the sky.

Using the space below, use your cotton balls to make the clouds you just observed outside.

Colorea un círculo azul enseguida del tipo de nube que ves en el cielo.

Usa el espacio de abajo para hacer con tus bolas de algodón las nubes que observaste afuera.

Activity 2

Migration Mapping | Mapeo de Migración

MATERIALS

- Handout: *Where Do the Butterflies Go?* - 1 per student
- Pencil

WHAT TO DO

1. Read, *Monarch Migration: Counting By 10*. For Spanish or bilingual have students watch the video of Ben Gundersheimer reading Señorita Mariposa: https://www.youtube.com/watch?v=h-s4plLc1OM
2. Explain the handout: *Where Do the Butterflies Go?* to each student. Help them follow each of the directions on the handout.

BRENTWOOD ELEMENTARY MIGRATION MAP

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.B.3

MATH
PK3.V.A.2
PK4.V.A.2

See Appendix G-1 for full descriptions of TEKS.

NOTES

MIGRATION MAPPING | MAPEO DE MIGRACIÓN

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

monarch	monarca
migration	migración

BILINGUAL STRATEGIES

As the teacher reads, make pauses and have students work in pairs to turn and talk to check for understanding. For example ask a student, what is going on in the story? Students turn to their partner and use the following sentence stem:

English:

What is going on in the story?

In the story the monarch butterflies _____.

Spanish:

¿Que esta pasando en el cuento?

En el cuento las mariposas monarcas _____.

VOCABULARY	VOCABULARIO
monarch butterfly	mariposa monarca
migration	migración

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Keep students' worksheets in a journal. They will practice writing the word migration and draw a picture of what the word means.

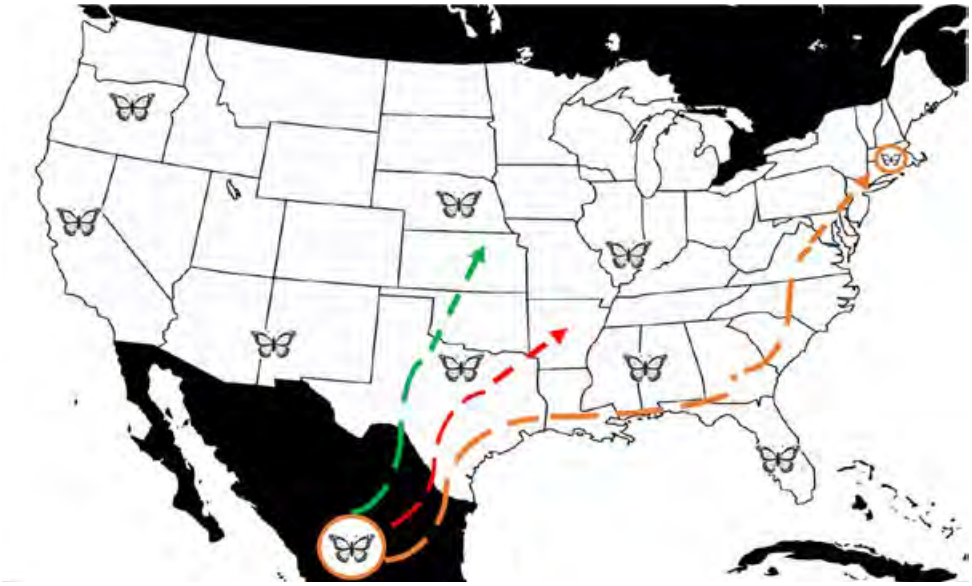
MIGRATION MAPPING | MAPEO DE MIGRACIÓN

Where Do The Butterflies Go?
¿A Dónde Van las Mariposas?

NAME | NOMBRE: _____

First, find the orange line and trace the monarch's path from the Oyamel forests in Mexico to your school in Texas. **Next** circle 10 monarch butterflies. **Last,** practice writing the word *migration*.

Primero, encuentra la línea anaranjada y traza el camino de la monarca del bosque Oyamel en México a tu escuela en Tejas. **Segundo**, circula 10 mariposas monarcas. **Finalmente**, practica escribiendo la palabra *migración*.



Migration

Migración

Activity 3

Graphing the Monarch Migration
Graficando la Migración de La Monarca

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS)

SCIENCE
PK4.VI.B.3

MATH
PK3.V.E.2
PK4.V.E.2

See Appendix G-1 for full descriptions of TEKS.

MATERIALS

- Map of the North America or the United States and Mexico
- Handout: *Color and Cut Monarch Migration Mapping*, 1 per student

PREPARATION

Check out the fall peak migration by latitude chart below and plan to graph monarch numbers over a 2-4 week time period.

FALL | OTOÑO

Latitude | Latitud	Peak Monarch Abundance Abundancia de Pico de Monarca	Latitude | Latitud	Peak Monarch Abundance Abundancia de Pico de Monarca
49	August 18-30 Agosto 18-30	31	October 4-16 Octubre 4-16
47	August 24 – September 5 Agosto 24 – Septiembre 5	29	October 10-22 Octubre 10-22
45	August 29 – September 10 Agosto 29 – Septiembre 10	27	October 15-27 Octubre 15-27
43	September 3-15 Septiembre 3-15	25	October 20 – November 1 Octubre 20 – Noviembre 1
41	September 8-20 Septiembre 8-20	23	October 27 – November 8 Octubre 27 – Noviembre 8
39	September 14-26 Septiembre 14-26	21	November 3-15 Noviembre 3-15
37	September 19 – October 1 Septiembre 19 – Octubre 1	19.4*	November 10-22 Noviembre 10-22
35	September 24 – October 6 Septiembre 24 – Octubre 6		

*THIS LATITUDE REPRESENTS THE GENERAL VICINITY OF THE OVERWINTERING COLONIES.
*LA LATITUD REPRESENTA LA VECINDAD GENERAL DE LAS COLONIAS HIBERNANDO.

WHAT TO DO

1. Replicate the graph P. 70, Monarch Migration Graphing, on poster board or butcher paper.
2. Have students color and cut out a set of four monarch butterflies using the handout below. If needed, students can color and cut out another set of monarchs if the first set is used.
3. Pick your 2-4 week observation window that coincides with peak migration dates. Check the peak migration dates for fall and spring, https://www.monarchwatch.org/tagmig/peak.html. Follow monarch migration progress using Journey North's monarch migration map, https://journeynorth.org/monarchs. Northern states may miss spring migration as "first sightings" above Virginia don't typically occur until the summer months. However, just briefly, those same schools may hit peak migration right as they return for a new school year.
4. Take students outside each school day, at the same time of day and for the same duration if possible, to sit near the butterfly garden. Have students raise their hand each time they see a monarch. You will record a tally mark on a scratch sheet of paper.
5. Once back in the class, allow each student to place a monarch on the graph for each monarch that was observed in the garden area. Call students to place a monarch in alphabetical order so everyone is sure to get the opportunity to place at least one monarch on the graph.
6. Optional: On Friday of each week, talk about the total number of observed butterflies and have students practice writing that number.

TAKE A CANDID PHOTO OF STUDENTS MAKING MONARCH OBSERVATIONS AND ADD THEM TO YOUR WEEKLY STUDENT LEARNING MURAL IN THE HALL.

GRAPHING THE MONARCH MIGRATION
GRAFICANDO LA MIGRACIÓN DE LA MONARCA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students' reference. (Provide a visual next to the word.)

September	**septiembre**
October	**octubre**
November	**noviembre**
December	**diciembre**

BILINGUAL STRATEGIES

Have students work in pairs to share observations as they go outside. Encourage the students to say how many butterflies did they see in the following sentence stems:

English:

Today I saw _____ monarch butterfly/ies.

Spanish:

Hoy vi una(s) _____mariposa(s) monarca(s).

VOCABULARY	VOCABULARIO
monarch butterfly	**mariposa monarca**
migration	**migración**
spring	**primavera**
fall	**otoño**

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C, 1.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students keep track of their observations in their journals.

GRAPHING THE MONARCH MIGRATION | GRAFICANDO LA MIGRACIÓN DE LA MONARCA

Monarch Migration Graph
Gráfica de Migración Monarca

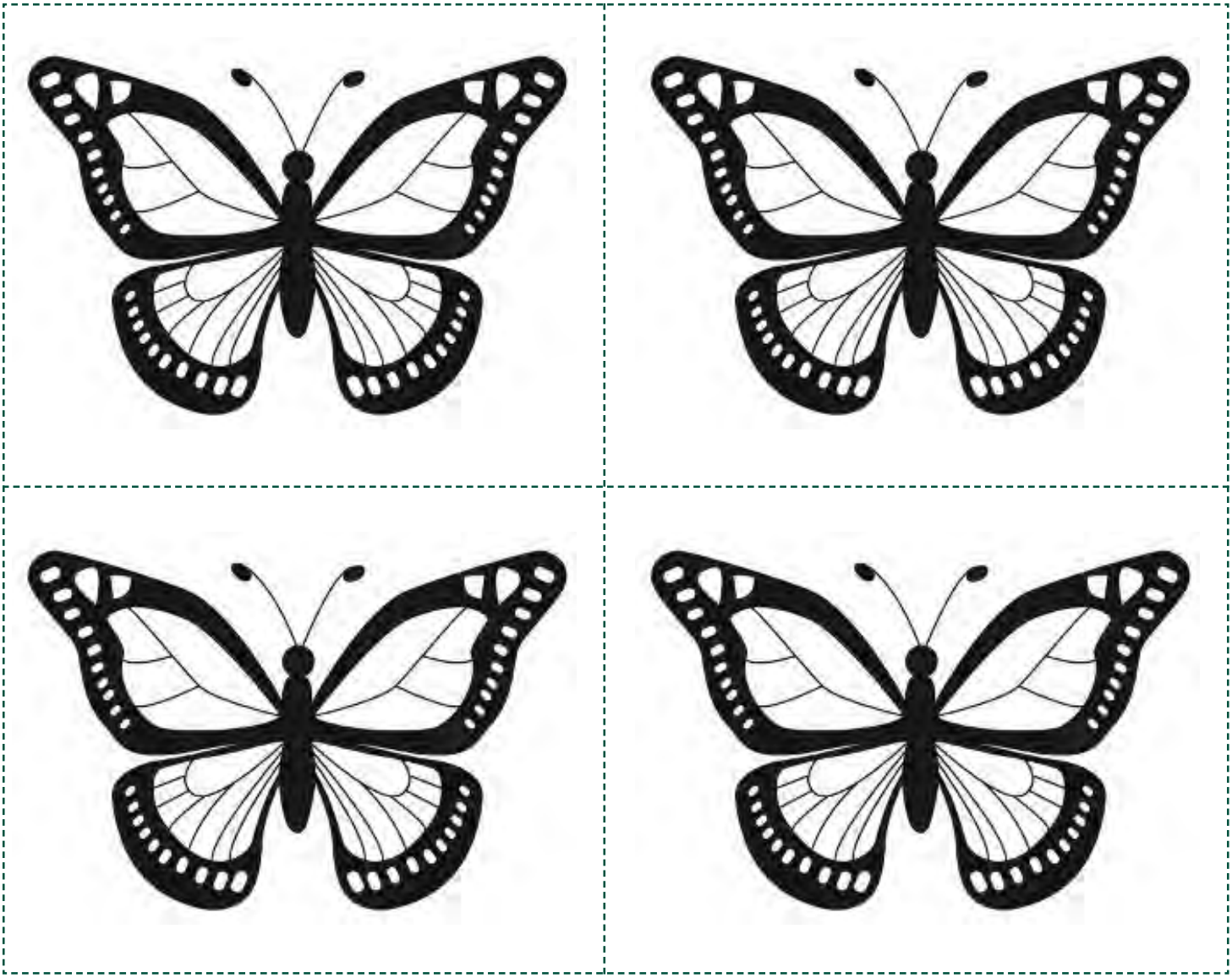
NAME: | NOMBRE: _____

WEEK: | SEMANA: _____

Weeks Semanas	Number of Monarch Butterflies Sighted Número de Mariposas Monarcas Avistadas
Week 1 Semana 1	
Week 2 Semana 2	
Week 3 Semana 3	
Week 4 Semana 4	

GRAPHING THE MONARCH MIGRATION | GRAFICANDO LA MIGRACIÓN DE LA MONARCA

Color and Cut: Monarch Migration Graphing
Colorea y Recorta: Graficando la Migración de Monarcas



K-2

The Monarch Butterfly

(3-4) 30 MINUTE CLASS PERIODS | SCIENCE, MATH, READING, ENGINEERING, WRITING

BACKGROUND

Students are building content knowledge so that they are better able to design, build, study and maintain a Monarch Recovery Garden. Monarchs are among the most easily recognizable of the butterfly species which call the Americas home. Monarch butterflies are bright orange with black and white markings. The body of the monarch is black. The head has a set of antennae. From the thorax come the wings, and are mostly orange with black veins running throughout. The outer edge of the wings has a thick black border. Within the black border are white spots. The white spots can range in size and they decorate the wings. At the upper corner of the top set of wings are orange spots. The underside of the monarch butterflies' wings can be seen when the butterfly is at rest or when it is feeding on a flower. Instead of bright orange, the underside is more drab and orange-brown.

Males and females can be told apart by looking at the top of their hind wings. Males have a black spot at the center of each hind wing, while the females do not. While the spots on males were once thought to be scent glands, they are actually vestigial and no longer serve that purpose. This is not the case for all butterfly species.

LEFT: FEMALE MONARCH; NOTE LACK OF HIND WING PATCHES (PHOTO: CANDY SARIKONDA) RIGHT: MALE MONARCH; NOTE DARK SPOT ON EACH HIND WING (PHOTO: CARRIE BENHAM)

LESSON OBJECTIVES

Students will:

- Identify and observe insects and their common characteristics.
- Build an insect.
- Construct the monarch butterfly life cycle.
- Act out the monarch butterfly life cycle.

Questions should be answered in the science notebooks and can be discussed in pairs, small groups and with the whole class. Building science literacy starts in Pre-K. Help students build their skills in reading, writing, listening and responding to science.

MATERIALS

- Science notebook.
- Activity 2 Engineering Call-Out: A variety of consumable materials along with scissors and glue.
- Pictures of common insects via magazines, online resources or the checklist at BugFacts.net.
- Book – *On Beyond Bugs: All About Insects.*
- Copies of Evidence-Monarch Butterflies. Make one copy per pair or per group of four.
- Life Cycle Cards: Make one set per student or pair of students.
- Determine which of the life cycles you will make available to your students and gather the needed materials.
- Optional: slides of insects and insect parts – create a center where students can see insects in detail through microscope or detailed microscope images from the internet.

SIZE: Monarch butterflies have a wingspan of 3 ½ to 4 inches in length and weigh on average 500 mg or 0.5g (about .02 oz.).

LIFESPAN: Most monarch butterflies do not live more than a few weeks. There are about four generations born each spring and summer and most of the offspring do not live beyond five weeks. The lone exception is the last generation born at the end of the summer.

The last generation of each year is the over-wintering generation that must make the journey back to Mexico. Rather than breeding immediately, the over-wintering monarchs fly back to Mexico and stay there until the following spring. In the early spring, they fly north to the southern United States and breed.

Over-wintering monarch butterflies can live between 8 and 9 months.

Activity 1

Insects I Know | Insectos Que Conosco

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What is an insect? What insects live in our schoolyard?
¿Qué es un insecto? ¿Qué insectos viven en el patio de nuestra escuela?

1. Have students write or help you write a list of every insect they can think of. Students can also make a picture list by drawing insects they are familiar with. Have students begin this list in their science notebook, listing the traits or characteristics that make insects, insects (for example: insects have eyes).
2. **Take a nature walk.** Go outside on a ten minute nature walk. (Provide students with your outside expectations and safety precautions.)

   Define the boundaries for the investigation. Generate ideas from the students about where they might find insects (where they live and eat) and model finding and observing the physical attributes and behavior of insects aloud. Instruct students to investigate what is living there and where they are in the schoolyard. Encourage students to take mental notes and make a list or sketches in their science notebook. After 5-10 minutes of independent or partner exploration, instruct students to pick an insect to carefully observe and draw (5 minutes). Option: Provide students with a temporary notebook they can wear outside. Just attach some note cards to their student lanyard and bring out a box of golf pencils for them to use on the walk.
3. **Debrief.** Have students compare the drawing they created to the list of characteristics of insects. Did everyone draw an insect or are some of them spiders, rolly pollies or centipedes?

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(D), K.1(E), K.12(B), K.13(B)
1.1(D), 1.1(E), 1.13(A)
2.1(D), 2.1(E), 2.13(B)

See Appendix G-1 for full descriptions of TEKS.

NOTES

NOTE: Students may have rolly pollies and/or centipedes, and that is okay. Later they will understand why not all insects on their list are true insects.

INSECTS I KNOW | INSECTOS QUE CONOSCO

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

investigation	investigación
observe	observar
identify	identificar
insects	insectos
monarch	monarca
cycle	ciclo

VOCABULARY	VOCABULARIO
eggs	huevos
caterpillar	oruga
chrysalis	crisálida
butterfly	mariposa

BILINGUAL STRATEGIES

A list of words from the Monarch life cycle in Spanish, a poster board with the images and words of the butterfly life cycle in Spanish & Notebook.

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Also, show the Monarch life cycle in Spanish and go through the cycle stage by stage.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

INSECTS I KNOW | INSECTOS QUE CONOSCO

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson); or the wall of cognates; and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección); o la pared de cognados; y la maestra puede escribir su respuesta para modelar la escritura.

1. What is an insect?

An insect is _____.

1. ¿Qué es un insecto?

Un insecto es _____.

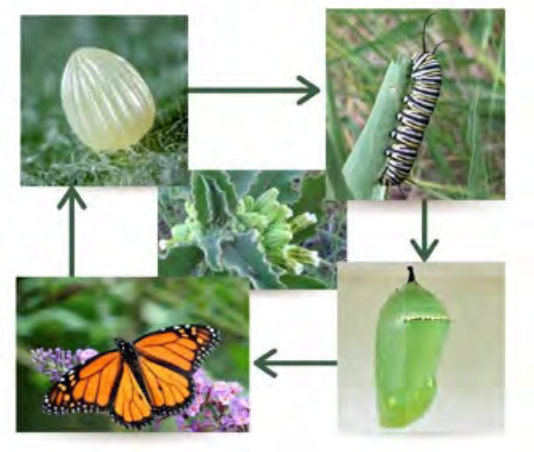
2. What insects live in our schoolyard?

The insects that live in our schoolyard are _____.

2. ¿Qué insectos viven en el jardín de la escuela?

Los insectos que viven en el jardín de la escuela son _____.

Show students the butterfly life cycle and write/read the stages in each picture. Show students the Spanish word for each stage of the cycle.



HTTPS://MONARCHJOINTVENTURE.ORG/MONARCH-BIOLOGY/LIFE-CYCLE

Egg	Huevo
Larva	Larva
Pupa	Crisálida
Adult	Adulta

Activity 2

Is That Really An Insect?
¿Es Eso Realmente Un Insecto?

ARE INSECTS AND BUGS THE SAME THING?
NO, a bug is a certain type of insect.

¿LOS INSECTOS Y LOS BICHOS SON LO MISMO?
NO, un bicho es un cierto tipo de insecto.

- Insects have three body parts. This is not always the case for bugs.
- Insects have a variety of different mouth parts, but true bugs have a "stylet" used to suck juices, typically plants, but some species feed on animals.
- Insects hatch from eggs and most go through complete metamorphosis.
- True bugs go through incomplete metamorphosis; which means they hatch as nymphs from their egg. A nymph is a miniature version of the adult bug (https://askabiologist.asu.edu/explore/true-bugs)

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What is an insect? | ¿Qué es un insecto?

Have students look through magazines, such as *Ranger Rick Jr.* or *Ranger Rick*. Your librarian may also have some field guides with pictures of insects and bugs found in your region or state. A very simple visual of insects can be found at, www.bugfacts.net/checklist.php. What similarities and differences do they notice?

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.5(D), K.5(F), K.13(B)
1.5(D), 1.5(F), 1.13(A)
2.5(D), 2.5(F), 2.13(B)

ENGINEERING OPTION
K.1(G)
1.1(G)
2.1(G)

See Appendix G-1 for full descriptions of TEKS.

NOTES

ENGINEERING OPTION

What purpose do wings serve on an insect? Provide students with a variety of consumable materials and have them construct an insect that has movable wings. Materials can include but are not limited to: pipe cleaners, egg cartons, paper (a variety of types), Wiki Stix, buttons, beans, pebbles, googly eyes, pom-poms, colored dots, straws, popsicle sticks, etc.

1. **Have a class discussion** about the various traits students have found (this can come from a mental or written list). As a class determine 5 characteristics that help scientists identify insects. Then ask them to compare their list to an actual list of insect characteristics.
   - » Exoskeleton
   - » 3 body regions: head, thorax and abdomen
   - » 3 pairs of segmented legs
   - » 1 pair of antennae
   - » Most have two pairs of wings – **NOTE:** a few insects, such as ants don't usually have wings; some insects, such as flies only have one pair of wings.
2. Read, *On Beyond Bugs: All About Insects* by Tish Rabe, from Cat in the Hat's Learning Library.

Question 2-1

Do the insects in the images share the same characteristics from your first list? Are there new traits you want to add to the list or are there traits you want to take off your list?

Pregunta 2-1

¿Los insectos de las imágenes comparten las mismas características de tu primera lista? ¿Hay nuevos rasgos que deseas agregar a la lista o hay rasgos que deseas eliminar de tu lista?

Question 2-2

How do you think scientists determined or came up with the one list all scientists would use to identify insects?

Pregunta 2-2

¿Cómo crees que los científicos determinaron o crearon la única lista que todos los científicos usarían para identificar insectos?

IS THAT REALLY AN INSECT? | ¿ES ESO REALMENTE UN INSECTO?

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

insects	insectos
parts	partes
exoskeleton	exoesqueleto
abdomen	abdomen
metamorphosis	metamorfosis
antennae	antena

VOCABULARY	VOCABULARIO
bugs	insectos
type	tipo
species	especies
nymph	ninfa

BILINGUAL STRATEGIES

Provide students with a graphic organizer to write the differences between a bug and an insect. Teachers can help by writing the answers on an anchor chart and students can write it on the graphic organizer.

INSTRUCTIONS

Go over the cognate list with students and have them listen to you first, then repeat after you, and last say them by themselves.

VIDEO:

Students can benefit from watching a video. Video can help with visuals for images and unknown words and spelling patterns. Bugs & Insects (https://www.youtube.com/watch?v=0Rgl69R92bo).

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.C
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

IS THAT REALLY AN INSECT? | ¿ES ESO REALMENTE UN INSECTO?

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson); or the wall of cognates; and the teacher can write their answer to model the writing.

INVESTIGATING QUESTION:
Do you think insects and bugs are the same?

1. Are insects and bugs the same? Why? or Why not?

A bug is the same as an insect because _____.

An insect is **not** the same as a bug because _____.

Students draw an insect and a bug in their journal.

Model to students how to fill in a Venn diagram with anchor chart

Instrucciones

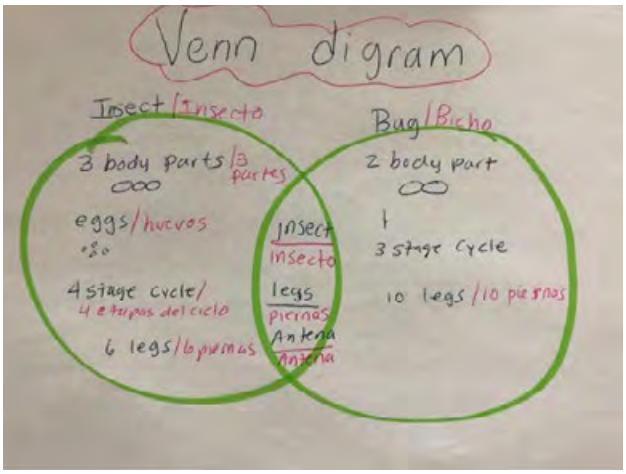
El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección); o la pared de cognados; y la maestra puede escribir su respuesta para modelar la escritura.

PREGUNTA DE INVESTIGACIÓN:
¿Crees que los insectos y los bichos son lo mismo?

1. **¿Cómo sabes si los insectos son lo mismo que los bichos? ¿Porque sí? ¿o Porque no?**

Un bicho es un insecto porque _____.

Un insecto **no es** un bicho porque _____.



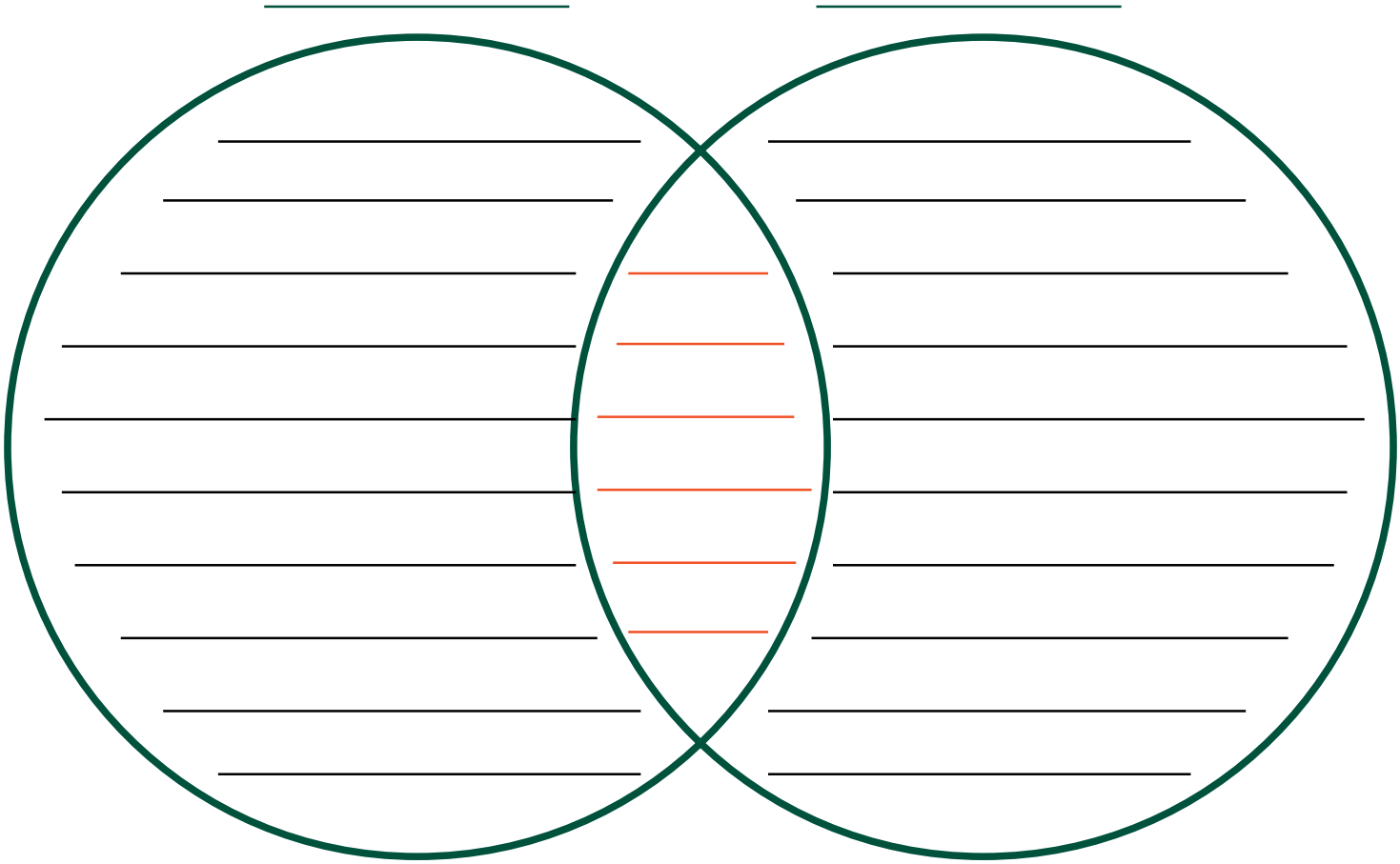
DRAWING BY
ANNABEL HERANANDEZ

IS THAT REALLY AN INSECT? | ¿ES ESO REALMENTE UN INSECTO?

Venn Diagram | Diagrama de Venn

NAME | NOMBRE: _____

DATE | FECHA: _____



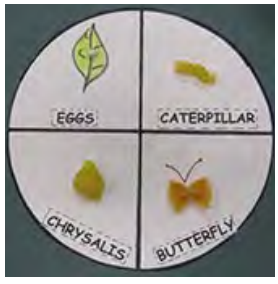
Activity 3

Butterflies Are Insects
Las Mariposas Son Insectos

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

How does a scientist prove a claim?
(How do they prove what they are saying is true?)
¿Cómo puede un científico probar un reclamo?
(¿Cómo prueban que lo que dicen es verdad?)

1. **Have students Think-Pair-Share with a partner.** Be ready to defend the claim that a monarch butterfly is an insect. Will they use their science notebook, books, photographs? Allow them to gather (within a reasonable amount of time) what they need to defend their claim. See p. 87 for a set of monarch images students can use as a part of their evidence.
2. **Now that students are confident monarchs are insects, it's time to look at them more closely.** Pass out the sets of Life Cycle Cards, p. 85-86. Have each student work alone to construct the cycle in the correct order. Next have them describe or tell their neighbor why they put the cycle in that particular order. When the student is ready check their work.



3. **Students may now create the monarch butterfly life cycle** using one of the methods below:
   - » Draw the cycle in their science notebook.
   - » Color, cut out, and put together the Monarch Life Cycle Wheel.
   - » Color, cut out and glue into the science notebook, using the worksheet, *Life Cycle of the Monarch Butterfly.*
4. Sing, *The Butterfly Ballad* to the tune of "Mary Had A Little Lamb". After students learn the words, teach students to act it out.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

K.1(E), K.1(G), K.3(B), K.3(C), K.5(F), K.13(B)
1.1(E), 1.1(G), 1.3(B), 1.3(C), 1.5(F), 1.13(A), 1.13(B)
2.1(E), 2.1(G), 2.3(B), 2.3(C), 2.5(F), 2.13(B), 2.13(D)

See Appendix G-1 for full descriptions of TEKS.

NOTE: There are limits to the evidence the photos can provide, for instance, students cannot tell from the photo whether or not the monarch has an exoskeleton.

BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

The Butterfly Ballad | La Balada de la Mariposa

BY | POR: GUY BELLERANTI

Sing to the Tune of "Mary Had a Little Lamb" | Cantar al tono de "Maria Tiene Un Cordierto"

Butterfly starts as an egg,
As an egg, as an egg,
Butterfly starts as an egg,
Let's see what happens next.

La mariposa comienza como un huevo,
Como un huevo, como un huevo
La mariposa comienza como un huevo,
Veamos qué pasa a después.

Caterpillar hatches out,
Hatches out, hatches out,
Caterpillar hatches out,
Let's see what happens next.

Caterpillar sale,
Sale, sale
Caterpillar sale,
Veamos qué pasa a después.

Caterpillar gobbles leaves,
Gobbles leaves, gobbles leaves,
Caterpillar gobbles leaves,
Let's see what happens next.

Oruga devora hojas,
Devora hojas, devora hojas,
Oruga devora hojas,
Veamos qué pasa a después.

Caterpillar grows and sheds,
Grows and sheds, grows and sheds,
Caterpillar grows and sheds,
Let's see what happens next.

La oruga crece y arroja,
Crece y arroja, crece y arroja,
La oruga crece y arroja,
Veamos qué pasa a después.

It becomes a chrysalis,
Chrysalis, chrysalis,
It becomes a chrysalis
Let's see what happens next.

Se convierte en crisálida,
Crisálida, crisálida,
Se convierte en crisálida,
Veamos qué pasa a después.

Butterfly comes out at last,
Out at last, out at last,
Butterfly comes out at last,
And then it flies away.

Mariposa sale por fin,
Afuera por fin, afuera por fin,
Mariposa sale por fin,
Y luego se va volando.

BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

The Butterfly Ballad - Act it Out
La Balada de la Mariposa - Actuarlo

VERSE 1

Roll up in a ball on the floor and cover your head.

VERSE 2

Crawl like a caterpillar.

VERSE 3

Act like you are eating, gobbling up as much food possible.

VERSE 4

Act like you are growing,
stretch long and tall.

VERSE 5

Pull your knees up to your chest and be as still as possible.

VERSE 6

Fly like a butterfly.

ACTÚA EL VERSÍCULO 1

Enrolla una bola en el suelo y cúbrete la cabeza.

VERSÍCULO 2

Gatea como una oruga.

VERSE 3

Actúa como si estuvieras devorando tanta comida como sea posible.

VERSE 4

Actúa como si estuvieras creciendo, estírate largo y alto.

VERSE 5

Levanta las rodillas hasta el pecho y quédate lo más quieto posible.

VERSE 6

Vuela como mariposa.

BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

LIFE CYCLE CARD 1 | CICLO DE LA MARIPOSA TARJETA 1

Monarch Butterfly Eggs | Huevos de la Mariposa Monarca

LIFE CYCLE CARD 2 | CICLO DE LA MARIPOSA TARJETA 2

Monarch Butterfly Larvae | Larva de Mariposa Monarca

BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

LIFE CYCLE CARD 3 | CICLO DE LA MARIPOSA TARJETA 3

Monarch Butterfly Chrysalis

Crisálida de la Mariposa Monarca

LIFE CYCLE CARD 4 | CICLO DE LA MARIPOSA TARJETA 4

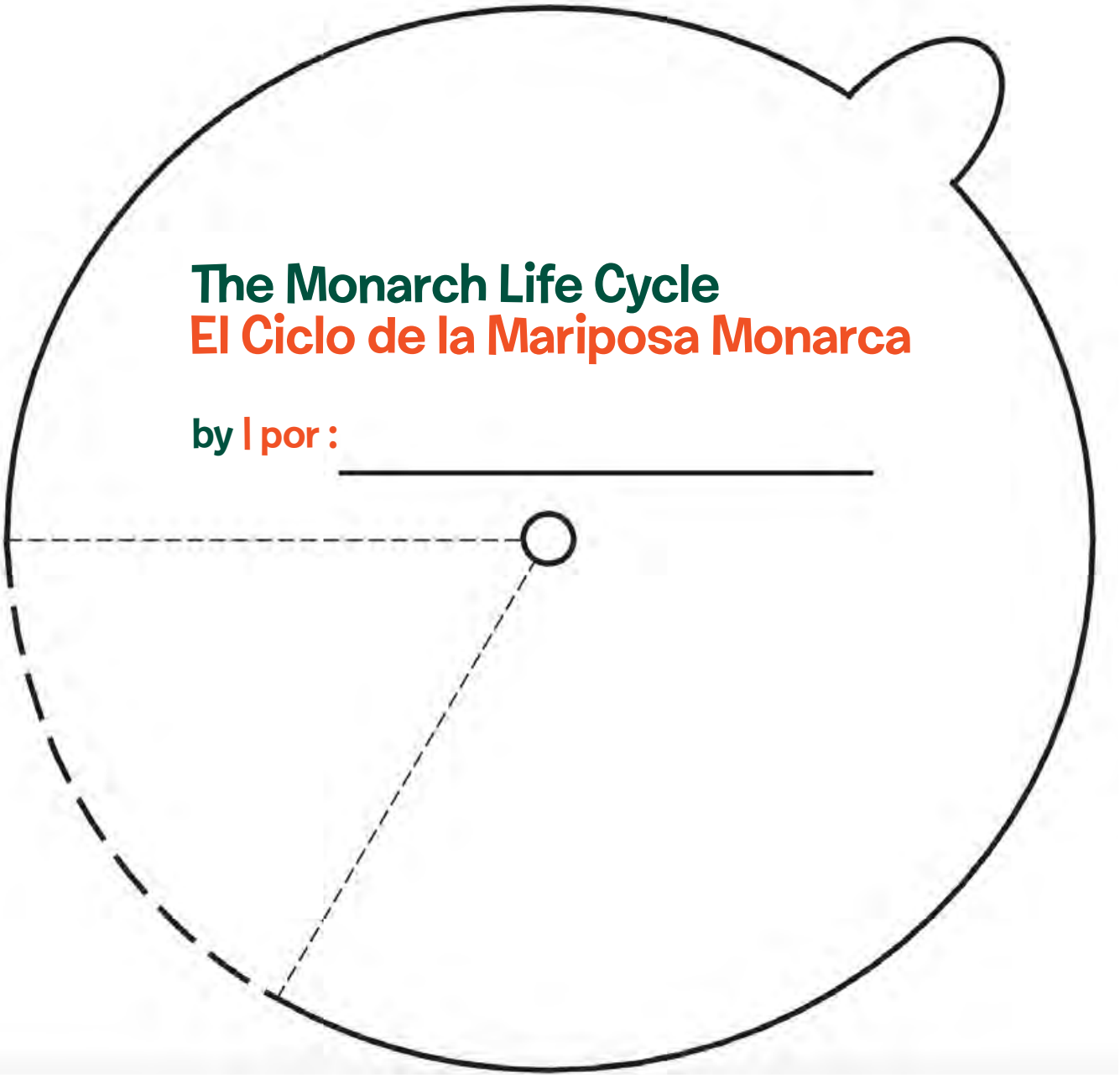
Adult Monarch Butterfly | Mariposa Monarca Adulta

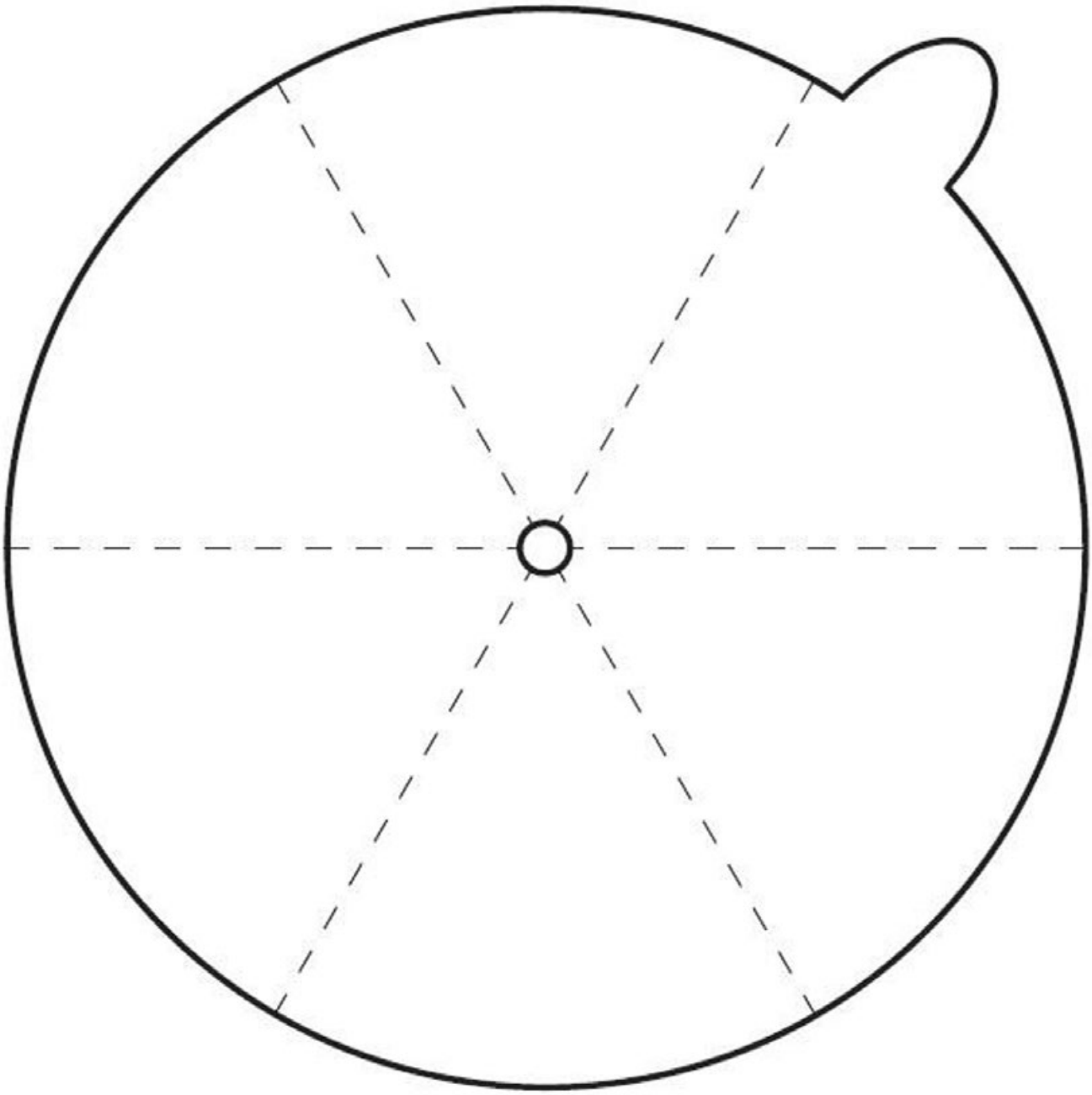
BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

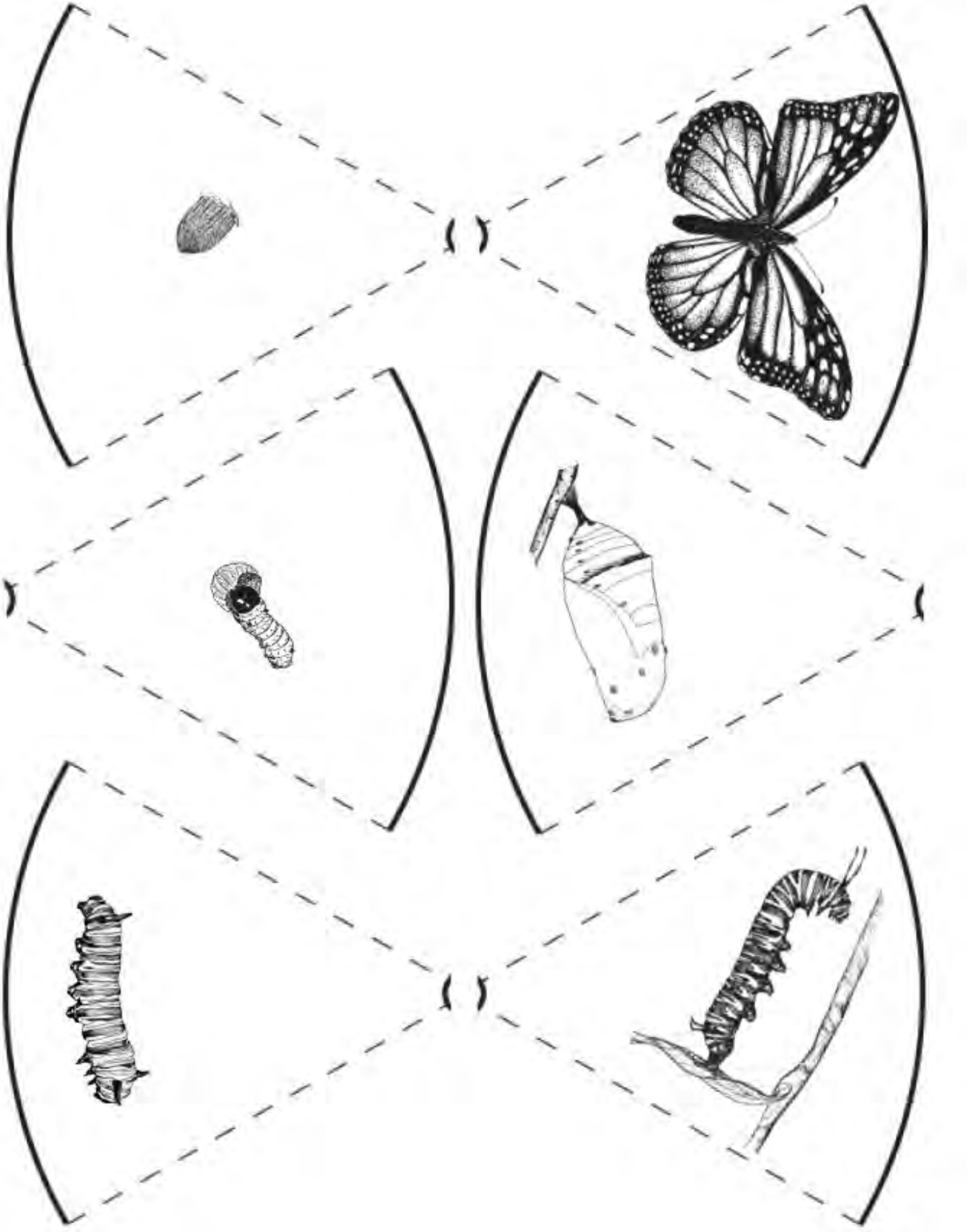
IMAGES COURTESY OF THE U.S. FISH AND WILDLIFE SERVICE MIDWEST REGIONAL CENTER

The Monarch Life Cycle
El Ciclo de la Mariposa Monarca

by | por : _____







www.dltk-ninos.com

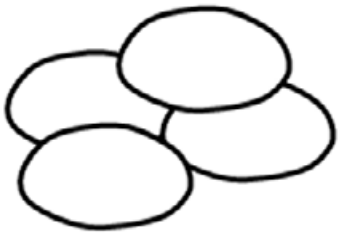
Mariposas

Nombre: _____

The Life Cycle of the Monarch Butterfly

The eggs hatch. Larva eat the milkweed leaves for about 2 weeks as they develop into full grown caterpillars.

The caterpillars attach themselves head down to a convenient twig. They shed their outer skin and begin the transformation into a chrysalis, a process which is completed in a matter of hours.



Adult butterflies lay eggs under milkweed plant leaves.

After about two weeks, the butterfly emerges from the chrysalis.

The butterfly waits unit its wings stiffen and dry before it flies away to start its life cycle all over again.

https://kidzone.ws/animals/monarchlifecycle.htm Used with Permission.

www.dltk-ninos.com

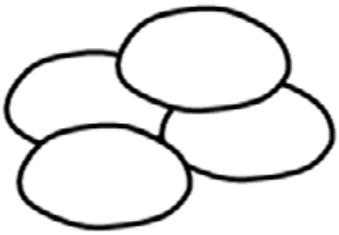
Mariposas

Nombre: _____

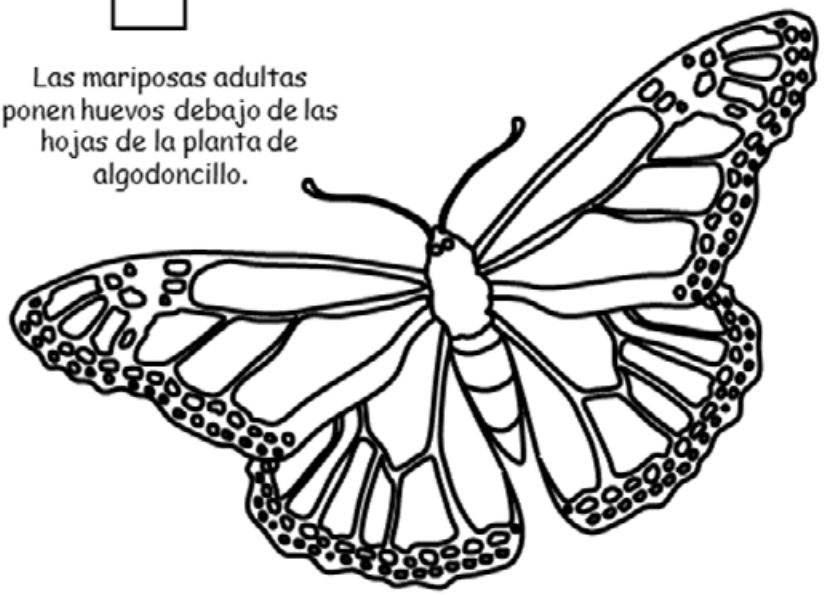
CICLO DE VIDA DE LAS MARIPOSAS MONARCAS

Los huevos se abren. Las larvas se alimentan de las hojas de algodoncillo durante aproximadamente 1 semanas mientras se convierten en orugas totalmente desarrolladas.

Las orugas se pegan de una rama cabeza abajo. Mudan su piel exterior y comienzan su transformación en una crisálida, este proceso se completa en cuestión de horas.



Las mariposas adultas ponen huevos debajo de las hojas de la planta de algodoncillo.



Después de dos semanas, la mariposa emerge de la crisálida.

La mariposa espera hasta que sus alas se endurezcan y se sequen antes de volar para empezar su ciclo de vida nuevamente.

https://kidzone.ws/animals/monarchlifecycle.htm Used with Permission.

BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

scientist	científico
prove	provar
defend	defender
monarch	monarca
transformation	tranformación
emerges	emerge

VOCABULARY	VOCABULARIO
claim	reclamo
gather	reunir
evidence	evidencia
defend	defender

BILINGUAL STRATEGIES

Reporter/interviewer — is a bilingual strategy to help students explain the process that involves several steps.

REPORTER | REPORTERO	INTERVIEWEE | ENTREVISTADO
What tools do scientists use for their experiments? ¿Qué herramientas usan los científicos para sus experimentos?	The tools scientists use are _____. Las herramientas que usan los científicos son _____.
What tools did you use to find out if the butterfly is an insect or a bug? ¿Qué herramientas utilizaste para saber si la mariposas es un insecto o un bicho?	The tools I used were _____. Las herramientas que use fueron _____.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.E
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

For the bilingual strategy, pair students with a beginning or intermediate language proficiency with students with an advanced or high advanced language proficiency. Provide questions and sentences for students. The beginning and intermediate students will ask the questions and the advanced or advanced high will respond to the questions.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

BUTTERFLIES ARE INSECTS | LAS MARIPOSAS SON INSECTOS

Journal Sheet

Guiding Questions/Sentence Stems

After the reporter/interviewee activity, have students write in their diaries using the sentences stems.

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

INVESTIGATING QUESTION:
How does a scientist prove a claim?

The tools that I used to observe the butterfly were _____.

The butterfly is an insect because_____.

Draw a butterfly and write its parts. Diagrams are a good way for ELLs to learn vocabulary.

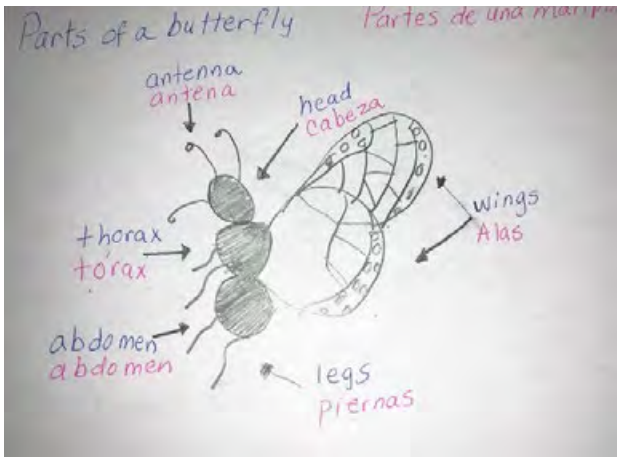
Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados, y la maestra puede escribir su respuesta para modelar la escritura.

PREGUNTA DE INVESTIGACIÓN:
¿Cómo demuestra un científico una afirmación de su investigación?

Las herramientas que usé para examinar la mariposa fueron_____.

La Mariposa es un insecto porque _____.



DRAWING BY ANNABEL HERANANDEZ

K-2

What Do Plants Need To Survive?

(3-4) 30 MINUTE CLASS PERIODS | SCIENCE, MATH, READING, ENGINEERING, WRITING

BACKGROUND

Students are building background knowledge that will help them design, build, study and maintain a Monarch Recovery Garden. Plants and animals each have specific needs that must be met in order to survive. Some of those needs are similar and others are different. Building upon Lesson 1 where we made observations of insect life in the schoolyard, students will now make observations of plants species in the same location.

For something to be considered living it requires food to get energy to carry out all functions. All living things grow and follow a life cycle. All living things breathe; each plant or animal having specialized organs to complete this function. All living things reproduce and have sensory responses, such as animals to extremes in hot and cold and plants to the absence of light, water and air.[1] Plants, as living things require four specific elements to survive, food (in the form of nutrients found in the soil), water, air, and sun.

- **Air -** During the process of photosynthesis, plants use carbon dioxide to make food and release oxygen, as a result.
- **Water -** Roots carry water and nutrients to the plant. Water is also used during the process of photosynthesis by helping to release energy from stored food in the plant. Water pressure also helps to promote the growth of stems and leaves.
- **Nutrients -** Plants derive most nutrients from the soil. Nutrients can also come from fertilizers. Nutrients help plants grow and function properly and act similar to vitamins for humans.
- **Sunlight -** During photosynthesis, plants take energy from sunlight to produce sugars or food.

LESSON OBJECTIVES

Students will:

- Identify and categorize living and non-living elements in the schoolyard.
- Observe plant surroundings and look for patterns amongst a variety of plant life in the schoolyard.
- Identify the four basic needs of plants.

Questions should be answered in student science notebooks and can be discussed in pairs, small groups and with the whole class. Building science literacy starts in PK. Help students build their skills in reading, writing, listening and responding to science.

MATERIALS

- Science notebook
- Sticky notes – each student needs four
- Plant Needs' game cards - each student will receive one colored piece of paper for the game and then will receive one of each color for their science notebook. Create your own and laminate using construction paper or card stock. Colors needed: yellow, blue, white, brown. Size: 3x5 or smaller
- At least one of the three books is needed:
  - *The Dandelion Seed* by Joseph Anthony
  - *Oh Say Can You Seed? All About Flowering Plants* by Bonnie Worth
  - *From Seed to Plant* by Gail Gibbons

Activity 1

Living and Non-Living Parts of a Habitat
Seres Vivientes y No-Vivientes Parte del Hábitat

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

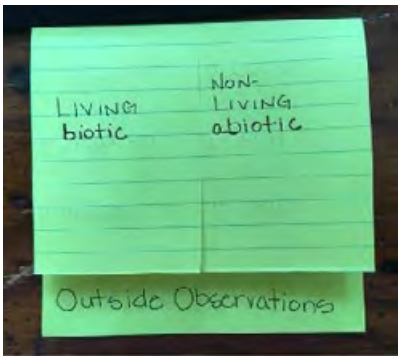
What do I see outside? | ¿Qué veo afuera?

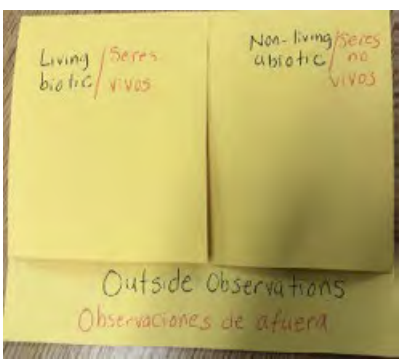
1. **Take students outside, preferably to an outdoor learning space.** Ask students to think back to their nature walk where they explored the schoolyard for insects. Reflect on what was seen while investigating. List all the things that students say in two columns on your whiteboard.
2. **Ask the students the difference between the two columns.** Add the labels to the two columns you've created. Explain by saying, a habitat provides all the things needed for life to exist. The ecosystem is the relationship between all the things that are living and nonliving.

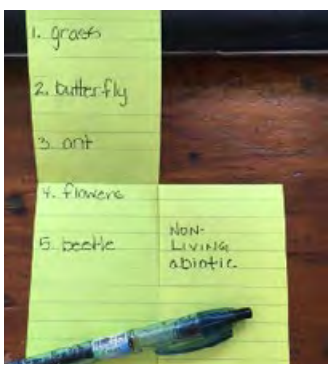
LIVING | BIOTIC	NON-LIVING | ABIOTIC

3. **Once back inside, ask students to create their own chart in their science notebook or create a two-tab foldable**. Ask students to include at least 5 biotic and 5 abiotic elements in their notebook/foldable.

BILINGUAL FOLDABLE







TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(F), K.12(A), K.12(B)
1.1(F), 1.12(A)
2.1(F), 2.12(A)

See Appendix G-1 for full descriptions of TEKS.

NOTE:
Bring a whiteboard and marker outside with you. Be sure to use academic vocabulary with your students.

LIVING AND NON-LIVING PARTS OF A HABITAT
SERES VIVIENTES Y NO VIVIENTES-PARTE DEL HÁBITAT

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

nutrients	nutrientes
plants	plantas
photosynthesis	fotosintesis
air	aire
habitat	habitat
ecosystem	ecosistema

VOCABULARY	VOCABULARIO
living	viviente
non-living	no viviente
need	necesidad
relationship	relación

BILINGUAL STRATEGIES

Explain to students the concept of living and nonliving by showing them examples with pictures or images. ELLs learn by connecting the words with an image.

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Show students the images and point out living and nonliving in the pictures, also show examples around the classrooms.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

2.E
4.F

See Appendix H-1 for full descriptions of ELPS.

NOTES

VIDEO

Students can benefit from watching a video. Videos can help with visuals for images, unknown words and spelling patterns.

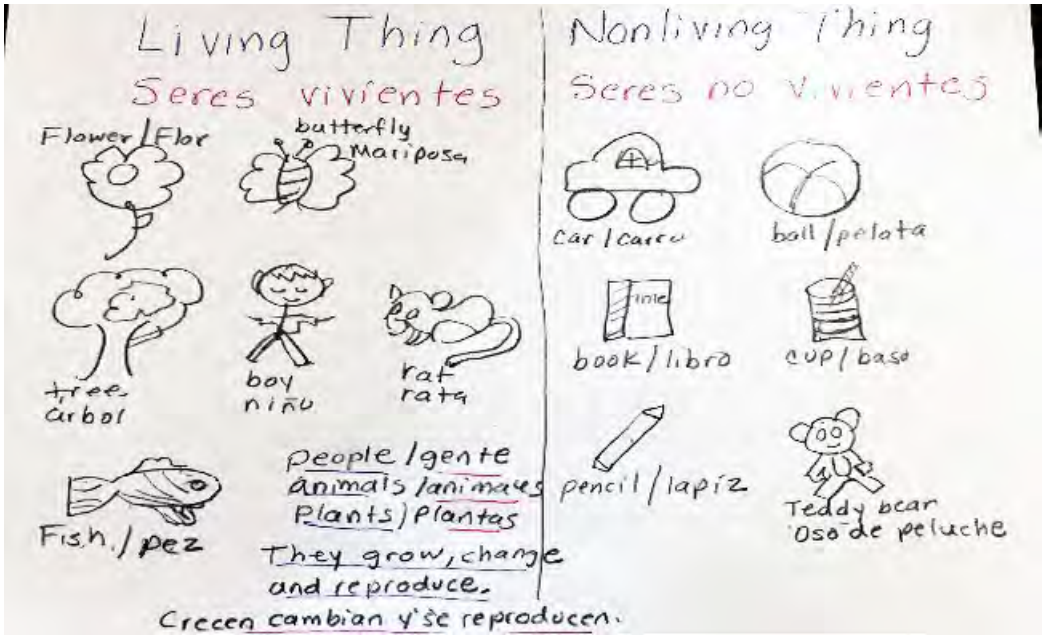
https://youtu.be/HGJVrZ2-DVo

https://www.generationgenius.com/videolessons/living-vs-non-living-things-video-for-kids/

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.



DRAWING BY
ANNABEL HERANANDEZ

LIVING AND NON-LIVING PARTS OF A HABITAT | SERES VIVIENTES Y NO VIVIENTES-PARTE DEL HÁBITAT

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados, y la maestra puede escribir su respuesta para modelar la escritura.

INVESTIGATING QUESTION:
What do I see outside?

1. What are some things that you saw outside?

Some things that I saw outside were _____.

2. Write a difference between a living and non-living thing.

A difference between a living and non-living thing is that a living thing _____ and non-living thing _____.

PREGUNTA DE INVESTIGACIÓN:
¿Qué veo afuera?

1. **¿Cuáles fueron algunas de las cosas que viste afuera?**

Algunas de las cosas que vi afuera fueron _____.

2. **Escribe una diferencia entre un ser viviente y un ser no viviente.**

Una diferencia entre un ser viviente y no viviente es que el ser viviente _____ y el ser no viviente _____.

Activity 2

Observing Plant Life | Observando la Vida de Las Plantas

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What is found around plants?
¿Qué se encuentra alrededor de las plantas?

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(E), K.5(G), K.12(A)
1.1(E), 1.5(G), 1.12(B)
2.1(E), 2.5(G), 2.12(A)

See Appendix G-1 for full descriptions of TEKS.

1. **Take your students back outside, if possible to the same location and with their science notebook.** Reflect with students about the last time they were here. They learned about how living and non- living elements are a part of a habitat. Now students are going to focus on one particular living aspect of a habitat, plants.
2. **Ask students to make up-close observations of the plants, grasses, flowers and trees in the immediate area.** Pick one and then ask them to make sketches in their notebook and answer the following questions.
3. **Next have students talk in groups of four, sharing their sketches and answers to the questions.** Make sure students know they can make changes to their original answers if they find they agree with someone else in the group.

Question 1
How does it look and feel outside?

Pregunta 1
¿Cómo se ve y se siente afuera?

Question 2
Where is the plant?

Pregunta 2
¿Dónde está la planta?

Question 3
What is surrounding the plant?

Pregunta 3
¿Qué rodea a la planta?

Question 4
What do you notice that is helping it grow?

Pregunta 4
¿Qué notas que lo está ayudando a crecer?

OBSERVING PLANT LIFE | OBSERVANDO LA VIDA DE LAS PLANTAS

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

plant	planta
area	area
observe	observar
habitat	habitat
note	nota
groups	grupos

VOCABULARY	VOCABULARIO
flowers	flores
grasses	pasto
aspect	apecto
notice	notar

BILINGUAL STRATEGIES

Provide students with a graphic organizer to help them organize their thoughts, and also provide vocabulary cards such as grass, flowers and trees.

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Explain to students that they will be observing the grass, flowers and trees; point at them while you explain to students. Provide the vocabulary cards so they can become familiar with the words. Then, explain that they will be using the graphic with pictures to help them answer the questions.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.C
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

OBSERVING PLANT LIFE | OBSERVANDO LA VIDA DE LAS PLANTAS

For **ACTIVITY NUMBER 2** partner students; encourage students to talk about their observations by taking turns. To answer the lesson questions, provide students with the following picture cards:

Grass
césped

Flowers
flores

Tree
árbol

Looks
mira

Feel
sentir

Surrounds
rodeando

Food
comida

Environment
ambiente

OBSERVING PLANT LIFE | OBSERVANDO LA VIDA DE LAS PLANTAS

For **ACTIVITY NUMBER 3** teach students what to say instead of "I don't know." Often ELLs don't have enough vocabulary to express their answers. If they are provided with more information or time to think, they will be able to express some of their thoughts.

What to say instead of "I Don't Know"

May I please have some more information?

Would you please repeat that question?

May I have some time to think?

May I ask a friend for help?

Where could I find more information about that?

Qué decir en vez de "No Sé"

¿Me podría dar más información?

¿Podría repetir la pregunta?

¿Me podría dar más tiempo para pensar?

¿Puedo pedir ayuda a un amigo?

¿Dónde puedo encontrar más información sobre eso?

Activity 3

Plants' Needs | Lo Que Necesitan las Plantas

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What do plants need to survive?
¿Qué necesitan las plantas para sobrevivir?

1. **After the student's recent plant observations, we want to focus on what plants actually require to survive.** Put up four large sticky (chart paper size) notes. In the same groups as yesterday, ask one person from each group to place an answer on the sticky note. Once completed, ask the students to take another look at the charts, look for patterns. Now ask them what four things plants need to survive. See if they can come up with air, water, sun and soil.

What does it look and feel like outside?	What is surrounding the plants?	What do you notice that is helping the plants grow?	Does how it looks and feels outside help plants grow? YES NO

Steps 2 and 3 are encouraged to be completed outside.

2. **Read**: *Oh Say Can You Seed? All about Flowering Plants* by Bonnie Worth and/or *From Seed to Plant* by Gail Gibbons.
3. To reinforce the four elements that plants need to survive, tell students they are going to play a quick game.
   - » To play, give each student 1 of the following pieces of colored paper (yellow, blue, white, and brown) no bigger than 3x5.
   - » **Without making any sounds,** they have to find the other three elements a plant needs to survive. For example, if student one has a yellow strip of paper, then they have to find a student who has a blue, a student who has a white and a student who has a brown piece of paper.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(F), K.12(A)
1.1(F), 1.12(B)
2.1(F), 2.12(A)

ENGINEERING OPTION
K.2(D)
1.2(D)
2.2(D)

See Appendix G-1 for full descriptions of TEKS.

NOTES

NOTE: Add images and/or print out text to help younger students whose reading and written skills are not as well developed as students in older grades.

- Then as a group they must tell each other what element they are **without speaking.**
- When the group feels they've completed the task, they are to immediately sit down where they are, **remaining silent.**
- Let one group member **whisper** to you the four elements plants need to survive.
- Provide a reward for each group who is correct.
- **Optional:** After confirming each group's correct answers, they must act out each element for the rest of the class – all without talking. First ask all the "suns" to stand up, students will act out the sun, then ask all the "soils" to stand up, students will act out the soil. Do the same for water and air.

4. Once back in the class give each student one of each colored paper. Have them write what element the colored paper represents and then create a page titled, **What Plants Need to Survive**, in their science notebook. Students may cut the paper down and tape or glue them into their notebook.

ENGINEERING OPTION

Design a learning tool using LEGOs that teaches what plants need to survive. After they have a concept, provide student pairs with LEGOs. Once they have completed their first design ask them to test it on other students. Did it work as they planned? Allow them time to go back to the drawing board and redesign their model. Also allow students to take photos of their design. Print them off and display them in the class.

PLANTS' NEEDS | LO QUE NECESITAN LA PLANTAS

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

require	requiere
person	persona
pieces	piezas
elements	elementos
correct	correcto
plan	plan

VOCABULARY	VOCABULARIO
need	necesidad
surrondings	alrededor
patterns	patrones
water	agua

BILINGUAL STRATEGIES

To help students to understand the 4 basic elements that plants need to survive, build students background knowledge by using a venn diagram to compare the elements that humans need to survive.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.C
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

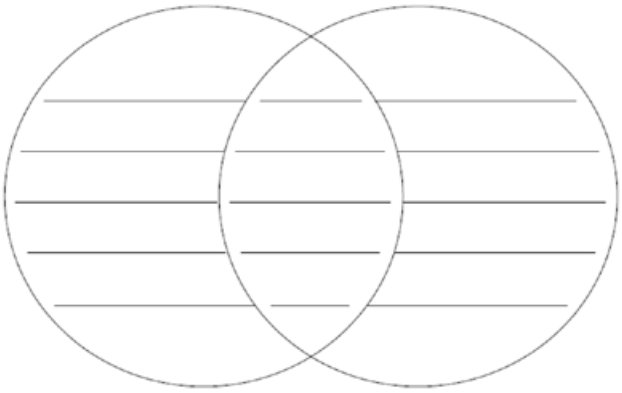
INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Ask students what they need in order to survive, then ask what plants need to in order to survive. Write the answers in a venn diagram, if possible draw an image next to each word.

Humans | Humanos **Plants | Plantas**



- food | comida
- shelter | abrigo
- sunlight | sol
- water | agua
- soil | tierra
- clothing | vestimenta
- air | aire

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

PLANTS' NEEDS | LO QUE NECESITAN LA PLANTAS

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson); or the wall of cognates; and the teacher can write their answer to model the writing.

INVESTIGATING QUESTION:
What do plants need to survive?

1. What does it look and feel like outside?

Outside looks _____ and feels _____.

2. What is surrounding the plants?

The plants are surrounded by _____ and _____.

3. Does how it looks and feels outside help plants grow? Yes, no and why?

How it looks helps the plants grow because _____.

How it looks **doesn't** help the plants grow because _____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección); o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

PREGUNTA DE INVESTIGACIÓN:
¿Qué necesitan las plantas para sobrevivir?

1. **¿Cómo se ve y se siente afuera?**

Afuera se ve _____ y se siente _____.

2. **¿Qué hay alrededor de las plantas?**

Alrededor de las plantas hay _____

3. **¿Cómo se ve y se siente afuera ayuda a las plantas a crecer? Si no y porque?**

Como se ve afuera ayuda a que las plantas crezcan porque _____.

Como se ve y se siente afuera **no** ayuda a que las plantas crezcan porque

K-2 Properties of Matter in a Monarch Garden

120 MINUTES OVER A WEEK'S TIME| SCIENCE, MATH, READING, ENGINEERING, WRITING

BACKGROUND

Matter can be understood in terms of the types of atoms present and the interactions both between and within those atoms. The states, properties and reactions of matter can be described and predicted based on the types, interactions and motions of the atoms within it, both in living and nonliving systems.

By the end of grade two, students should be able to distinguish between different kinds of matter, and understand that matter exists in many forms. Matter can be described and classified by its observable properties, by its uses and by whether it occurs naturally or is manufactured. Also, by the end of grade two, students are expected to recognize that types of matter with different properties are suited to different purposes, e.g. soil can be used for planting plants or blocks are part of construction sets.

As students get ready to work on their Monarch Recovery Garden, it's important they have a basic understanding about how the sun warms the Earth. The sun's energy and how it flows through matter is an important concept that will be built upon now and through high school. K-2 students only need to know that the sun provides warmth and when the sun is not visible, whether due to the Earth's rotation or because it is covered by clouds, they do not feel as warm as they did before. This is also a good opportunity to identify patterns in seasonal and daily weather.

While the study of properties of matter is typically reserved for students' studies of physical science, it's essential they recognize matter exists all around us, even in a garden. Students will begin to identify properties of matter by observing objects found in their garden. They will observe color, state (solid, liquid gas), texture and flexibility of matter.

LESSON OBJECTIVES

Students will:

- Make weather observations.
- Record data about the sun's impact on the Earth's surface.
- Record properties of matter found in the monarch garden.

MATERIALS

- Science notebook
- 2 outdoor thermometers
- Copies of the data collection sheets:
  Sunlight Observations-Data Collection
  Discovery Box Data
- **Book:** *What Is It Made Of? Noticing Types of Materials*, by Marth E.H. Rustad (If you do not have this title in your library work with your librarian to find a suitable substitute.)
- Discovery Boxes with garden items. See Activity 2 notes for more information.

Activity 1

Observing the Weather
Observando el Clima

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What's the weather like outside?
¿Cómo está el clima afuera?

1. Choose a time period over the next 5 days to take students outside with their science notebooks for 5-10 minutes. Once outside, prompt students to collect their data on the Sunlight Observations data sheet in their science notebook.
   Option: You can cut out each data collection sheet and tape each page as a series, one underneath the other.
   This will ensure all the collection sheets will be on one notebook page and more easily flipped through.
2. In preparation for *Activity 2 – What's the Matter in the Garden?*, have students collect one item from the schoolyard each of the 5-days. These items can be placed into the discovery boxes and used as part of the activity. These discovery box items can be reused again in Activity 4.

ENGINEERING OPTION
Have students determine how they can use LEGOs to construct a bar graph showing the data they collected over their 5-days of weather observation.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(D), K.1(E), K.1(F), K.2(B), K.3(A), K.5(B), K.5(E), K.5(G), K.9(B), K.10(B)
1.1(D), 1.1(E), 1.1(F), 1.2(B), 1.3(A), 1.5(B), 1.5(E), 1.5(G), 1.10(D)
2.1(D), 2.1(E), 2.1(F), 2.2(B), 2.3(A), 2.5(B), 2.5(E), 2.5(G), 2.9(A), 2.10(B)

ENGINEERING OPTION
K.1(G), 1.1(G), 2.1(G)

MATH
K.1(E), K.1(F), K.8(A), K.8(B), K.8(C)
1.1(E), 1.1(F), 1.8(A), 1.8(B), 1.8(C)
2.1(E), 2.1(F), 2.10(B), 2.10(D)

See Appendix G-1 for full descriptions of TEKS.

NOTE:
This activity requires a 5-day observation period with at least one sunny day. In preparation for this activity do each of the following:

- Place two thermometers outside to measure temperature, one in a location receiving full sun and another in a location that is shaded. Do not wait until you are outside with students to place the thermometers. Setting them up before school will allow the sun's energy to flow through them during the lunch hour before taking your students out to make observations.
- Cut out the data sheet or have students cut out the data sheet and glue it in their science notebook. Their data will serve as evidence for future discussions.

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Sunlight Observation Data Collection

Recopilación de Datos de Observación de Luz Solar

NAME | NOMBRE:

DATE | FECHA: _____

Circle the day of the week. | Encierra en un círculo el día de la semana.

Monday lunes	Tuesday martes	Wednesday miércoles	Thursday jueves	Friday viernes

Temperature in Full Sun: _____°F/°C

Temperatura en Pleno Sol _____°F/°C

Temperature in the Shade: _____°F/°C

Temperatura en la Sombra _____°F/°C

Circle what it looks like outside. | Encierra en un círculo como esta el clima fuera.

Cloudy nublado	Partly Sunny parcialmente nublado	Raining/Snowing Lluvioso/nevando	Sunny Soleado

Circle how you feel when you stand in the SUN.
Encierra en un círculo cómo te sientes cuando estás parado en el SOL.

Hot Caliente	Warm Cálido	Cold Frío	Cool Medio frío

Circle how you feel when you stand in the SHADE.
Encierra en un círculo cómo te sientes cuando estás parado en la sombra.

Hot Caliente	Warm Cálido	Cold Frío	Cool Templado

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Sunlight Observation Graph
Gráfico de Observación de Luz Solar

TEMPERATURE IN THE SHADE | TEMPERATURA EN LA SOMBRA

100°					
95°					
90°					
85°					
80°					
75°					
70°					
65°					
60°					
55°					
50°					
45°					
40°					
35°					
30°					
25°					
20°					
15°					
10°					
5°					
0°					
Temperature In Fahrenheit Temperatura En Fahrenheit	Monday Lunes	Tuesday Martes	Wednesday Miércoles	Thursday Jueves	Friday Viernes

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Sunlight Observation Graph
Gráfico de Observación de Luz Solar

WHAT IT LOOKS LIKE OUTSIDE | CÓMO SE VE FUERA

Place an X in the chart box that shows what it looks like for each day you make observations.
Coloca una X en el cuadro del gráfico que muestra cómo se ve cada día que hace observaciones.

Cloudy Nublado					
Partly Sunny Parcialmente Nublado					
Rainy/Snowy Lluvioso/ Nevanado					
Sunny Soleado					
Type of Weather Tipo de clima	1	2	3	4	5

OBSERVATION DAY | DÍA DE OBSERVACIÓN

Write 1-2 sentences summarizing your graph.
Escribe una o dos oraciones que resuman tu gráfica.

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Sunlight Observation Graph
Gráfico de Observación de Luz Solar

HOW I FEEL WHEN I STAND OUTSIDE | CÓMO ME SIENTO CUANDO ESTOY AFUERA

Amount of Sun Cantidad De Sol				
Full Sun Pleno sol				
Shade Sombra				
	Hot Caliente	Warm Cálido	Cold Frío	Cool Templado

HOW MANY TOTAL STUDENTS FOR THE WEEK | CUÁNTOS ESTUDIANTES EN TOTAL POR LA SEMANA

When you think about the temperature outside during your week-long observations, did the temperature feel different in the sun versus in the shade?

YES NO

Cuando piensas en la temperatura exterior durante tus observaciones de una semana, ¿la temperatura se sintió diferente al sol que a la sombra?

SI NO

GIVE A REASON FOR YOUR ANSWER. | JUSTIFICA TU RESPUESTA.

_____

_____

_____

_____

WHICH STATEMENT BEST DESCRIBES THE SUN? | ¿QUÉ ENUNCIADO DESCRIBE MEJOR AL SOL?

Provides warmth to humans, wildlife and plants. | Brinda calidez a los humanos, la vida silvestre y las plantas.

Helps humans, wildlife and plants cool down. | Ayuda a los humanos, la vida silvestre y las plantas a enfriarse.

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Discovery Box | Caja de Descumbrimiento

PROPERTIES OF MATTER | PROPIEDADES DE LA MATERIA

NAME | NOMBRE: _____

Object Name Nombre del Objeto	Use Uso	Color Color	Solid Liquid, or Gas Sólido, Líquido O Gas	Texture Textura	Flexibility Flexibilidad

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

observation	observación
properties	propiedades
gas	gas
energy	energía
liquid	liquido
solid	sólido

VOCABULARY	VOCABULARIO
weather	clima
time	tiempo
data	datos
collect	recoger

BILINGUAL STRATEGIES

Students benefit greatly from a Know-Want to Know-Learned (KWL) graphic organizer. They are effective tools for engaging students in the learning process, helping them recall knowledge, by finding out what they want to know and tracking their learning progress. Teachers gain a better understanding of how much students already know about the subject, and they can help fill the gap with the information the student is not familiar with.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.E
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Have a KWL chart poster ready on the board and provide students with the same chart to paste in their notebooks. Then ask students what they know about the weather. Fill the chart on the board with their answers. Students will copy their answers into the chart in their notebooks. Then ask them what they want to know about the weather outside and record their answers in the correct column. Explain to students that at the end of the lesson, they will fill out the last column on their own with what they have learned.

K What I already **KNOW** about the topic!	**W** What I **WANT** to know about the topic!	**L** What I **LEARNED** about the topic!
S ¡ Lo que ya sé **SOBRE** el tema!	**Q** ¡ Lo que **QUIERO** saber sobre el tema!	**A** ¡ Lo que **APRENDÍ** sobre mi tema!

EXAMPLE OF KWL/SQA GRAPHIC ORGANIZER

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

OBSERVING THE WEATHER | OBSERVANDO EL CLIMA

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

INVESTIGATING QUESTION:
What's the weather like outside?

1. What is your weather prediction for tomorrow?

My weather prediction for tomorrow is _____.

2. What is your favorite type of weather and why?

My favorite weather is _____ because _____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados, y la maestra puede escribir su respuesta para modelar la escritura.

PREGUNTA DE INVESTIGACIÓN:
¿Cómo está el clima afuera?

1. ¿Cuál es tu predicción del clima para el día de mañana?

Mi predicción del clima para el día de mañana es _____.

2. ¿Cuál es tu clima favorito y porque?

Mi clima favorito es _____ porque _____.

Activity 2

What's the Matter In the Garden?
¿Qué Pasa en el Jardín?

1. **Read:** *What Is It Made Of? Noticing Types of Materials* by Martha E. H. Rustad.
2. This activity is best suited for the outdoors. Provide each group of 2-4 students with a discovery box. Ask students to record their observations for each piece of matter in the box in their science notebook. **Option**: If your discovery boxes include several pieces of matter then you may ask students to pick 4-5 to observe.
3. **Explain:** "There's a lot of 'matter' in a garden. When we work on our Monarch Recovery Garden, it will be important to have an understanding of the matter our monarchs and other wildlife will encounter."

NOTES

Soon students will be working on the creation, design, implementation and maintenance for the school's Monarch Recovery Garden(s). The properties of matter investigation is designed with the garden(s) in mind.

Depending on the ages of your students, either have your students create the data collection pages in their science notebook or use the data collection pages below. After collecting data students can cut it out and glue it into their science notebook.

DISCOVERY BOX - items listed are only suggestions and remember students may have collected discovery box items during their 5-day weather observations from Activity 1.

Suggested Box Size: shoe size

Include magnifying glass(es), variety of mulches (hardwoods of varying colors, recycled mulches), pebbles, soil, lava sand, dried molasses, moss, plant leaves, flowers, stems, sealed vials of water and air, etc.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

K.1(D), K.1(E), K.6, K.10(A)
1.1(D), 1.1(E), 1.6(A), 1.10(A)
2.1(D), 2.1(E), 2.6(A)

See Appendix G-1 for full descriptions of TEKS.

NOTES

WHAT'S THE MATTER IN THE GARDEN? | ¿QUÉ PASA EN EL JARDÍN?

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

require	requiere
person	persona
pieces	piezas
elements	elementos
correct	correcto
plan	plan

VOCABULARY	VOCABULARIO
garden	jardín
matter	materia
recovery	recuperar
wildlife	fauna silvestre

BILINGUAL STRATEGIES

To help students to understand the properties of matter use the vocabulary cards.

INSTRUCTIONS

Go over the cognate list with students and have them listen to you first, then repeat after you, and last say them by themselves.

For the properties of matter lesson, print or project the cards and show them one by one. Students need to tell you the properties of matter of the image. When the students finish naming their properties, place the card on the board.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.C
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

CARDS ON PAGE 125 AND 126

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

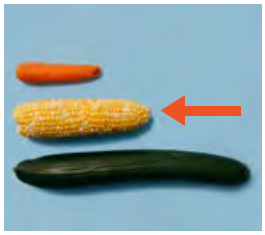
WHAT'S THE MATTER IN THE GARDEN? | ¿QUÉ PASA EN EL JARDÍN?

Big
grande

Circle
circulo

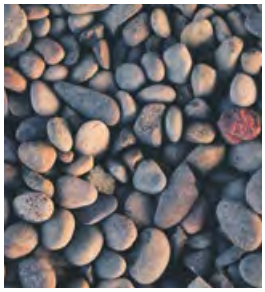
Rough
áspera

Pink
rosa



Medium
medio

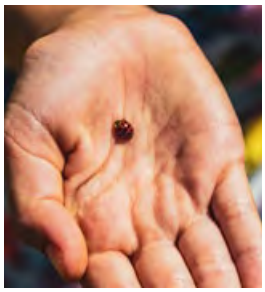
Triangle
triángulo



Smooth
suave

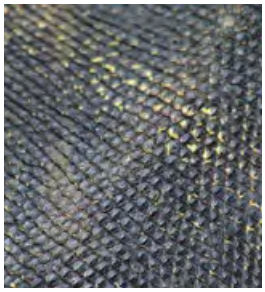
Gray
gris

WHAT'S THE MATTER IN THE GARDEN? | ¿QUÉ PASA EN EL JARDÍN?



Small
pequeña

Hexagon
hexágono

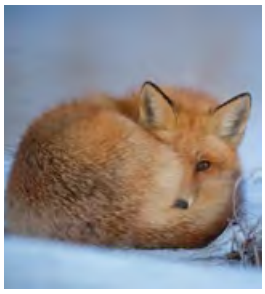


Bumpy
desigual

Black
negra

Thin
delgada

Rectangle
rectángulo



Soft
mullido

Brown
marrón

WHAT'S THE MATTER IN THE GARDEN? | ¿QUÉ PASA EN EL JARDÍN?

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

1. Give an example of matter?

An example of matter is

_____.

2. Describe the fox's fur from the picture.

The fox's fur is _____,

_____, and _____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados, y la maestra puede escribir su respuesta para modelar la escritura.

1. **¿Da un ejemplo de la materia?**

Un ejemplo de la materia es

_____.

2. **Describe el pelo del zorro en la photo.**

El pelo del zorro es_____,

_____, y _____.

K-2 Building a Monarch Habitat – A Friend in Need is a Friend Indeed

(3-4) 30 MINUTE CLASS PERIODS | SCIENCE, MATH, READING, ENGINEERING, WRITING

BACKGROUND

Pollinators are animals that move from plant to plant while searching for protein-rich pollen or high- energy nectar to eat. As they go, they are dusted by pollen and move it to the next flower, fertilizing the plant and allowing it to reproduce and form seeds, berries, fruits and other plant foods that form the foundation of the food chain for other species—including humans. Pollinators are themselves important food sources for other wildlife. Countless birds, mammals, reptiles and amphibians eat the protein and fat-rich eggs, larvae, or adult forms of pollinators, or feed them to their young. Pollinators play a critical role in the food supply for wildlife and people!

Bees are well-known pollinators, but over 100,000 vertebrates – including butterflies, moths, wasps, flies and beetles – and over 1,000 mammals, bird reptiles and amphibians, act as pollinators. The loss of any species weakens the ecosystem that all species rely on for survival, including humans. Monarch butterfly decline is an indicator that there is something wrong in our shared environment and a warning that we could be affected as well. Do we really want to live in a world where the next generation has no chance of seeing a monarch butterfly on a flower?

THE PROBLEM:

- The North American monarch population has declined by more than 90 percent in the past two decades. This is due to decline in summer breeding habitat in the U.S. and decline in winter habitat in Mexico.
- 1/3 of the monarch's summer breeding habitat has been destroyed, largely in the Midwest. Expansion of row crop agriculture and, to a lesser extent, development, has destroyed 90 percent of our nation's native grassland ecosystems, on which monarchs depend. Milkweed, the only host plant for monarch caterpillars, has declined in the U.S. due to overuse of herbicides by commercial agriculture and conventional gardening practices in suburban and urban areas.

- Monarch overwintering sites are under threat, especially in Mexico where the forests used by monarchs are under logging pressure.
- Monarchs are being directly killed by insecticides both as adult butterflies and as caterpillars, in agricultural, suburban and urban landscapes.

LESSON OBJECTIVES

Students will:

- Identify elements of a habitat.
- Observe a variety of different habitats.
- Define diversity.
- Count the different types of plant and animal life in each habitat.
- Talk about monarch butterfly decline.
- Build a model of a Monarch Recovery Garden.

MATERIALS

- Science notebook.
- Copies of Habitats and Diversity, 1 per student or pair of students.
- National Geographic: *How to Create Your Own Monarch Butterfly Rest Stop*, 4:34 https://www.youtube.com/watch?v=6JpLR2hpfSk&feature=youtu.be.
- Habitat Hunt, 1 per student pair.
- Habitat Hunt Animal Cards, 1 per student pair (cards can be repeated or more cards can be developed).
- Monarch Recovery Model Boxes, 1 box per 2 students. To create the Monarch Recovery Garden Model boxes, see the Engineering Options in Activity 3.
- Copies of the Monarch Recovery Garden Model Guide, 1 per student pair.

Activity 1

Habitat Diversity | Diversidad de Hábitat

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN

What does "diversity" mean?
¿Qué significa "diversidad"?

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(E), K.5(D), K.12(A), K.12(B)
1.1(E), 1.5(D), 1.12(A)
2.1(E), 2.5(D), 2.12(A)

See Appendix G-1 for full descriptions of TEKS.

NOTES

1. Gather three books and/or three images from the internet showing different ecosystems and the wildlife, plants and animals that are found there. Another option would be to work with your librarian and/or art teacher to locate similar books and photographs or paintings for this activity. Book choices include:
   - **AUTHOR: TONY FREDERICKS**
     - *In One Tide Pool*
     - *Near One Cattail: Turtles, Logs and Leaping Frogs*
     - *Under One Rock*
   - **AUTHOR: MARY QUATTLEBAUM**
     - *Jo MacDonald Hiked the Woods*
     - *Jo MacDonald Saw a Pond*
   - **AUTHOR: MARIANNE BERKES**
     - *Over in a Forest: Come and Take a Peek*
     - *Over on a Mountain: Somewhere in the World*
     - *Over in the Ocean: In a Coral Reef*
     - *Over in a River: Flowing Out to Sea*
2. Students will use each of the three images or a page from three different books to take a closer look at the diversity or difference in plant and animal life in each habitat. Use the *Habitats and Diversity* data sheet. Then students will go outside to look at the diversity in plant and animal life in the schoolyard. Students will organize their observations using box 4 of the Habitats and Diversity data sheet.
3. Talk about what they think diversity means in a habitat based on the data they collected. Complete this activity by allowing students to share what they found and then write or draw in their science notebook what diversity means.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

ecosystem	ecosistema
diversity	diversidad
nectar	néctar
protein	proteína
fertilization	fertilización
produce	produce

VOCABULARY	VOCABULARIO
define	definir
count	contar
decline	disminución
model	modelo

BILINGUAL STRATEGIES

To help students understand the lesson vocabulary the instructor can use a Frayer Model graphic organizer, on page 134, where students can draw or write the definition, illustration, example and not an example.

INSTRUCTIONS

Go over the cognate list with students and have them listen to you first, then repeat after you, and last say them by themselves. To use the Frayer Model (pg. 134), the instructor can fill the graphic with students. Once students become familiar they can do it in partners or by themselves.

FRAYER MODEL ON PAGE 134

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.C
2.E

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing, they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede dibujar en vez de escribir, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

INVESTIGATING QUESTION:
What does "diversity" mean?

1. Write the word diversity in the line, then read the whole sentence.

The rainbow's diversity of colors is pretty.

The rainbow has a _____

of colors.

The zoo has a _____

of animals.

PREGUNTA DE INVESTIGACIÓN:
¿Qué significa diversidad?

1. **Escribe la palabra diversidad en el espacio de la oración y después lee la oración completa.**

La diversidad de colores del arcoiris es bonita.

El arco iris tiene _____

de colores.

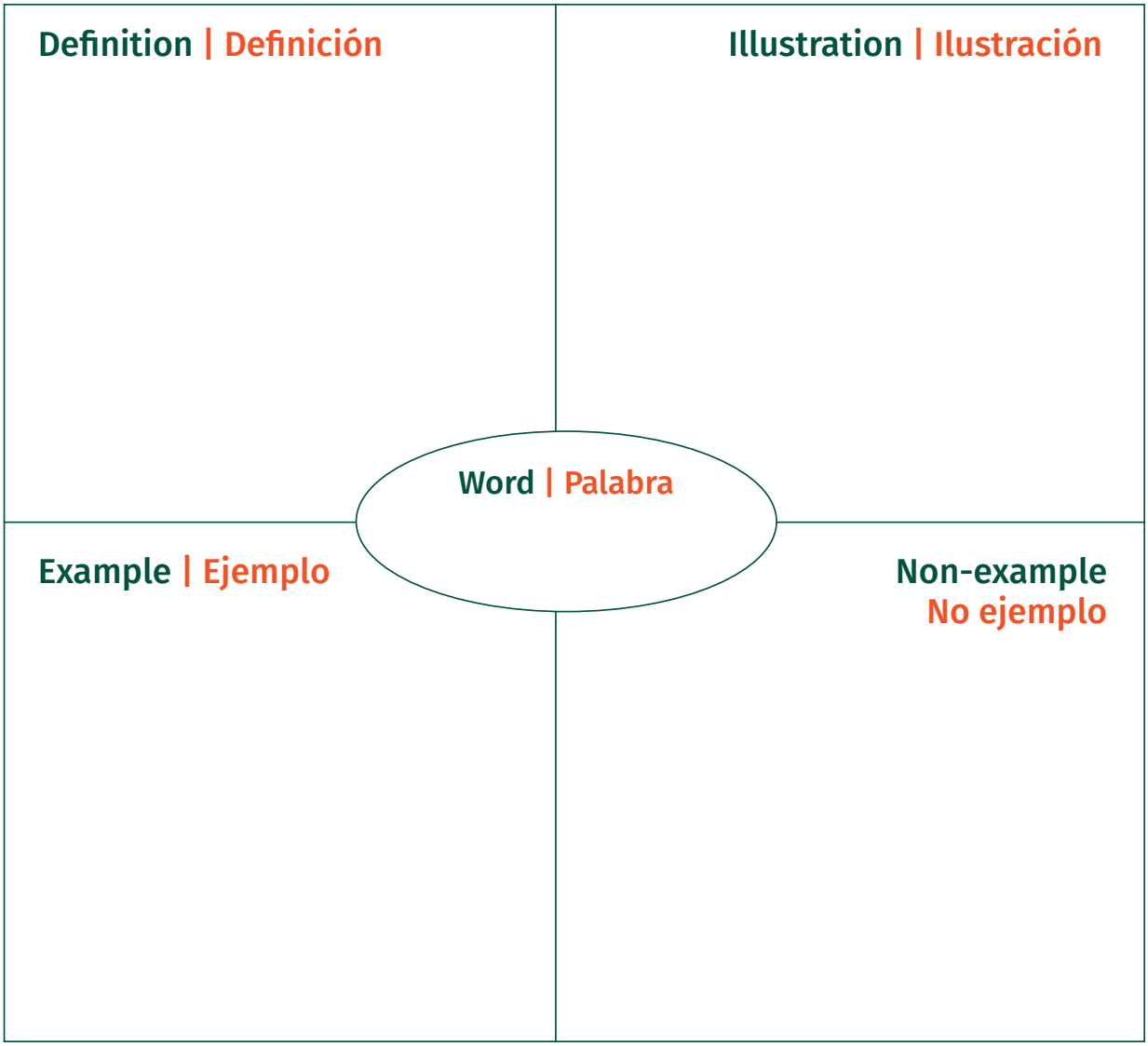
El zoológico está lleno de

_____ de animales.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Frayer Bilingual Model (FBM)

Choose a couple vocabulary words and have students fill the FBM with each word. Students will need a FBM for each word. This will help students to understand and practice vocabulary. Students can work in pairs or groups.



Activity 2

Habitat Hunt | Caza de Hábitat

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What habitat elements are found in my schoolyard?
¿Qué elementos del hábitat se encuentran en el patio de mi escuela?

1. Review the four basic elements of habitat and the importance of each for an animal's survival.
2. The Habitat Hunt will be completed outside. Give each pair of students a Habitat Hunt data sheet, found on p. 138, clipboard, and four different colored flags.
3. Then provide each student pair or allow students to choose a local/regional animal. Once they have their animal explain: "You are a _____ , and in order to survive you need food, water, cover and places to raise your young. Take a look around you. Do you see all the necessary habitat elements for you to survive here?" Have students spend some time exploring the area of the schoolyard you have defined for them, looking for all the characteristics of habitat that meet their specific needs. Based on what they find, they will determine if the area could be considered "home" or if they need to continue looking.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(E), K.3(B), K.5(D), K.12(B)
1.1(E), 1.3(B), 1.5(D), 1.12(A)
2.1(E), 2.3(B), 2.5(D), 2.12(A)

See Appendix G-1 for full descriptions of TEKS.

NOTES

NOTE: It will be necessary for students to identify the habitat needs of their individual animals prior to going outside to complete their data sheet.

When students return to the classroom, wrap up by allowing them to share with another pair of students or share out with the entire class.

OPTIONAL: Allow students to take photos using their personal phones or school iPads of each habitat element they find. Print those images and have students place them on the back of this page, with tape, and label underneath the image what habitat element is pictured. Students may find they have anywhere from no elements to all four.

Habitats and Diversity | Hábitats y Diversidad

Question 1

Look at each habitat. Why do you think it is important to have a variety of plants in a habitat?

Pregunta 1

Mira cada hábitat. ¿Por qué crees que es importante tener una variedad de plantas en un hábitat?

Habitat Hunt | Caza de Hábitat

Question 1

Will you stay and set up home for you and your family here? Why or why not?

Pregunta 1

¿Te quedarás y establecerás un hogar para ti y tu familia aquí? ¿Por qué si o por qué no?

Question 2

What other habitat elements would you like to see here?

Pregunta 2

¿Qué otros elementos del hábitat te gustaría ver aquí?

Question 3

If habitat elements could be added to meet your survival needs could you stay and set up home here?

Pregunta 3

Si se pudieran agregar elementos de hábitat para satisfacer tus necesidades de supervivencia, ¿podrías quedarte y establecerse casa aquí?

HABITAT HUNT | CAZA DE HÁBITAT

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

elements	elementos
habitat	habitat
animal	animal
explore	explorar
correct	correcto
necessary	necesario

VOCABULARY	VOCABULARIO
hunt	caza
regional	regional
basic	basico
review	revisión

BILINGUAL STRATEGIES

To help students understand the lesson, review the vocabulary words before the activity. This will help students to comprehend what they are looking for outside.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

2.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

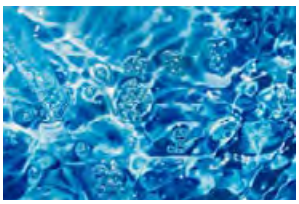
INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Before students start hunting, take a few minutes to explain some **key vocabulary**: *food, water, shelter and a place to raise young*. First, show students the picture of the vocabulary or draw it on the board. Second, have students repeat the word after you. Third, ask students if they know the word in Spanish, write the word under the English word. Then, say a sentence with each vocabulary word and have students repeat it after you. Finally, partner students and ask them to use the words in a sentence.

Food
Alimento



Water
Agua

Shelter
Albergue

Place to raise young
Lugar para la cría

The food is delicious.	La comida está rica.
I like to drink water.	Me gusta beber agua.
The birds need shelter to sleep.	Los pájaros necesitan un albergue para dormir.
The forest is a good place for a bear to be raised.	El bosque es un buen lugar para que crezca un oso.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

HABITAT HUNT | CAZA DE HÁBITAT

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

INVESTIGATING QUESTION:
What habitat elements are found in my schoolyard?

1. What are the necessary elements of a habitat?

The necessary elements of a habitat are _____, _____, _____, and _____.

2. Do you think that a mountain lion can live in the schoolyard? Why or Why not?

I think that a mountain lion can live in the schoolyard because _____ _____.

I **don't** think that a mountain lion can live in the schoolyard because _____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir; puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados, y la maestra puede escribir su respuesta para modelar la escritura.

PREGUNTA DE INVESTIGACIÓN:
¿Qué elementos del hábitat se encuentran en el patio de mi escuela?

1. **¿Cuales son los elementos necesarios de un hábitat?**

Los elementos necesarios de un hábitat son _____, _____, _____ y _____.

2. **¿Crees que un oso león de montaña puede vivir en el patio de la escuela? ¿Por qué sí o por qué no?**

Yo creo que en un oso león de montaña si puede vivir en el patio de la escuela porque _____ _____.

Yo creo que un oso león de montaña **no puede** vivir en el patio de la escuela porque _____.

Activity 3

Monarch Recovery Garden Model
Modelo de Jardín de Recuperación Monarca

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

How can we design a model habitat suitable for the monarch butterfly?
¿Cómo podemos diseñar un hábitat modelo adecuado para la mariposa monarca?

1. In preparation for making, designing and planning their Monarch Recovery Garden model, have the following discussion with your students.

   How would you feel if one of our friends in class left? What if someone in class left every week? What would our class eventually look like? (There'd be no more students.) What would you want to do? (I'd want to know why they were leaving, and if there was anything I could do to help or keep friends from leaving.) Well, this is what's happening to monarch butterflies and they need our help. In the last 20 years, when your parents were growing up, the monarch population in North America went down by 90 percent. Here's what 90 percent looks like. (Have 10 kids stand up – they are all monarchs. Now have 9 sit criss cross on the floor where they were previously standing – there is only one monarch left.) We know what will help their numbers go up; healthy diverse habitats that do not use pesticides or insecticides (no chemicals).

   Stop for a moment and ask students what the class could do to help monarch butterflies. Based on prior learning, students should suggest a garden, a place to live, etc. Go with the garden idea and then watch this National Geographic Video: https://youtu.be/6JpLR2hpfSk.
   Continue the discussion below.

   Monarch butterflies need two kinds of plants, host plants and nectar plants. Host plants are considered the "nursery", while the nectar plants are where they "eat". Butterflies do not sleep like you and me, they only rest (butterflies are quiescent). When butterflies need to take shelter for

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
K.1(A), K.1(G), K.3(B), K.5(G), K.12(A), K.12(B)
1.1(A), 1.1(G), 1.3(B), 1.5(G), 1.11(A), 1.12(B)
2.1(A), 2.1(G), 2.3(B), 2.5(G), 2.12(A)

ENGINEERING OPTION
K.2(D)
1.2(D)

See Appendix G-1 for full descriptions of TEKS.

NOTES

the night they go to protected places called "roosts". Roosts may be tall grasses, perennial herbaceous plants, woody shrubs, and caves, and in some cases, man-made structures.

Diversity is the key to a successful Monarch Recover Garden (MRG). The MRG location on the school grounds will need to be in an area of full sun where it receives at least eight hours of direct sunlight. Also consider wet, sandy or muddy spots for butterflies to take in salts and other mineral nutrients. Using dark stones or tiles for butterflies to perch on to warm up on cool mornings adds to the butterfly activity in the garden.

2. Hand out the Monarch Recovery Garden model box (see Engineering Option below for instructions on creating these boxes) and Model Guide, found on p. 145. This activity works best in pairs, as it's easier to have both students fully engaged working on their model. Go over your expectations for constructing the model and keep students updated on the time they have to complete the design and construction process.
3. Once students have completed their model and the MRG Model Guide, have each pair of students take a picture of their work. Provide students with an 8.5 x 11 piece of white cardstock or one-fourth of a white poster board to serve as their base (put their names in one corner). If your school is developing a pollinator garden this year, make sure to reference the students' work during the planning phases and ask for their suggestions. **Whatever your plans, make sure students are actively involved in the garden process so they take ownership and responsibility for its growth and success.**

ENGINEERING OPTION

Use a cardboard or clear plastic shoe box to store each group's model materials. Now it's time to reuse the natural items from Lesson 3 to help construct a more robust Discovery Box. You may want to raid your math manipulatives and consumables from the science lab. The following list is only a suggestion. When you have gathered what you feel are adequate supplies for your students to create their model of a Monarch Recovery Garden, be sure you keep an inventory and count of what each box includes. Sometimes objects sprout legs and disappear.

Suggested List of Materials:

- pattern blocks
- sticks
- colored wood blocks
- leaves
- base ten blocks
- craft pom-poms
- 2-sided counters
- cotton balls
- pebbles
- bark
- tangrams
- Cuisenaire rods
- Grass
- color tiles
- tree seeds (acorns, pecans, etc.)

MONARCH RECOVERY GARDEN MODEL
MODELO DE JARDÍN DE RECUPERACIÓN

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

3.H

See Appendix H-1 for full descriptions of ELPS.

NOTES

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

model	modelo
recover	recuperar
construct	construir
disappear	desaparecer
correct	correcto
plan	plan

VOCABULARY	VOCABULARIO
host	anfitrión
pesticides	pesticidas
insecticides	insecticidas
suitable	adecuada

BILINGUAL STRATEGIES

To help students with this project, allow students to work in groups. Provide students with an iPad or computer to do more research as well as extra time for them to work on the model. Teachers can recommend websites such as:

https://www.nwf.org/-/media/Documents/PDFs/Wildlife-Guide/Monarch-Butterfly-fact-sheet_Spanish.ashx?la=en&hash=490606E9AFB50313C5E9711A60A501A9BE7E1099

https://www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Milkweed_Spanish.ashx?la=en&hash=4ECB5F7FBD3AA4EADDA6029E3AD81F5AC46F733A

https://www.nwf.org/Garden-for-Wildlife/Jardin-Silvestre

https://monarchjointventure.org/images/uploads/documents/GardeningforMonarchsUpdated.pdf

https://monarchjointventure.org/images/uploads/documents/gardeningformonarchs_spanish.pdf

https://www.gardeners.com/how-to/monarch-butterfly/8588.html

https://www.wildflower.org/learn/power-the-migration

http://mariposamonarca. Travel/es/sos-monarca

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

Students can watch videos or read information about the Monarch gardens to get ideas for their recovery garden model.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. On a sheet of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out the piece of paper and paste it in their journal.

During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

MONARCH RECOVERY GARDEN MODEL | MODELO DE JARDÍN DE RECUPERACIÓN

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can draw instead of writing; they can see the anchor charts (posters boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

INVESTIGATING QUESTION:
How can we design a model habitat suitable for the monarch butterfly?

1. What material did you use to build your model and why?

The materials that I used to create my model were _____

_____

_____.

Because these materials help to _____

_____

_____

_____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración; puede dibujar en vez de escribir, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados, y la maestra puede escribir su respuesta para modelar la escritura.

PREGUNTA DE INVESTIGACIÓN:
¿Cómo podemos diseñar un hábitat modelo adecuado para la mariposa monarca?

1. **¿Qué materiales usaste para crear tu modelo y por qué?**

Los materiales que use para crear mi modelo fueron _____

_____

_____.

Porque estos materiales ayudan a ____

_____

_____

_____.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Habitats and Diversity | Diversidad y Hábitats

NAME | NOMBRE: _____

BOX 1 | RECUADRO 1

1. Circle the type of habitats you see.
   Encierra en un círculo el tipo de hábitat que ves.

forest bosque	pond estanque	ocean océano	tide pool piscina de marea
prairie prado	schoolyard patio de escuela	stream arroyo	under a log bajo un tronco del árbol

2. How many different plants do you see?
   ¿Cuántos tipos de plantas ves?

   _____

3. How many different animals do you see?
   ¿Cuántos tipos de animales ves?

   _____

4. Pick an animal you know. Place an X in the blank if you can point to the habitat elements the animal needs in the picture.
   Escoge un animal que conozcas. Si puedes reconocer los elementos del hábitat del animal en la foto marca una X en el espacio.

   food | comida _____

   water | agua _____

   shelter | abrigo _____

   place to raise young | lugar para criar a un joven

   _____

BOX 2 | RECUADRO 2

1. Circle the type of habitats you see.
   Encierra en un círculo el tipo de hábitat que ves.

forest bosque	pond estanque	ocean océano	tide pool piscina de marea
prairie prado	schoolyard patio de escuela	stream arroyo	under a log bajo un tronco del árbol

2. How many different plants do you see?
   ¿Cuántos tipos de plantas ves?

   _____

3. How many different animals do you see?
   ¿Cuántos tipos de animales ves?

   _____

4. Pick an animal you know. Place an X in the blank if you can point to the habitat elements the animal needs in the picture.
   Escoge un animal que conozcas. Si puedes reconocer los elementos del hábitat del animal en la foto marca una X en el espacio.

   food | comida _____

   water | agua _____

   shelter | abrigo _____

   place to raise young | lugar para criar a un joven

   _____

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Habitats and Diversity - Page 2
Diversidad y Hábitats - Pagina 2

BOX 3 | RECUADRO 3

1. Circle the type of habitats you see.
   Encierra en un círculo el tipo de hábitat que ves.

forest bosque	pond estanque	ocean océano	tide pool piscina de marea
prairie prado	schoolyard patio de escuela	stream arroyo	under a log bajo un tronco del árbol

2. How many different plants do you see?
   ¿Cuántos tipos de plantas ves?

   _____

3. How many different animals do you see?
   ¿Cuántos tipos de animales ves?

   _____

4. Pick an animal you know. Place an X in the blank if you can point to the habitat elements the animal needs in the picture.
   Escoge un animal que conozcas. Si puedes reconocer los elementos del hábitat del animal en la foto marca una X en el espacio.

   food | comida _____

   water | agua _____

   shelter | abrigo _____

   place to raise young | lugar para criar a un joven
   _____

BOX 4 | RECUADRO 4

1. Circle the type of habitats you see.
   Encierra en un círculo el tipo de hábitat que ves.

forest bosque	pond estanque	ocean océano	tide pool piscina de marea
prairie prado	schoolyard patio de escuela	stream arroyo	under a log bajo un tronco del árbol

2. How many different plants do you see?
   ¿Cuántos tipos de plantas ves?

   _____

3. How many different animals do you see?
   ¿Cuántos tipos de animales ves?

   _____

4. Pick an animal you know. Place an X in the blank if you can point to the habitat elements the animal needs in the picture.
   Escoge un animal que conozcas. Si puedes reconocer los elementos del hábitat del animal en la foto marca una X en el espacio.

   food | comida _____

   water | agua _____

   shelter | abrigo _____

   place to raise young | lugar para criar a un joven
   _____

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Habitat Hunt | Cacería de un Hábitat

NAME | NOMBRE: _____

DIRECTIONS | DIRECCIONES

You are a _____ , and in order to survive you need food, water, cover and places to raise young. Take a look around you. Record the following information and decide whether or not you will stay here to set up your home.

Eres un _____. Para sobrevivir necesitas comida, agua, refugio y lugares para criar a los jóvenes. Mira a tu alrededor. Revisa la siguiente información y decide si te quedarias o no aquí para que sea tu hogar.

Food source | Fuente de comida: _____

Water source | Fuente de agua: _____

Cover | cubrir: _____

Places to raise young | Lugares para criar a jóvenes: _____

QUESTIONS | PREGUNTAS

1. Could this be a home for you and your family?
   ¿Podría ser este un hogar para tu familia ?
   yes | si no | no

2. Using words or drawings, explain why or why not.
   Con palabras o dibujos indica por qué sí o por qué no.

3. What other habitat elements do you need in order to build your home in the schoolyard?
   ¿Qué otros elementos del hábitat necesitas para construir tu casa en el patio de la escuela?

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Chipmunk

The eastern chipmunk is found in deciduous forests, shrub habitat, forest edges and sub-urban and urban areas where there is a lot of cover to protect it from predators.

Chipmunks are omnivores (they feed on both plants and animals). Their diet includes seeds, nuts, berries, fruits, flowers, mushrooms, insects, worms, snails, frogs, bird eggs and small birds.

They are most active in the early morning and late afternoon. Although they climb trees, they spend most of their lives on the ground or underground in burrows.

Ring-Necked Pheasant

The “ring-neck” is a large bird with short rounded wings and a long, tapered tail. Ring-necked pheasants are usually found in fertile croplands and cultivated grain fields scattered with unplanted weed lots, pastures, small wetlands and occasional woody areas with underbrush.

Adult pheasants feed primarily on waste grains, weed seeds and insects which are located by scratching.

Harsh winter conditions can make it difficult for these ground feeding birds to find food.

Common Musk Turtle

The common musk turtle is also known as a “stinkpot” because when it is captured or disturbed it secrets a smelly fluid from its top shell.

This is a small turtle, about 3-5 inches, with tan, brown, and gray or black top shell that may have dark flecks and be coated with algae.

These are aquatic turtles who love rivers, streams and reservoirs. Shallow, slow-moving streams and rivers with muddy bottoms and dense vegetation are preferred. Musk turtles are less common in ponds and lakes.

The diet of the musk turtle includes freshwater mussels, snails, crayfish, aquatic insects, worms, small fish, tadpoles, carrion and aquatic plants.

Praying Mantis

The praying mantis became the state insect of Connecticut in 1977. It is about 2-3 inches in length and has shades of bright green to tan.

This insect can be found throughout the state from early May or June until the cold weather sets in.

Rarely found in hot humid or very dry climates, the praying mantis prefers sunny areas of green growth dominated by shrubbery or herbaceous plants.

They eat diurnal insects, including caterpillars, flies, butterflies, bees and some moths.

Pennsylvania Leatherwind Beetle

This beetle is the most common of the Goldenrod Solider Beetle family. Both the adults and larvae have the ability to produce "defensive chemicals from their abdomens.

Commonly seen in groups in late summer and early fall on goldenrod flowers where it feeds on nectar, pollen and insects. The beetle has a big appetite for aphids, so they are great to have in the garden – FREE organic pest control!

They can be found in meadows, fencerows, gardens and other areas with thick, sunlit vegetation.

Monarch Butterfly

Monarchs are native to North and South America.

These butterflies use different habitat in the warm months versus the cold months. They cannot survive freezing temperatures, so they over-winter in the cool high mountains of central Mexico and woodlands in central and southern California. In the spring, summer and fall they can be found wherever there are milkweeds. They are always searching for milkweed and suitable nectar plants.

These butterflies are like all butterflies, they change their diet as they develop. During the caterpillar stage they live only on milkweed plants. Adult monarchs feed on nectar from a wide range of flowers. All the monarch butterfly's water needs are met through nectar feeding.

Bumblebee

Bees are by far the most important pollinators of native plants, and the insects are essential to producing more than a third of the foods and drinks we consume.

Bumblebees are active during the day and are non- aggressive bees.

Their nests can be found underground in abandoned rodent burrows or mouse nests. Unlike honeybees, they do not store large amounts of honey.

Bumblebees feed on nectar and pollen. Worker bees collect the nectar and pollen and bring it to the hive to feed the colony. All honey-producing bees need access to water to cool the hive and help produce honey.

Little Brown Bat

This bat is very small ranging in size from 2.5 to 4 inches in length. They are brown in color and they have ears which are short and round. The Little Brown Bat is typically found living around swamp lands, but are also found in humid climates close to water. They have also been found in buildings and attics, in trees, under rocks and in wood piles.

They sleep and groom during the day and hunt by night. During the winter months they typically live in caves and abandoned mines.

The humid habitat offers them access to plenty of insects, such as mosquitos, moths, wasps, beetles, gnats and mayflies. In this environment they also have access to plenty of water for drinking.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Ardilla

La ardilla listada del este se encuentra en bosques caducifolios, hábitat de arbustos, bordes de bosques y áreas suburbanas y urbanas donde hay mucha cobertura para protegerla de los depredadores.

Las ardillas listadas son omnívoras (se alimentan tanto de plantas como de animales). Su dieta incluye semillas, nueces, bayas, frutas, flores, hongos, insectos, gusanos, caracoles, ranas, huevos de aves y pájaros pequeños.

Faisán De Cuello

El “cuello anillado” es un ave grande con alas cortas y redondeadas y una cola larga y afilada. Los faisanes de cuello anillado se encuentran generalmente en tierras de cultivo fértiles y campos de grano cultivados esparcidos con lotes de malezas sin plantar, pastos, pequeños humedales y áreas boscosas ocasionales con maleza.

Los faisanes adultos se alimentan principalmente de granos de desecho, semillas de malas hierbas e insectos que se localizan al rascar.

Las duras condiciones invernales pueden dificultar que estas aves que se alimentan en el suelo encuentren alimento.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Tortuga De Musk Común

La tortuga almizclera común también se conoce como & quot;olla apestosa" porque cuando es capturada o perturbada, secreta un fluido maloliente de su caparazón superior.

Esta es una tortuga pequeña, de aproximadamente 3-5 pulgadas, con caparazón superior de color canela, marron y gris o negro que puede tener manchas oscuras y estar cubierta de algas.

Estas son tortugas acuáticas que aman los ríos, arroyos y embalses. Se prefieren los arroyos y ríos poco profundos lentos con fondos lodosos y vegetación densa. Las tortugas almizcleras son menos comunes en estanques y lagos.

La dieta de la tortuga almizclera incluye mejillones de agua dulce, caracoles, cangrejos de río, insectos acuáticos, gusanos, peces pequeños, renacuajos, carroña y plantas acuáticas.

Mantis Religiosa

La mantis religiosa se convirtió en el insecto del estado de Connecticut en 1977. Mide aproximadamente 2-3 pulgadas de largo y tiene tonos de verde brillante a bronceado.

Este insecto se puede encontrar en todo el estado desde principios de mayo o junio hasta que comienza el clima frío.

Rara vez se encuentra en climas cálidos, húmedos o muy secos, la mantis religiosa prefiere áreas soleadas de crecimiento verde dominadas por arbustos o plantas herbáceas.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Escarabajo De Cuero De Pennsylvania

Este escarabajo es el más común de la familia Goldenrod escarabajo soldado. Tanto los adultos como las larvas tienen la capacidad de producir "sustancias químicas defensivas a partir de su abdomen".

Se ve comúnmente en grupos a fines del verano y principios del otoño en flores de vara de oro donde se alimenta de néctar, polen e insectos. El escarabajo tiene un gran apetito por los pulgones, por lo que es genial tenerlos en el jardín: ¡control orgánico de plagas GRATIS!

Se pueden encontrar en prados, cercas, jardines y otras áreas con vegetación espesa e iluminada por el sol.

Mariposa Monarca

Las mariposas monarcas son nativas de América del Norte y del Sur. Estas mariposas utilizan un hábitat diferente en los meses cálidos en comparación con los meses fríos. No pueden sobrevivir a temperaturas bajo cero, por lo que pasan el invierno en las frías montañas altas del centro de México y en los bosques del centro y sur de California. En primavera, verano y otoño se pueden encontrar donde haya algodoncillo. Siempre están buscando algodoncillo y plantas de néctar adecuadas.

Estas mariposas son como todas las mariposas, cambian su dieta a medida que se desarrollan. Durante la etapa de oruga, viven solo de plantas de algodoncillo. Las monarcas adultas se alimentan del néctar de una amplia gama de flores. Todas las necesidades de agua de la mariposa monarca se satisfacen mediante la alimentación con néctar.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Abejas

Las abejas son los polinizadores más importantes de las plantas nativas y los insectos son esenciales para producir más de un tercio de los alimentos y bebidas que consumimos.

Los abejorros están activos durante el día y no son abejas agresivas.

Sus nidos se pueden encontrar bajo tierra en madrigueras de roedores abandonadas o nidos de ratones. A diferencia de las abejas, no almacenan grandes cantidades de miel.

Los abejorros se alimentan de néctar y polen. Las abejas obreras recogen el néctar y el polen y lo llevan a la colmena para alimentar a la colonia. Todas las abejas productoras de miel necesitan acceso al agua para enfriar la colmena y ayudar a producir miel.

Murciélago

Este murciélago es muy pequeño y tiene un tamaño de 2,5 a 4 pulgadas de largo. Son de color marrón y tienen orejas cortas y redondas. El pequeño murciélago marrón se encuentra típicamente viviendo alrededor de tierras pantanosas, pero también se encuentra en climas húmedos cerca del agua. También se han encontrado en edificios y áticos, en árboles, debajo de rocas y en pilas de madera.

Duermen y se acicalan durante el día y cazan de noche. Durante los meses de invierno suelen vivir en cuevas y minas abandonadas.

El hábitat húmedo les ofrece acceso a una gran cantidad de insectos, como mosquitos, polillas, avispas, escarabajos, jejenes y efímeras. En este entorno también tienen acceso a abundante agua para beber.

HABITAT DIVERSITY | DIVERSIDAD DE HÁBITAT

Monarch Recovery Garden Model Guide
Modelo de Guia Para un Restablecimiento del Jardín Monarca

NAME | NOMBRE: _____

What should be in the garden to help increase the monarch population?
¿Qué debería haber en el jardín para ayudar a aumentar la población de monarcas?

1.	2.	3.
4.	5.	6.

What will each object in my model represent? | ¿Qué representará cada objeto de mi modelo?

OBJECT | OBJETO	WHAT IT REPRESENTS | LO QUE REPRESENTA
Example: an acorn | Ejemplo: una bellota	a tree | árbol
1.	
2.	
3.	
4.	
5.	
6.	
Extra	
Extra	

After the key is complete, come to me and I will give you a base for your model. When the model is complete take a picture of it, print it out and tape it to the back of this page.

3-5 Structure and Function: Plants vs. Animals

60 MINUTES | ENGINEERING, MATH, READING, SCIENCE, TECHNOLOGY, WRITING

BACKGROUND

Structure and function are explained as the way in which an object or living thing is shaped and its substructure determines many of its properties and functions. Structure and function are complementary properties. The functioning of natural and built systems alike depends on the shapes and relationships of certain key parts as well as on the properties of the materials from which they are made. By this age students have had a lot of experience with their own structures and functions, i.e. their five senses. What do they feel, hear, see, taste, and smell? What helps me feel, hear, see, taste and smell? In this lesson students will take that knowledge and apply new learning about the structure and function of basic plant parts. Students are not expected to memorize plant structures and the associated function, but are expected to apply their understanding that both plants and animals have structures with functions that aid them in survival.

A sense of scale is necessary in order to know what properties and what aspects of shape or material are relevant at a particular magnitude or in investigating particular phenomena – that is, the selection of an appropriate scale depends on the question being asked. For example, understanding how a bicycle works is best addressed by examining the structures and their functions at the scale of, say, the frame, wheels, and pedals. However, building a lighter bicycle may require knowledge of the properties of the materials needed for specific parts of the bicycles. Think about the scale to which your students will be exploring structure and function.

LESSON OBJECTIVES

Students will:

- Compare and contrast the basic structure and function between plants and animals.
- Dissect two flowers, make observations and dialogue with peers, looking for similarities and differences.
- Create a graphic organizer to demonstrate understanding.

MATERIALS

- Flowers – (2) varieties per student pair for dissection
- Flowers – (1) variety per student pair for observation only
- Magnifying glass, hand lens or field microscope per student pair
- Handout – *Name of a Flower System*
- Note Cards – 6 per pair of students

Activity 1

What is Structure and Function?
¿Qué es Estructura y Función?

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What is meant by structure and function of a living or non-living thing?
¿Qué se entiende por estructura y función de un ser vivo o no vivo?

1. Ask students to make observations about the similarities and differences between themselves and their peers. Ask them to write down two similarities and two differences. Observations should be physically observed versus inferred, such as I am wearing blue tennis shoes and Peter is wearing black tennis shoes.
2. Discuss the fact that although each student in the class is a unique individual with his or her own special combination of characteristics, we all have certain features in common. Now ask students to write fingers, nose and knees in their science notebook and briefly explain their function. For example: fingers - I use them to grab, hold and pick up things and also to write and type (text).
3. Pose this question: "Could we make the same observations about plants and animals?" After a brief discussion explain that students will have an opportunity to make observations about a few plant species (Might want to use flowers from the garden – look at the plant parts prior to class to determine whether or not your garden's flowers would be a good fit for this activity).
4. Have students work in pairs. Share your expectations and pass out the materials listed. Provide your students enough time to make observations, sketches, notes, etc. in their science notebook. *See Teacher Facilitation* on the next page to help guide students through this part of the activity. **Optional:** Have students use their phones or school iPads to take pictures that can be printed and placed in their science notebook alongside their written notes.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

3.1(B), 3.1(D), 3.1(E), 3.2(C), 3.5(A), 3.5(C), 3.5(F), 3.13(A)
4.1(B), 4.1(D), 4.1(E), 4.2(C), 4.5(A), 4.5(C), 4.5(F), 4.13(A)
5.1(B), 5.1(D), 5.1(E), 5.2(C), 5.5(A), 5.5(C), 5.5(F), 5.13(A)

MATH

3.1(E)
4.1(E)
5.1(E)

See Appendix G-1 for full descriptions of TEKS.

NOTES

TEACHER FACILITATION

- Explain to students that they will carefully take each flower apart and group its similar parts together. Suggest that they begin by looking the flower over carefully to see how many different kinds of parts they can readily see. Caution them that toward the center of the flower the parts are smaller and harder to distinguish. Remind them to use their hand lenses/glasses/scopes to check for slight differences.
- Ask students to hold the flower upside down and carefully remove the parts, one at a time. Remind them to work with one flower at a time, working from the outside toward the inside. Have them place all the like parts together on one index card then count and record the number on the card. Do this for each flower.
- Next have students line these cards up in order from the outermost parts of the flower to the innermost parts. Have available several of the same type of flowers that are not to be dissected so students can refer to the original configuration of the parts.
- Have students compare their results by observing order, groupings of parts and the number of parts with other groups via a *Gallery Walk.* Do they notice a relationship between the numbers of parts?

NOTE: Best scenario would be to provide each pair or small group of students with two different flowers. This will allow them to find similarities and differences between their flowers and answer questions with greater understanding.

SIMPLE FLOWERS TO DISSECT:

Tulips
Lilies
Magnolias
Iris
Rhododendrons and Azaleas

COMPLICATED FLOWERS TO DISSECT:

Daisies
Chrysanthemum
Dandelions
Sunflowers
Black-eyed Susan

WHAT IS STRUCTURE AND FUNCTION?
¿QUÉ ES ESTRUCTURA Y FUNCIÓN?

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

structure	estructura
function	función
plants	plantas
animals	animales
flower	flor
system	sistema

VOCABULARY	VOCABULARIO
similarities	similitudes
differences	diferencias
physically	físicamente
inferred	inferida
characteristics	características
compare	comparar
features	características

BILINGUAL STRATEGIES

Explain to students the meaning of the word **features** by describing one of their classmates. Show students pictures and point out the features.

Make sure you partner students according to their level of strength in their language 1 (L1) and language 2 (L2).

ENGLISH LANGUAGE PROFICIENCY SKILLS (ELPS):

1.A, 1.C
2.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

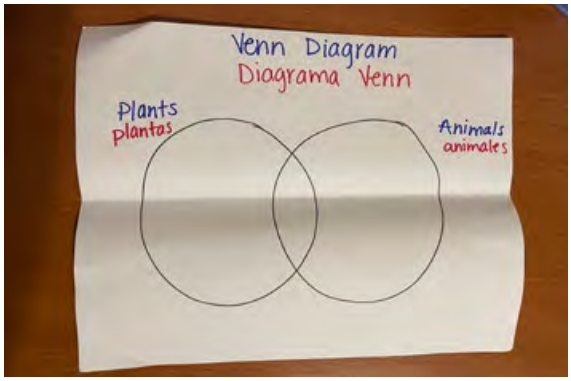
Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

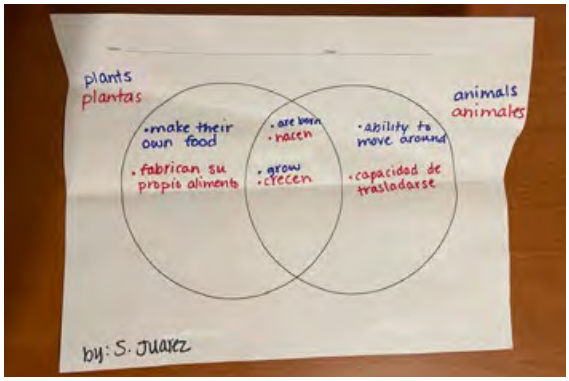
Students will create a Venn diagram to explain the differences of plants and animals as well as their similarities.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate words at the beginning of the lesson in their journal and the lesson vocabulary. On a sheet of paper provide the guiding questions and the sentence stems. Students can fill out and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever he or she feel more comfortable with. Teacher can decide what language students will write depending on the Bilingual model or the students' English level.



PICTURE BY: S. JUAREZ-TRUJILLO



PICTURE BY: S. JUAREZ-TRUJILLO

WHAT IS STRUCTURE AND FUNCTION? | ¿QUÉ ES ESTRUCTURA Y FUNCIÓN?

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. What is meant by the structure and function of a living or non-living thing?

Structure and function of a living or non-living thing is _____

_____

_____.

1. **¿Qué se entiende por estructura y función de un ser vivo o no vivo?**

Una estructura y función de un ser vivo o no vivo es _____

_____

_____.

Activity 2

Examples of Structure and Function in Plants and Animals

Ejemplos de Estructura y Función en Plantas y Animales

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

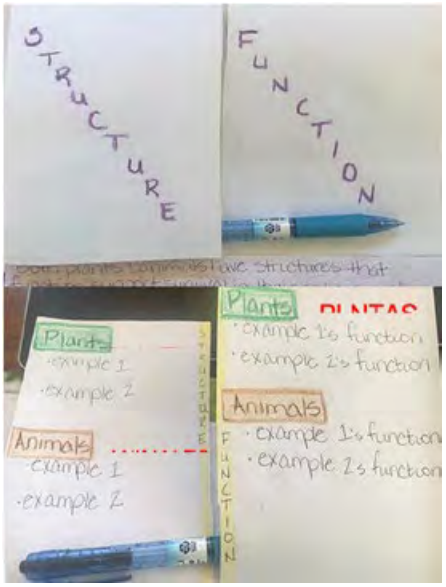
3.1(F), 3.3(B), 3.5(F), 3.13(A)
4.1(F), 4.3(B), 4.5(F), 4.13(A)
5.1(F), 5.3(B), 5.5(F), 5.13(A)

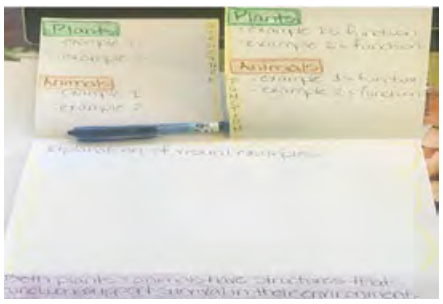
See Appendix G-1 for full descriptions of TEKS.

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What are two examples of structure and function in plants and animals?
¿Cuáles son dos ejemplos de estructura y función en plantas y animales?

1. Have students create a two-tab foldable providing evidence that plants and animals have internal and external structures that function to support survival, growth and behavior and reproduction. Use the example below as a guide. The foldable can be finished for homework. Encourage students to provide:
   - 2 examples for both plants and animals
   - Structures: students may draw, get pictures from the internet, take their own photos, and/or cut out images from a magazine
   - Functions: students will neatly write or type, print out, copy and paste the function associated with the structure
   - Students will briefly explain in words what their images show. (four complete sentences; one sentence for each example) (bottom strip-under the two- tabs)





EXAMPLES OF STRUCTURE AND FUNCTION IN PLANTS AND ANIMALS | EJEMPLOS DE ESTRUCTURA Y FUNCIÓN EN PLANTAS Y ANIMALES

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

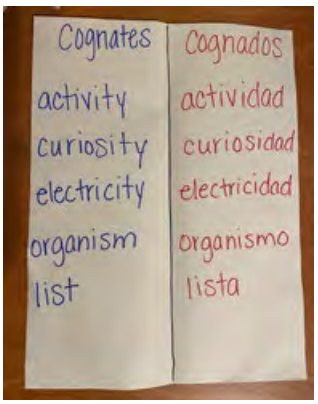
Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

structure	**estructura**
function	**función**
plants	**plantas**
animals	**animales**

VOCABULARY	VOCABULARIO
similarities	**similitudes**
differences	**diferencias**
compare	**comparar**
features	**características**

BILINGUAL STRATEGIES

Have the students present to a partner what they think the words in the cognates mean. Ask the students to create an illustration of each of the cognates presented above. Visuals help second language learners memorize and understand new vocabulary.



PICTURE BY S. JUAREZ-TRUJILLO

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) at the beginning of the lesson in their journal and the lesson vocabulary. On a sheet of paper provide the guiding questions and the sentence stems. Students can fill out the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever he or she feel more comfortable with. Teacher can decide what language students will write depending on the Bilingual model or the students' English level.

EXAMPLES OF STRUCTURE AND FUNCTION IN PLANTS AND ANIMALS
EJEMPLOS DE ESTRUCTURA Y FUNCIÓN EN PLANTAS Y ANIMALES

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. What are two examples of structure and function in plants and animals?

One example of structure in plants and animals is_____

_____

_____.

Another example of function in plants and animals is_____

_____

_____.

1. **¿Cuáles son dos ejemplos de estructura y función en plantas y animales?**

Un ejemplo de estructura en plantas y animales es_____

_____

_____.

Otro ejemplo de función en plantas y animales es _____

_____

_____.

Activity 3

Names in a Flower System
Nombres en un Sistema Floral

INVESTIGATING QUESTION | PREGUNTA DE INVESTIGACIÓN:

Do flowers have structures and functions they need to survive just like humans?
¿Tienen las flores estructuras y funciones que necesitan para sobrevivir al igual que los humanos?

1. Explain to the student that the different parts of the flower have names and specific functions in the plant. Give each group a copy of *Names of a Flower System*. Use an information text group reading strategy to review *Names of a Flower System* with students. Reminder: Students are not required to memorize or understand the function of the plant parts, only to see that there are differences in structures and functions for plants and animals. **Optional**: This text discusses parts of the flower. As you are reading with students also allow them to use their hand lens and a fresh flower to observe the parts you are reading about.

TECHNOLOGY & ENGINEERING OPTION
Student triads will use LEGOs to design 3 scenes showing a pollinator picking up pollen and dropping it off at another flower in the garden. Then students will use a smart phone to record a short "movie" of what's happening. Lastly, students will share their movie with the class.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
3.1(E), 3.5(D), 3.5(F), 3.13
4.1(E), 4.5(D), 4.5(F), 4.13(A)
5.1(E), 5.5(D), 5.5(F), 5.13(A)

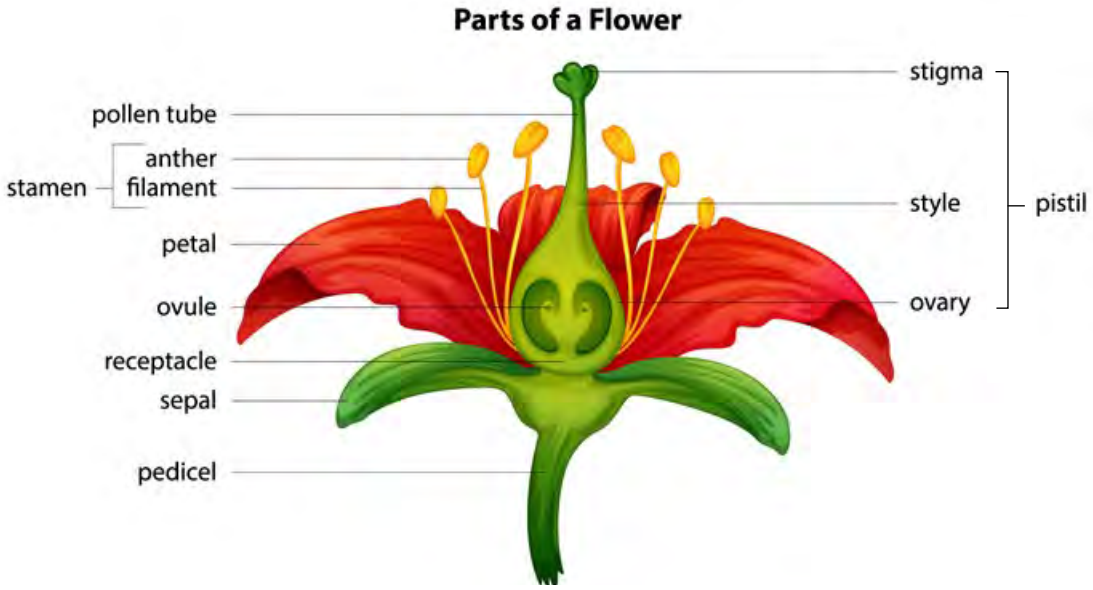
TECHNOLOGY & ENGINEERING OPTION
3.1(G), 3.3(B)
4.1(G), 4.3(B)
5.1(G), 5.3(B)

See Appendix G-1 for full descriptions of TEKS.

NOTES

NAMES IN A FLOWER SYSTEM | NOMBRES EN UN SISTEMA FLORAL

Name of Flowers



Flowers come in many different shapes, sizes, and colors. Although they may look very different, you have learned they share similar structures that help them function in the garden just like you have body parts that help you function and survive each and every day.

Turn over a flower that's not been dissected and you will see a little skirt of green leaves around the base (Instruct student pairs to make this observation). This lower outermost layer is composed of **SEPALS**. The whole group of them is called the **CALYX**. Before the flower opens, the sepals protect the more delicate flower parts inside. Sepals are usually green, but in lilies and tulips they are colorful and look just like petals.

The **PETALS** stand out in a flower because their major function is to attract specific animals to the flower for the purpose of pollination (Ask students what pollinators they know of). Petals have different adaptations, colors, shapes and smells to ensure frequent visits by these specially invited guests, leading to pollination and ultimately the production of seeds.

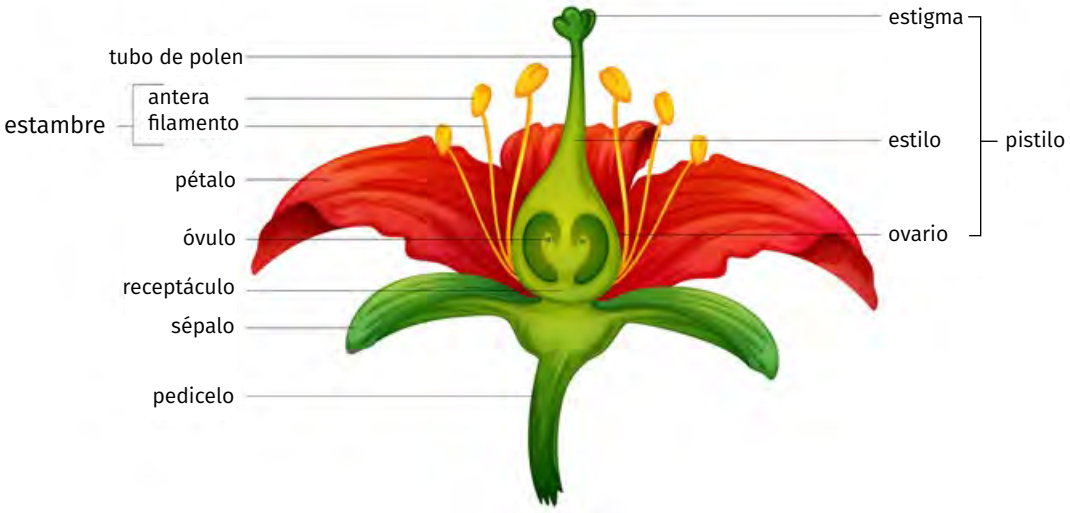
Look closely inside the petals and you'll see a group of yellow, fuzzy containers on thin stalks. Don't look too closely or you may end up with yellow dust on your nose. That's **POLLEN** from the **STAMENS**. The stamens are made of a thin **FILAMENT** which holds up a bigger structure, called the **ANTHER**. The anthers are full of pollen and when open, they release dusty pollen to be picked up by various pollinators (or your nose). The pollinators take the pollen from flower to flower, usually on their legs.

Last but not least, hidden among the stamens is the **PISTIL**. There can be just one or many depending upon the flower type. The pistil is often divided into three parts. The enlarged base is the **OVARY** where the seeds develop. At the end of the pistil is the stigma. It is sticky making it easy for pollen to stick to it, and pollen on a stigma leads to seeds in fruits and vegetable.

NAMES IN A FLOWER SYSTEM | NOMBRES EN UN SISTEMA FLORAL

Nombres de Flores

Partes de una Flor



Las flores vienen en diferentes formas, tamaños y colores. Aunque pueden verse muy diferentes, haz aprendido que comparten estructuras similares que les ayudan a funcionar en el jardín, al igual que tu tiene partes del cuerpo que te ayudan a funcionar y sobrevivir todos los días.

Da la vuelta a una flor que no haya sido desecada y verás una pequeña falda de hojas verdes alrededor de la base (Indique a las parejas de estudiantes que hagan esta observación). Esta capa inferior más externa está compuesta por **SÉPALOS**. Todo el grupo de ellos se llama **CÁLIZ**. Antes de que la flor se abra, los sépalos protegen las partes más delicadas de la flor en el interior. Los sépalos suelen ser verdes, pero en los lirios y tulipanes son coloridos y se parecen a los pétalos.

Los **PÉTALOS** se destacan en una flor porque su función principal es atraer animales específicos a la flor con el propósito de polinizar (Pregunta a los estudiantes que polinizadores conocen). Los pétalos tienen diferentes adaptaciones, colores, formas y olores para asegurar visitas frecuentes de estos organismos especialmente invitados, lo que lleva a la polinización y, en ultimadamente a la producción de semillas.

Mira de cerca dentro de los pétalos y verás un grupo de recipientes amarillos y difusos en tallos delgados. No mires demasiado cerca o puedes terminar con polvo amarillo en la nariz. Eso es **POLEN** de **ESTAMBRES.** Los estambres están hechos de un **FILAMENTO** delgado que sostiene una estructura más grande, llamada **ANTERAS**. Las anteras están llenas de polen y, cuando se abren, liberan polen polvoriento para ser recogido por varios polinizadores (o tu nariz). Los polinizadores llevan el polen de flor en flor, generalmente en sus patas.

Por último, pero no menos importante, escondido entre los estambres está el **PISTILO**. Puede haber solo una o muchas dependiendo del tipo de flor. El pistilo a menudo se divide en tres partes. La base agrandada es el **OVARIO** donde se desarrollan las semillas. Al final del pistilo está el estigma. ¡Es pegajoso, lo que facilita que el polen se adhiera a él, y el polen en un estigma conduce a semillas en frutas y verduras!

NAMES IN A FLOWER SYSTEM | NOMBRES EN UN SISTEMA FLORAL

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

sepals	**cépalos**
calyx	**cáliz**
petals	**pétalos**
pollen	**polen**
stamens	**estambres**
filament	**filamento**
anther	**anteras**
pistil	**pistilo**
ovary	**ovario**

VOCABULARY	VOCABULARIO
dissected	**desecada**
pollination	**polinización**
observe	**observar**
survive	**sobrevivir**

BILINGUAL STRATEGIES

Students will look at the cognate list above and talk about the similarities of the words. For example: ova**ry**-ovar**io**. The similarity is **ovar** and what changes is the ending.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C
4.H

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. Students listen as you say the word,

2. Students repeat the word after you, and

3. Students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) at the beginning of the lesson in their journal and the lesson vocabulary. On a sheet of paper provide the guiding questions and the sentence stems. Students can fill out and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever he or she feel more comfortable with. Teacher can decide what language students will write depending on the Bilingual model or the students' English level.

NAMES IN A FLOWER SYSTEM | NOMBRES EN UN SISTEMA FLORAL

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

1. Do flowers have structures and functions they need to survive just like humans?

Flowers do/do not have structures and functions they need to survive just like humans because _____

_____

_____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. **¿Tienen las flores estructuras y funciones que necesitan para sobrevivir al igual que los humanos?**

Las flores tienen/ no tienen estructuras y funciones que necesitan para sobrevivir al igual que los humanos porque _____

_____

_____.

3-5 The Sun: Feeding Ecosystems Everywhere

2 ½ HOURS | READING, SCIENCE, WRITING

BACKGROUND

The sun reigns as the supreme energy source in habitats around the world. From the sun plants gather energy needed to make their own food through the process of photosynthesis. Without the sun, the entire chain and subsequent webs could not exist. Many times, we see food chains that start with the producer and not the sun. Leaving out this essential element can lead to student misconception at the very foundation of the food chain concept.

Along with understanding the sun's role in a food chain, it's also important for students to understand the symbols used to provide a visual model of these chains. Ask your students to explain what the arrows mean between the elements of a food chain. Usually, students are unable to tell you or they say it represents "eats". "Eats" usually works until you get to the producer and the sun, because the grass doesn't eat the sun. Guiding students to understand the true meaning of the "arrows" will deepen their understanding of the concept. The arrows used in food chain models show how energy flows and how it is passed from one element to the next. Now when students get to the producer and the sun's energy within a food chain, they will exchange the word "eat" with the words "energy flows from". For example, energy flows or is passed from the sun to the prairie grass and then energy flows or is passed from the prairie grasses to the insects, etc.

LESSON OBJECTIVES

Students will:

- Connect prior knowledge on habitats and food chains with new observations from a children's book.
- Create a food chain, placing habitat elements in order as energy flows from one element to the next, placing strong emphasis on the sun's role in a food chain.
- Research the monarch butterfly food chain.
- Write their own food chain story, modeled after the story they read and focusing on the monarch butterfly food chain using native plants and natural predators.

MATERIALS

- Book: *Pass the Energy, Please!* By Barbara Shaw McKinney
- *Una curiosa merienda:* https://drive.google.com/file/d/1YE1rZ5lr1XVTcOeFSOPXBpyRDCyzDN7w/view
- Notecards cut in half, 7 halves per small group or pair of students
- 6 pennies or plastic markers per small groups or pair of students
- Books as student resources on butterfly habitat, specifically on monarch habitats, such as:
  - *Monarch Butterfly*, Gail Gibbons
  - *National Geographic Readers: Great Migrations*
  - *Hurry and the Monarch*, Antione O'Flatharta
  - *Velma Gratch and the Way Cool Butterfly,* Alan Madison
  - *Monarch and Milkweed*, Helen Frost
- Science Notebook

Activity 1

Food Chains | Cadenas Alimentarias

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What is a food chain?

¿Qué es una cadena alimentaria?

1. On a large piece of poster board, write the food chain in number 5 below in large print. Roll it up and put a rubber band around it. You will use it when you go outside.
2. Take students outside and have them bring their science notebook and a pencil. Read, *Pass the Energy, Please!*, by Barbara Shaw McKinney. Before you start reading, ask your students to find the ecosystems file in their brain's life science filing cabinet and do a quick scan. Tell them, "Keep that content fresh in your mind as I read aloud."
3. Ask, "What was the main idea of the story?" Depending on the age of your students and where you are in your studies related to ecosystems, they will say things like, animals, food chains/webs, producers and consumers. Make note of these words in your notebook and add them to the class word bank/wall.
4. Unroll your poster board and ask students to copy the "list" in their science notebook and describe what they think it is.
5. After discussing the questions, put a name to what students have been describing, if they do not already know it's a food chain. Encourage students to develop their own definition and then you can give them the "textbook" definition. "A food chain is a linear network of links in a food web starting from the sun and producer organisms such as, grass or trees and ending at top predators such as, grizzly bears or killer whales or decomposers." Along with their definition ask them to write a food chain they might find in their schoolyard. Give students the opportunity to Think-Pair-Share their definition and schoolyard food chain.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

3.1(A), 3.1(F), 3.3(B), 3.5(E), 3.12(B)
4.1(A), 4.1(F), 4.3(B), 4.5(E), 4.12(B)
5.1(A), 5.1(F), 5.3(B), 5.5(E), 5.12(A), 5.12(B)

See Appendix G-1 for full descriptions of TEKS.

NOTE: Create a word bank that is visible to the entire class of the words students use to respond to your questions. This can serve as a tool and a reminder to use academic vocabulary while writing.

NOTES

sun / sol → grass / pasto → insect / insecto → mouse / ratón → snake / serpiente

Ask the following questions to students. Students can work in pairs or small groups and then open it up to a class discussion

Question 1

What do you see? Describe it.

Pregunta 1

¿Qué ves? Describemelo.

Question 2

What words could be used in place of the arrows? Why do you think that (what was the reasoning)?

Pregunta 2

¿Qué palabras podrian usarse en lugar de las flechas? ¿Por qué piensas eso (cual es el razonamiento)?

Question 3

What would happen if the sun was taken out of the chain? Provide reasoning.

Pregunta 3

¿Qué pasaria si sacaran el sol de la cadena? Proporciona razonamiento.

FOOD CHAINS | CADENAS ALIMENTARIAS

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

sun	sol
insect	insecto
snake	serpiente
energy	energia

VOCABULARY	VOCABULARIO
food web/chain	red alimentaria/ cadena
producers	productores
consumers	consumidores
decomposers	descomponedores

BILINGUAL STRATEGIES

Write down the cognate on index cards. Teachers can write them by language or side by side in different colors. Then have students pick up two index cards and explain the relationship between the cards. For example: insect and snake- the snake eats the insect as part of the food chain.

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and the lesson vocabulary in their journal. On a sheet, of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffold¬ing for students to get started on writing and speaking in complete sentences. Students can fill out on the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to the cognate words and/or write the answer in Spanish or English whatever he or she feels more comfortable with. The teacher can decide what language students will write depending on the Bilingual model or the students' English level.

FOOD CHAINS | CADENAS ALIMENTARIAS

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. What is a food chain?

A food chain is _____

_____

_____.

1. ¿Que es una cadena alimentaria?

Una cadena alimentaria es _____

_____

_____.

2. Provide an example of a food chain.

An example of a food chain begins with _____, which provides energy to _____ and continues with _____

_____.

2. Dame un ejemplo de una cadena alimentaria

Un ejemplo de una cadena alimentaria comienza con _____, la cual provee energía a _____ y continua con _____

_____.

Activity 2

Energy in a Food Chain
Energía en una Cadena Alimentaria

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

Why is energy important to plants and animals?
¿Por qué es importante la energía para las plantas y los animales?

1. Give student pairs or small groups seven halves of a notecard and six pennies (or any place holders). Ask them to write one of the food chains from the story, *Pass the Energy, Please!*, on the notecards. One food chain link per card, **for example:**

sun sol	grass pasto	insect insecto
mouse ratón	snake serpiente	

2. Next have students place their cards in the correct order. Use the coins to represent the passing or flow of energy. Student pairs also need to answer these questions,
   1) "What role does the sun play in the food chain?" and
   2) "Why is energy important to plants and animals?"
   Use a strategy that will allow students to check each other's food chains and discuss the answer to the questions below.
3. Once students know their order is correct instruct them to write their food chain in their science notebook, along with the question and their answer found in part three.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
3.1(A), 3.1(F), 3.3(B), 3.5(E), 3.12(B)
4.1(A), 4.1(F), 4.3(B), 4.5(E), 4.12(B)
5.1(A), 5.1(F), 5.3(B), 5.5(E), 5.12(A), 5.12(B)

See Appendix G-1 for full descriptions of TEKS.

NOTES

PASS THE ENERGY, PLEASE! *Food Chain options for students –* *Feel free to add to or create your own*	**¡PASA LA ENERGÍA, POR FAVOR!** *Opciones de cadena alimentaria para estudiantes- siéntase libre de agregar o crear la su propia versión*
Kelp and sea-weed, sun, fish, sea urchin, otter	Kelp y algas marinas, sol, pescado, erizo de mar, nutria
sun, grass, buffalo	sol, hierba, búfalo
manatee, sea grasses, sun	manatí, hierbas marinas, sol
bamboo shoots, panda, sun	brotes de bambú, panda, sol
grasses and tree leaves, cheetah, sun, gazelle	hierbas y hojas de árboles, guepardo, sol, gacela
milkweed pod (seeds), sun, snake, mouse, owl	vaina de algodoncillo (semillas), sol, serpiente, ratón, búho
phytoplankton, Arctic seal, sun, zooplankton, polar bear	fitoplancton, foca ártica, sol, zooplancton, oso polar
dead animal carcass, sun, plants, vulture	cadáver de animales muertos, sol, plantas, buitre

ENERGY IN A FOOD CHAIN | ENERGÍA EN UNA CADENA ALIMENTARIA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

sun	sol
insect	insecto
snake	serpiente
energy	energia
phytoplankton	fitoplancton
manatee	manatí

VOCABULARY	VOCABULARIO
food chain	cadena alimentaria
energy	energía
plants	plantas
animals	animales

BILINGUAL STRATEGIES

After the students have found the correct order for their food chain, ask students to create a brief story, poem or song with their food chain. For example: **Cada mañana después de que sale el sol, se ven unos brotes de bambú radiantes y llenos de vida, pero esto termina cuando llega el panda y se come los brotes.**

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C
5.B

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and the lesson vocabulary in their journal. On a sheet, of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffold¬ing for students to get started on writing and speaking in complete sentences. Students can fill out on the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to the cognate words and/or write the answer in Spanish or English whatever he or she feels more comfortable with. The teacher can decide what language students will write depending on the Bilingual model or the students' English level.

ENERGY IN A FOOD CHAIN | ENERGÍA EN UNA CADENA ALIMENTARIA

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

1. Why is energy important to plants and animals?

Energy is important to plants and animals because _____

_____

_____.

2. Give an example in which energy is important to both plants and animals.

An example in which energy is important to plants and animals is _____

_____

_____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. **¿Por qué es importante la energía para las plantas y los animales?**

La energía es importante para las plantas y animales porque _____

_____

_____.

2. **Dame un ejemplo en el que la energía es importante para las plantas y animales.**

Un ejemplo en el que la energía es importante para las plantas y animales es _____

_____

_____.

Activity 3

Author of your Own Food Chain Story Autor de tu Propia Historia Sobre la Cadena Alimentaria

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What do I need to write my own food chain story?
¿Qué necesito para escribir mi propia historia sobre la cadena alimentaria?

1. It's time for your students to become the author of their own *Pass the Energy, Please!*, mini-story or Una curiosa merienda. (https://www.youtube.com/watch?v=JSJpvmxP5Tk) See note for Activity 3 in the box above.
2. Explain: All authors have to do research for the books they write. We need to build our knowledge about the monarch butterfly and the ecosystem it lives in. Assign groups of students to find answers to the following questions or have students work together in small groups to answer the five questions below. Depending on the age of your students, you may want to ask them to come up with the questions they need answers to in order to write their food chain story.
3. Review the writing style in the story, *Pass the Energy, Please! Una curiosa merienda*. Are there any patterns to the author's style? Will you copy her style or will you create your own? (You might like to provide students with a monarch template/outline to write their final story in). As a class come with the expectations or use the ones listed below.
   - Main character: monarch butterflies
   - Demonstrate how energy flows through the monarch ecosystem
   - Show the sun's role in the monarch ecosystem
   - Use facts in your story, i.e., native plants and natural predators monarchs encounter
   - Age-appropriate grammar and academic vocabulary

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
3.3(B), 3.5(E), 3.12(B)
4.3(B), 4.5(E), 4.12(A), 4.12(B)
5.3(B), 5.5(E), 5.12(A), 5.12(B), 5.12(C)

See Appendix G-1 for full descriptions of TEKS.

NOTES

4. Work with the Language Arts teacher to set up a writer's workshop, giving the students an opportunity to work through the writing process and illustrations. Students can use online digital storybook makers or even use PowerPoint to create their story and record themselves reading the story aloud. Provide students with the opportunity to read their stories aloud (this would be a great book buddy read aloud with younger students) and post them in the hallways for students to read while they are waiting or in the school library.

Question 1
What is the life cycle of the monarch butterfly?

Pregunta 1
¿Cuál es el ciclo de vida de la mariposa monarca?

Question 2
What do monarchs eat?

Pregunta 2
¿Qué comen las mariposas monarca?

Question 3
What does the monarch butterfly require to live; what are its habitat requirements?

Pregunta 3
¿Qué necesita las mariposas monarcas para vivir? ¿Cuáles son sus requisitos de habitat?

Question 4
What type of climate do they live in?

Pregunta 4
¿En qué tipo de clima viven?

Question 5
Where (geographically) can monarchs be found?

Pregunta 5
¿Dónde (geográficamente) se pueden encontrar las monarcas?

AUTHOR OF YOUR OWN FOOD CHAIN STORY
AUTOR DE TU PROPIA HISTORIA SOBRE LA CADENA ALIMENTARIA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

native	nativa
energy	energia
monarch	monarca
plants	plants
animals	animales
natural	natural
predators	predadores
prey	presa
ecosystem	ecosistema

VOCABULARY	VOCABULARIO
food chain	cadena alimentaria
energy	energía
plants	plantas
animals	animales

BILINGUAL STRATEGIES

Students benefit greatly from newly acquired vocabulary. Using index cards write the cognate on the index card with one side being in English and the other in Spanish.

Pair the students preferably by one strong in L1 (language 1) and one strong in L2 (Language 2).

Have the students discuss the vocabulary and order the words alphabetically and then again by intensity (meaning placing the easier words to describe first and the harder words last).

ENGLISH LANGUAGE PROFICIENCY SKILLS (ELPS):

1.A, 1.C
2.C
3.H
5.D

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. Provide the guiding questions and the sentence stems on a sheet of paper. Students can fill out the sentence stems and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

AUTHOR OF YOUR OWN FOOD CHAIN STORY | AUTOR DE TU PROPIA HISTORIA SOBRE LA CADENA ALIMENTARIA

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

1. Demonstrate how energy flows through the monarch ecosystem.

Solar energy flows through the monarch butterfly ecosystem by

_____.

Example: (The sun provides energy to the flower and the flower creates nectar. The flower's nectar provides food and energy for the butterfly.)

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. **Demuestra cómo fluye la energía a través del ecosistema de la mariposa monarca.**

La energía solar fluye a través del ecosistema de la mariposa monarca por medio de

_____.

Ejemplo: (El sol provee la energía que la flor necesita para producir néctar. El néctar de las flores provee alimento y energía a la mariposa.)

3-5 Cycling Matter and Habitat Loss

(5) 50 MINUTE BLOCKS OF TIME PLUS OBSERVATION TIME | ENGINEERING, LANGUAGE ARTS, MATH, SCIENCE

BACKGROUND

Students are playing an active and important role as conservation stewards by constructing a Schoolyard Habitat specific to the needs of the monarch butterfly. The Monarch Recovery Garden is a large-scale project with many small working systems. To help students grasp the important role these systems play, they will be creating a small-scale biological ecosystem. This will allow them to examine and better comprehend how matter cycles through a habitat. The water, carbon and nitrogen cycle are all critically important in a healthy, functioning habitat. It is important for students to have a basic knowledge of these biogeochemical cycles. For a review or basic introduction to each cycle, use these resources:

» USGS Interactive **Water Cycle** Diagram:

- **English:** http://water.usgs.gov/edu/watercycle-kids-beg.html
- **Spanish:** El ciclo del agua-espanol

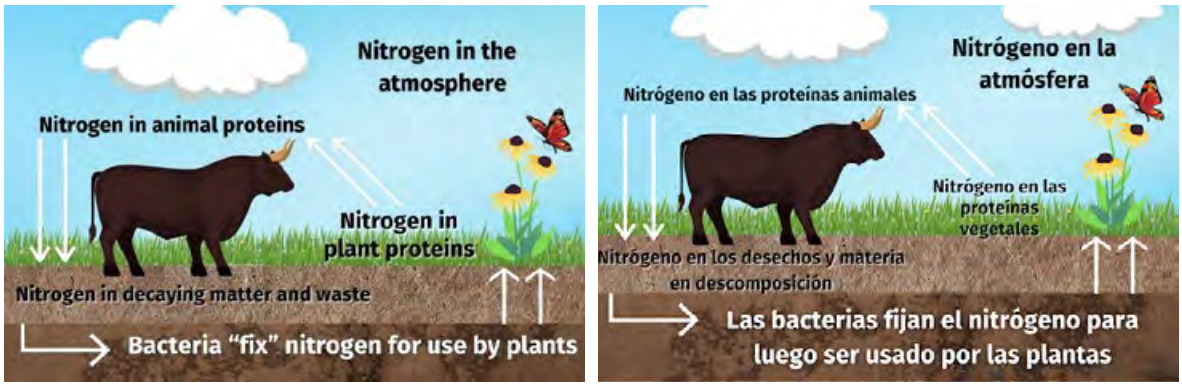
You can download a printable copy for students to cut out and put in their science notebook:

- **English:** http://pubs.usgs.gov/gip/146/pdf/gip_146_poster.pdf
- **Spanish:** https://www.usgs.gov/media/images/el-ciclo-del-agua-para-ni-os-water-cycle-schools-spanish

» University of Climate and Atmospheric Research-**Carbon Cycle** Diagram:

- **English:** https://eo.ucar.edu/kids/green/images/carboncycle.jpg
- **Spanish:** https://encolombia.com/wp-content/uploads/2019/12/Ciclo-del-Carbono-696x398.jpg

» A Simple Diagram of the Nitrogen Cycle



Please note students' knowledge is basic and they are not required to understand all of the processes within each phase of the cycles. For example, students should understand that when water droplets evaporate from the undersides of leaves the droplets turn from a liquid to a gas through a process called transpiration and the gas is released into the atmosphere. They are not required to understand the chemical process, structure and function, and details associated with transpiration.

Another function of a healthy habitat is a place where multiple organisms get what they need to survive: food, water, cover and a place to raise young. In other words, a habitat is home to plants and animals. When we look closer, different living things have different and specific needs. When two organisms (any kind of living things) have very similar habitats, their needs and how they meet these needs may be distinct, allowing them to live in close proximity to each other without competition. Two birds for instance, might live in the same tree but eat different foods, have different predators and have different tolerances to sunlight. The birds live in the same place, but do not fill the same role (called a niche). If organisms share the same niche, they may compete and limit the number of organisms that can live there. Competition, over a long time, may lead to greater animal and plant diversity as organisms carve out distinct niches. In the case of the monarch butterfly, they have very specific habitat needs to support their life cycle. If your school already has a pollinator garden in place without the specific host and nectar plants for the monarch, then students are unlikely to see monarchs in this garden.

Students' thoughts and ideas will be challenged as they work through the process of creating a Monarch Recovery Garden and conducting monarch community science investigations. One strategy to help students effectively discuss their analyses and conclusions is by constructing arguments from evidence. Constructing arguments from evidence is not just a skill for older students. It takes time to build and requires multiple learning opportunities with the same overarching core ideas. Without repetition to develop long-term memory, students will have difficulty creating an argument to support what they are reading, writing or observing. Questions that require higher level thinking and push students beyond their comfort zone lead them to create hypotheses based on evidence. Developing an understanding of specific content is a process that happens over time. Students must have multiple opportunities to inquire, observe, ponder, discuss and reflect. As students work through these learning activities and construct and monitor their garden they will have numerous opportunities to gather evidence and defend their thoughts and ideas.

LESSON OBJECTIVES

Students will:

- Design a model of a closed ecosystem by constructing a three-layer aquatic, terrestrial and decomposition biological column.
- Make observations, collect data and draw conclusions about the water, carbon and nitrogen cycles.
- Determine the relationship between biochemical cycles and living plants and animals.
- Construct arguments from evidence.

MATERIALS

- Science notebook.
- Take a picture of one of your school gardens and print it out for each student.
- Materials for groups of 3-4 students to create a biological column – aquatic, terrestrial and decomposition systems. Please read through the options provided in Activity 1 and be prepared to carry out the terrarium project with your students. Spanish version can be found here: https://bit.ly/2XF83d1.
- A copy per student: *Can You Back that Up? Preparing an Argument from Evidence*.

CYCLING MATTER AND HABITAT LOSS

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

cycle	ciclo
carbon	carbón
nitrogen	nitrógeno
aquatic	acuático
terrestrial	terrestre
decomposition	descomposición

VOCABULARY	VOCABULARIO
observations	observaciones
biochemical	bioquímico
evidence	evidencia
model	modelo

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

3.5(E), 3.12(B)
4.5(E), 4.12(B)
5.5(E), 5.12(B)

See Appendix G-1 for full descriptions of TEKS.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

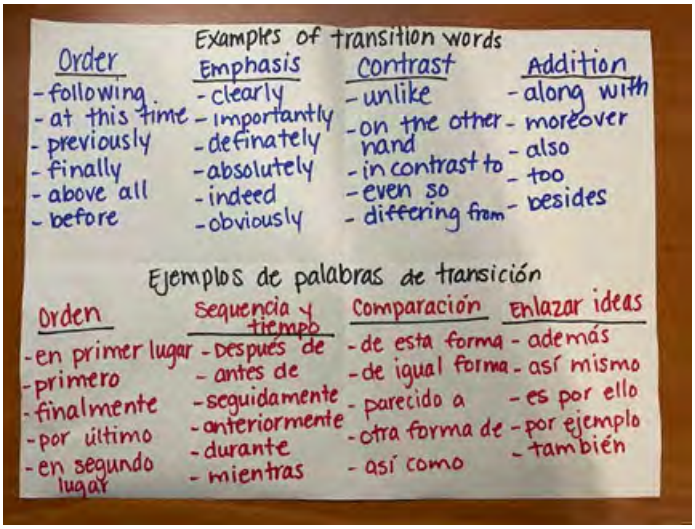
1.A, 1.C
2.C, 2.G
4.K

See Appendix H-1 for full descriptions of ELPS.

NOTES

BILINGUAL STRATEGIES

Students will write a short paragraph about the habitat of the monarch butterfly using only three to five sentences and using transition words such as aparte, tambien, finalmente.



PICTURE BY S. JUAREZ-TRUJILLO

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. Provide the guiding questions and the sentence stems on a sheet of paper. Ask students to fill out the paper and paste it in their journals. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

CYCLING MATTER AND HABITAT LOSS

Journal Sheet

Guiding Questions/Sentence Stems

1. Explain how the water cycle works

The water cycle starts with_____

_____

_____

_____.

1. ¿Cómo es el ciclo del agua?

El ciclo del agua empieza con _____

_____

_____

_____.

2. Explain how the carbon cycle works

The carbon cycle starts with_____

_____

_____

_____.

2. ¿Cómo es el ciclo del carbón?

El ciclo del carbón empieza con _____

_____

_____

_____.

3. Explain how the nitrogen cycle works

The nitrogen cycle starts with_____

_____

_____

_____.

3. ¿Cómo es el ciclo del nitrógeno?

El ciclo del nitrógeno empieza con _____

_____

_____

_____.

HTTPS://MONARCHJOINTVENTURE.ORG/MONARCH-BIOLOGY/LIFE-CYCLE

Activity 1

Building and Observing a Small Scale Ecosystem

Construcción y Observación de un Ecosistema a Pequeña Escala

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

How can I build a terrarium that supports plant and animal life?

¿Cómo puedo construir un terrario que sustente la vida vegetal y animal?

1. After reading through the resources make modifications based on the needs of your students. Below is an investigative option:
   - » Give your students the following resources. Students should review these resources, choose the type of ecosystem they want to build, and give you a list of materials they need.
   - » Pillbug Terrarium How-To Video:
     - **English:** https://www.youtube.com/watch?v=nqru5x3PP1I
   - » 2-liter Bottle Ecosystem Project Video:
     - **English:** https://www.youtube.com/watch?v=4d6W_eLisQk
   - » Earth System in a Bottle (Elementary Globe Lesson Plan):
     - **English:** https://www.globe.gov/documents/348830/350113/ElementaryGLOBE_EarthSystemsActivity1_en.pdf
     - **Spanish:** https://www.globe.gov/documents/348830/350113/EGLOBE_ESSActivity1_SP.pdf
     - **Spanish:** https://www.youtube.com/watch?v=wcrRPg-yxuI
   - » Teacher Vision: Soda Bottle Terrarium Video:

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

3.1(E), 3.1(G), 3.2(A), 3.3(A), 3.5(D), 3.12
4.1(E), 4.1(G), 4.2(A), 4.3(A), 4.5(D), 4.12(B)
5.1(E), 5.1(G), 5.2(A), 5.3(A), 5.5(D), 5.12(A), 5.12(C)

See Appendix G-1 for full descriptions of TEKS.

The terrarium project will take several days to complete. Consider setting aside additional class or recess time or asking students to come before or after school to complete their terrariums.

NOTES

2. Instruct students to follow the directions on the method of terrarium instructions they have chosen. Encourage (or assign) students with realistic job titles and cooperative groupings. For example, a student on the team can be a Lab Manager instead of a Materials Manager and another student on the team could be a Communications Manager instead of a Recorder/Reporter.
3. Once students complete their terrariums they should answer *Questions Part A* (next page) in their science notebooks.
4. Provide students with a regular and consistent time to continue making observations and recording the health status of their terrariums. They should answer *Questions Part B* throughout this time.

QUESTIONS PART A | PREGUNTA PARTE A

Question 1
List living and nonliving types of matter, including solids, liquids and gases.

Pregunta 1
Enumere los tipos de materias vivas y no vivas, incluidos sólidos, líquidos y gases.

Question 2
How is your model ecosystem similar to your school or home garden ecosystem? How is it different?

Pregunta 2
¿En qué se parece tu ecosistema del ecosistema de tu escuela (jardín) o huerto familiar? ¿En que se diferencia?

Question 3
What are the limitations of the model?

Pregunta 3
¿Cuáles son las limitaciones del modelo?

QUESTIONS PART B | PREGUNTA PARTE B

Question 1
How does water cycle in the terrarium? Explain.

Pregunta 1
¿Cómo es el ciclo del agua en el terrario? Explica.

Question 2
How does carbon cycle in the terrarium? Explain.

Pregunta 2
Cómo es el ciclo del carbono en el terrario? Explica.

Question 3
How does nitrogen cycle in the terrarium? Explain.

Pregunta 3
¿Cómo es el ciclo del nitrógeno en el terrario? Explica.

Question 4
Is the small scale ecosystem a suitable habitat for monarch butterflies? Explain your answer.

Pregunta 4
¿Es el ecosistema de pequeña escala un hábitat adecuado para las mariposas monarca? Explica tu respuesta.

Question 5
Use the terrarium to visualize how one of the following events would impact the systems in your habitat in 3 ways: extreme drought, hurricane, or wildfire.

Pregunta 5
Utilizando el terrario como modelo para visualizar este escenario, elija uno de los siguientes eventos y explique tres impactos que tendría en los sistemas de su hábitat: sequía extrema, huracán o fuego fatuo.

BUILDING AND OBSERVING A SMALL SCALE ECOSYSTEM
CONSTRUCCIÓN Y OBSERVACIÓN DE UN ECOSISTEMA A PEQUEÑA ESCALA

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

ecosystem	ecosistema
terrarium	terrario
bottle	botella
investigative	investigador
communications	comunicación
reporter	reportero
biology	biología
matter	materia
solid	sólido

VOCABULARY	VOCABULARIO
method	observaciones
cooperative	bioquímico
groupings	agrupaciones
recording	anotación

BILINGUAL STRATEGIES

The students will share their answers orally about their observations of the terrarium. Students will rotate to other tables and share their findings with other groups. Students may use the sentence stems from the picture as a guide and to hold them accountable to speak.

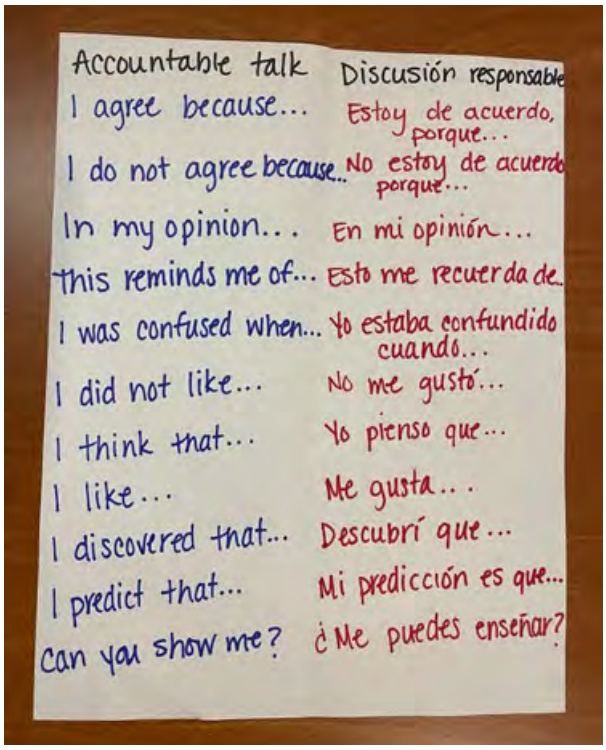
ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C, 2.G
4.K

See Appendix H-1 for full descriptions of ELPS.

NOTES

PICTURE BY S. JUAREZ-TRUJILLO



INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. Provide the guiding questions and the sentence stems on a sheet of paper. Students can fill out on a piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

BUILDING AND OBSERVING A SMALL SCALE ECOSYSTEM
CONSTRUCCIÓN Y OBSERVACIÓN DE UN ECOSISTEMA A PEQUEÑA ESCALA

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

1. How can I build a terrarium that supports plant and animal life?

I can build a terrarium that supports plant and animal life by _____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. **¿Cómo puedo construir un terrario que sustente la vida vegetal y animal?**

Yo puedo construir un terrario que sustente la vida vegetal y animal con _____.

Activity 2

Cycles in the Garden | Ciclos en el Jardín

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

How does matter cycle through the school garden?
¿Cómo circula la materia por el jardín de la escuela?

1. Give each student one of the pictures you took of the schoolyard habitat. Have them tape it to the top of a new page in their science notebook.
2. Take students outside to the garden with their science notebook and a pencil.
3. Remind students about the observations they made in their terrariums regarding the water, carbon and nitrogen cycles.
4. Underneath their picture, students will work in pairs to describe how each cycle through the garden. Help students by instructing them to focus on a specific part of the garden and not all the plants and animals in the garden. Provide students with an example if needed.
5. Now students will do an Inside-Outside Circle or Parallel Lines (also called Tea Party, Face-to-Face or Ladder).
   - » Have one partner from each pair move and form a circle with students facing outward. This will be the inside circle.
   - » Remaining students find and face their partners, forming the outer circle.
   - » Pose question 1 from the questions on page 205. Inside partner will answer and outside partner will listen (have students pause for "think time," then cue them to share).
   - » Next, partners switch roles – outside partner talks, inside partner listens. Use the same question allowing for each partner to share their thoughts.
   - » After both students have provided an answer, the outside circle of students will rotate clockwise, ending up with a new partner for the next question.
   - » Now with a new partner, ask question 2.
   - » Repeat this process for questions 3 – 5.

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE

3.3(B), 3.5(B), 3.5(E), 3.5(G), 3.12(A), 3.12(C)
4.3(B): 4.5(B), 4.5(E), 4.5(G), 4.12(B)
5.3(B), 5.5(B), 5.5(E), 5.5(G), 5.12(A), 5.12(B), 5.12(C)

See Appendix G-1 for full descriptions of TEKS.

NOTES

6. Follow up back in the classroom by asking students to answer the questions in complete sentences in their science notebook.

TECHNOLOGY & ENGINEERING OPTION:
Have students use LEGOs or natural items found outside to construct a model demonstrating how matter cycles through the garden habitat.

Question 1
Why is the water cycle important to plants and animals that live in the garden?

Pregunta 1
¿Por qué es importante el ciclo del agua para las plantas y los animales que viven en el jardín?

Question 2
Why is the carbon cycle important to plants and animals that live in the garden?

Pregunta 2
¿Por qué es importante el ciclo del carbono para las plantas y los animales que viven en el jardín?

Question 3
Why is the nitrogen cycle important to plants and animals that live in the garden?

Pregunta 3
¿Por qué es importante el ciclo del nitrógeno para las plantas y los animales que vieven en el jardín?

Question 4
What would happen if precipitation was taken out of the water cycle system?

Pregunta 4
¿Qué pasaria si la precepitación fuera eliminada del sistema del ciclo del agua?

Question 5
What would happen to monarchs in our garden if the carbon cycle stopped working?

Pregunta 5
¿Qué les pasaría a las monarcas en buestro jardin si el ciclo del carbono dejará de funcionar?

CYCLES IN THE GARDEN | CICLOS EN EL JARDÍN

Soda Bottle Terrarium

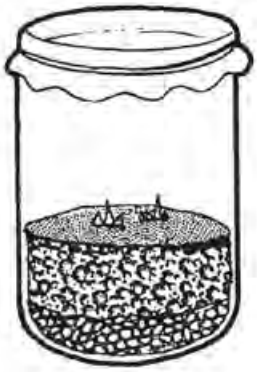
Terrario de Botella de Refresco

Students can make their own mini-environments using materials like plastic soda bottles, seeds, and small plants. Small groups may work together on one terrarium or students can build their own individual gardens.

Note: The directions below can be copied and placed at a special center where all the necessary materials and equipment are available. Make a chart and assign center times to the students.

How to Make a Soda Bottle Terrarium

You will need: 1 plastic soda bottle with top cut off
potting soil
grass seed
small plants
gravel
water
spoon
plastic wrap
rubber band



What to do:

- Make a layer of gravel on the bottom of the bottle.
- Spoon the soil into the bottle; fill it about ⅓ full (see picture above).
- Sprinkle the grass seed on top of the soil.
- Poke a hole in the soil with your finger.
- Put the roots of the plant into the hole.
- Smooth the dirt in and around the hole.
- Water the plants lightly.
- Cover the top of the bottle with plastic wrap.
- Place a rubber band around the plastic wrap to keep it in place.

Follow-up:

- Draw a picture of your terrarium. Label it Day One.
- Observe your garden every day of the week. Draw a picture of any changes you see. Label each change with the day. Use the Changes worksheet for your work.

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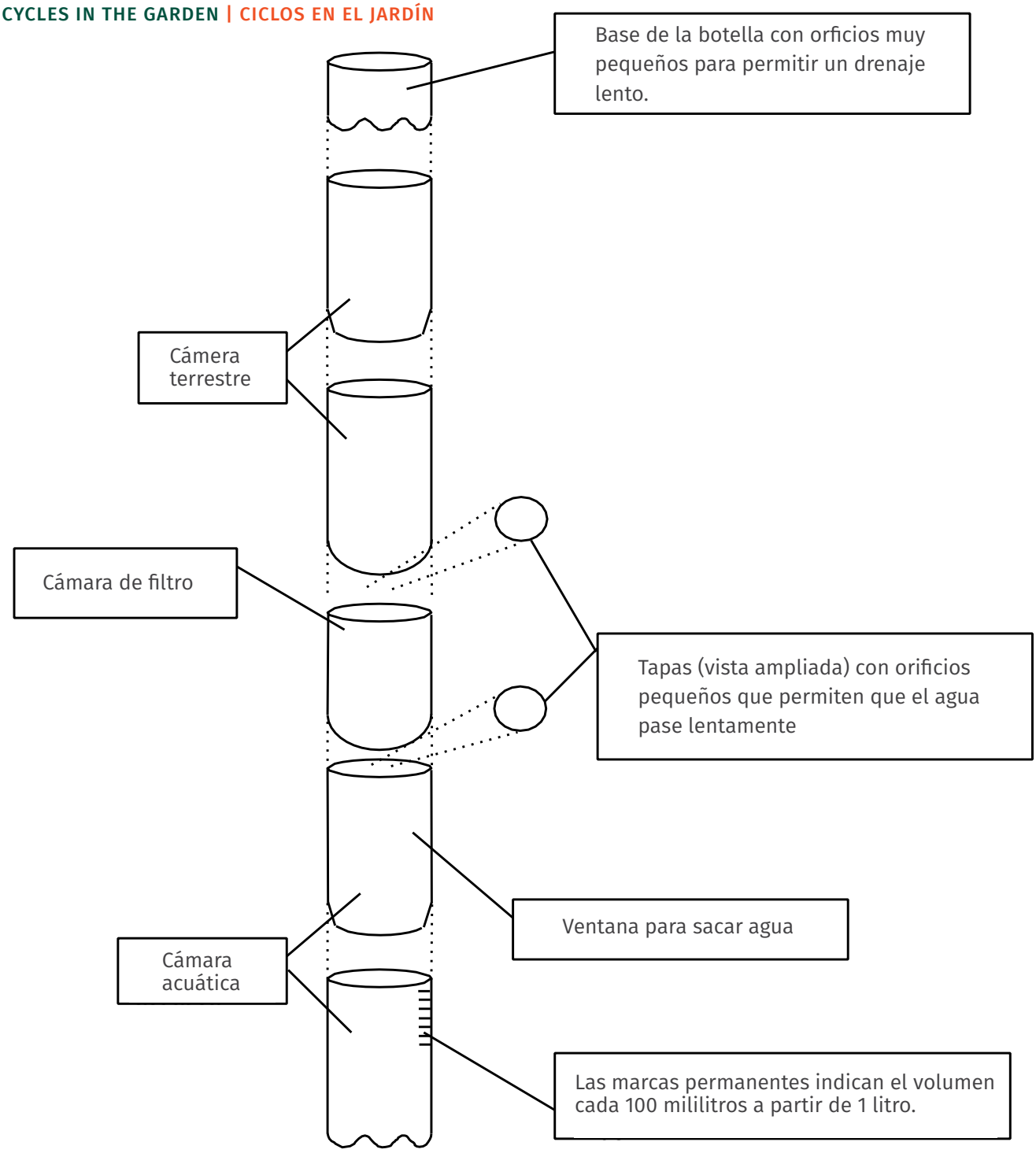
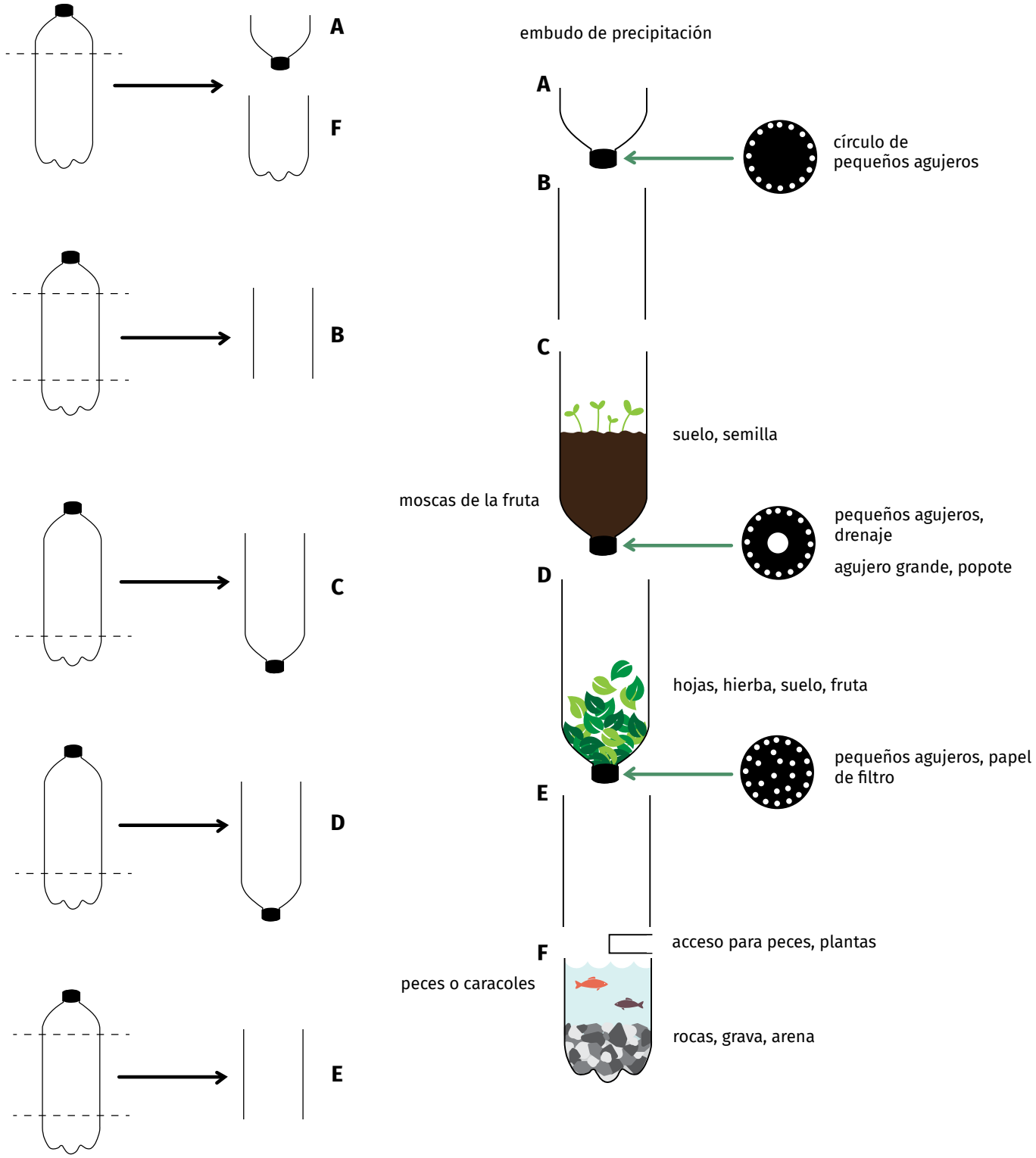
CYCLES IN THE GARDEN | CICLOS EN EL JARDÍN



CYCLES IN THE GARDEN | CICLOS EN EL JARDÍN



CYCLES IN THE GARDEN | CICLOS EN EL JARDÍN

Changes | Cambios

DATE | FECHA: _____

NAME | NOMBRE: _____

In each box draw a picture of the changes you observe. Be sure to write the day and date in each box.

En cada cuadro, haz un dibujo de los cambios que observas. Asegúrese de escribir el día y la fecha en cada casilla.

DAY 1 / DÍA DATE / FECHA _____	DAY 2 / DÍA DATE / FECHA _____
DAY 3 / DÍA 3 DATE / FECHA _____	DAY 4 / DÍA 4 DATE / FECHA _____
DAY 5 / DÍA 5 DATE / FECHA _____	DAY 6 / DÍA 6 DATE / FECHA _____

CYCLES IN THE GARDEN | CICLOS EN EL JARDÍN

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

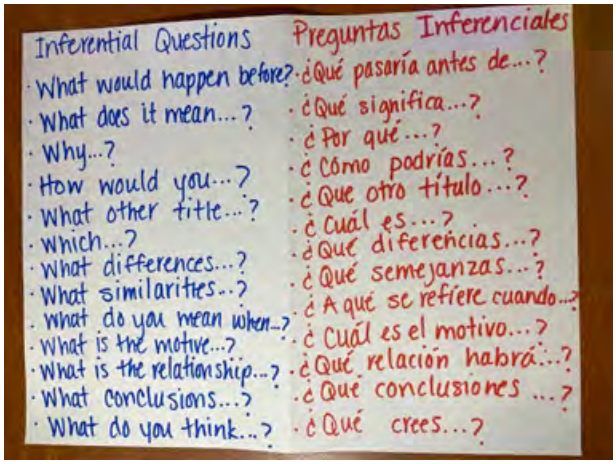
Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

parallel	paralela
calyx	cáliz
petals	pétalos
pollen	polen

VOCABULARY	VOCABULARIO
garden	jardín
changes	cambios
habitat	habitat
equipment	equipo

BILINGUAL STRATEGIES

Students use oral predictions to practice oral vocabulary. Then, they will write their findings for that day. Students may use some of the sentence starters listed below.



PICTURE BY S. JUAREZ-TRUJILLO

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C, 2.G
4.K

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and the lesson vocabulary in their journal. On a sheet, of paper provide the guiding questions and the sentence stems. The sentence stems provide scaffolding for students to get started on writing and speaking in complete sentences. Students can fill out on the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to the cognate words and/or write the answer in Spanish or English whatever he or she feels more comfortable with. The teacher can decide what language students will write depending on the Bilingual model or the students' English level.

CYCLES IN THE GARDEN | CICLOS EN EL JARDÍN

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. How does matter cycle through the school garden?

Matter cycles through the garden by _____.

1. ¿Cómo circula la materia por el jardín de la escuela?

La materia circula por el jardín de la escuela con _____.

Activity 3

Arguing in Class | Discusión en Clase

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

How do I make a claim, supported by evidence, that some species survive better in a habitat than others?
¿Cómo hago una afirmación, respaldada por evidencia, de que algunas especies sobreviven mejor en un hábitat que otras?

1. As students monitor and evaluate the number of monarch butterflies they see in their schoolyard habitat over time, they need to be able to effectively communicate what they know and what they want to happen. One skill that will help them is the capability to construct arguments from evidence.
2. Place students in groups of three or four. Provide students with the scenario below and the worksheet, *Can you Back that Up? Preparing My Argument from Evidence.* Eventually students and student groups should be able to come up with their own question, claims and evidence, but for this activity we are providing the scenario and the question they will write on their worksheet.

   Context: In habitats some organisms (like the hummingbird) can survive well, some survive less well (like the monarch), and some cannot survive at all.

   Question: Why are monarch butterflies not coming to our habitat? (This comes from the scenario below.)

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
3.2(B), 3.3(A), 3.3(B), 3.3(C), 3.12(A)
4.2(B), 4.3(A), 4.3(B), 4.3(C), 4.12
5.2(B), 5.3(A), 5.3(B), 5.3(C), 5.12(A), 5.12(C)

See Appendix G-1 for full descriptions of TEKS.

NOTE: Students' arguments need to focus on the types of plants monarch butterflies need for all stages of their life cycle, the school's geographic location along the monarch's migratory path, and the time of year students are making observations.

NOTES

SCENARIO – COMMUNITY AND SCHOOLYARD HABITATS

After learning about the importance of community habitats in class we wanted to investigate the types of plants and animals we had on our school grounds so we could provide habitat for our local wildlife. We were especially interested in what we could do to improve habitat for our local species.

During the next week we used the Eco-Schools USA Biodiversity Audit to identify the types and numbers of plant species we had. Next, we split into groups to conduct biodiversity audits for the types and numbers of mammals, birds, reptiles and insects found around the school.

All the groups concluded that our school grounds are boring, very little biodiversity! We had very few trees, shrubs and other vegetation and since we learned that animals need food, water, shelter and a place to raise young, we knew we had a lot of work to do.

It was important to our class to provide these habitat elements at school. We wanted the local wildlife to return. The school is surrounded by concrete sidewalks and asphalt. We actually have very little green space. When we learned more about community and schoolyard habitats, we discovered that lots of pollinators need our help. So, we developed an action plan and set out to provide a schoolyard habitat for the local pollinators.

After more research and working with members of our community we had our National Wildlife Federation Schoolyard Habitat® built – a beautiful pollinator garden! Now we were ready and on the lookout for increasing numbers of certain pollinators, including the monarch butterfly and the ruby-throated hummingbird. After three weeks of observations, we noticed an increase in the number of hummingbirds that were visiting the garden. They were visiting several of our flowers including the Trumpet Creeper, Honeysuckle, Canada Lily, and the Red Columbine. What we didn't notice were any monarch butterflies. We had a new question to investigate, "Why are monarch butterflies not coming to our habitat?"

ARGUING IN CLASS | DISCUSIÓN EN CLASE

Can You Back It Up? Preparing An Argument From Evidence
¿Puede Respaldarlo? Preparación de un Argumento a Partir de la Prueba

NAME | NOMBRE: _____ DATE | FECHA: _____

My question is? I ¿Mi pregunta es?	What do I already know? I ¿Que es lo que ya se?
What tests and/or investigations did I conduct related to my question? ¿Qué pruebas y / o investigaciones realice en relación con mi pregunta?	
This is what I found from my tests and/or investigations. Esto es lo que encontré en mis pruebas y / o investigaciones.	
What is my claim? (claims are made based on the results of your investigations.) ¿Cuál es mi reclamo? (las reclamaciones se basan en los resultados de sus investigaciones).	

ARGUING IN CLASS | DISCUSIÓN EN CLASE

What evidence do I have to support my claim? | ¿Qué evidencia tienes para respaldar mi reclamo?

PERSONAL | PERSONAL:

INTERNAL RESOURCES (other students or groups) | RECURSOS INTERNOS (otros estudiantes o grupos)

EXTERNAL RESOURCES (any source that doesn't come from a member of the class, e.g. books, community experts, internet, videos, etc.)

RECURSOS EXTERNOS (cualquier fuente que no provenga de un miembro de la clase, por ejemplo, libros, expertos de la comunidad, Internet, videos, etc.)

REFLECTIONS | REFLEXIONES

My ideas have changed because: | Mis ideas han cambiado porque:

My ideas have not changed because: | Mis ideas no han cambiado porque:

ARGUING IN CLASS | DISCUSIÓN EN CLASE

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

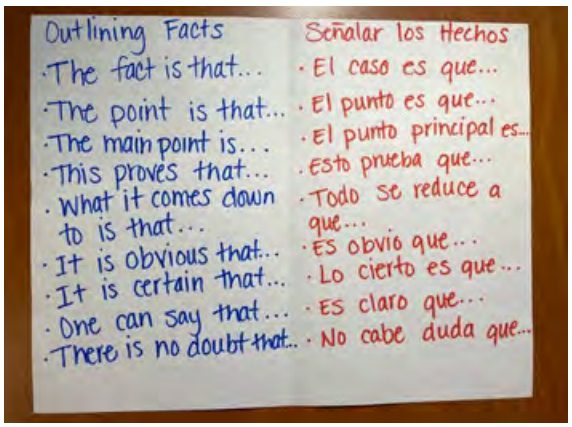
Suggestion: Teachers create a cognate wall in the classroom for students to refer to the words when they need it.

carbon	carbón
nitrogen	nitrógeno
cycle	ciclo
evidence	evidencia
organisms	organismos

VOCABULARY	VOCABULARIO
community	comunidad
wildlife	fauna silvestre
habitat	habitat
species	especies

BILINGUAL STRATEGIES

Have students compare their answers orally. They will show their points of view and findings and practice oral vocabulary. If needed, add sentence starters for the students to use.



PICTURE BY S. JUAREZ-TRUJILLO

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C, 2.G
4.K

See Appendix H-1 for full descriptions of ELPS.

NOTES

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,

2 students repeat the word after you, and

3 students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) at the beginning of the lesson in their journal and the lesson vocabulary. On a sheet of paper provide the guiding questions and the sentence stems. Students can fill it and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever he or she feel more comfortable with. Teacher can decide what language students will write depending on the Bilingual model or the students' English level.

ARGUING IN CLASS | DISCUSIÓN EN CLASE

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

1. How do I make a claim, supported by evidence that some species survive better in a habitat than others?

I can make a claim supported by evidence that some species survive better in a habitat than others by _____.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. **¿Cómo hago una afirmación, respaldada por evidencia de que algunas especies sobreviven mejor en un hábitat que otras?**

Yo hago una afirmación respaldada por evidencia de que algunas especies sobreviven mejor en un hábitat que otras con _____.

3-5 Community Change

(5) 50 MINUTE CLASS PERIODS | ENGINEERING, MATH, SCIENCE, SOCIAL STUDIES

BACKGROUND

Our land is changing. Land covered by forest is changing to farmland, land covered by farmland is changing to suburbs and cities are growing. Shorelines are shifting, glaciers are melting, and ecosystems boundaries are moving. As human population numbers have been rising, natural resource consumption has been increasing both in our country and elsewhere. We are altering the surface of the Earth on a grand scale. Nobel Prize recipient Paul J. Crutzen has said, "Humans have become a geologic agent comparable to erosion and volcanic eruptions..."

Land cover change has effects and consequences at all geographic scales: local, regional and global. These changes have enabled the human population to grow, but they also are affecting the capacity of ecosystems to produce food, maintain fresh water and forests, regulate climate and air quality and provide other essential functions necessary for life. As citizens, it is important for us to understand the changes we are bringing about to the earth system, and to understand the impacts of those changes for life on our planet. To learn more about the impacts associated with monarch habitat loss in the United States and Mexico refer to the introduction, NWF's numerous blogs on the monarch butterfly, http://blog.nwf.org/tags/monarch-butterfly/, and in the National Wildlife magazine article, Battle for Butterflies, https://www.nwf.org/Magazines/National-Wildlife/2015/AprilMay/Conservation/Battle-for-Butterflies

Please note: Providing effective educational content related to climate change, including the loss of habitat and the peril or extinction of a species, is best done in developmental stages that are grouped according to age levels. These stages are vitally important to environment-based education because of the subject's deep underlying complexity. The National Wildlife Federation along with the North American Association for Environmental Education, NAAEE, recommend that content specific to climate change, habitat loss/destruction and species peril and extinction be carefully taught according to age level. This allows for cognitive and problem-solving development of the human mind and also makes sense because the subject inherently requires strong and effective building blocks of knowledge and

skill. Also keep in mind that the size and extent of environmental problems can seem overwhelming to younger children who do not yet grasp all the possibilities for solutions. Younger children may have difficulty grasping the potential of collective societal scale and action or that individuals can make a useful contribution to such large-scale challenges. The guidelines created by the National Wildlife Federation and NAAEE are found in the appendix.

LESSON OBJECTIVES

Students will:

- Analyze aerial photos to see how land use has changed over time.
- Make claims about the merit of a solution to address the decline in the monarch population.
- Explain how our extraction of natural resources impacts wildlife habitat.
- Develop a conceptual model that demonstrates monarch habitat today and what it can look like in the future with community-wide pollinator restoration habitats.
- Design a physical model to be presented to a variety of community members, both inside and outside the school building to build support for the project.

MATERIALS

- Science notebook
- One inch grid paper copied onto a transparency, one for the teacher to use and one per pair of students, http://www.math.kent.edu/~white/graphpaper/one-bold.pdf or http://www.math.kent.edu/~white/graphpaper/
- Thin dry-erase markers, two colors per student pair
- Color copies of the two San Antonio, Texas images – one set per pair – COLOR COPIES MUST BE USED for students to identify changes in land cover over time
- Access to recyclable materials

Activity 1

Changing Cities | Ciudades Cambiantes

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

How do our needs and wants impact monarch butterflies?
¿Cómo afectan nuestras necesidades y deseos a las mariposas monarca?

1. Ask students the questions found below. Have pairs of students come up with their ideas and write them in their science notebook. Students should be prepared to share with the whole class. Debrief as a class and write down student's ideas on chart paper or other space where students can view clearly.

Question 1	Pregunta 1
Why are monarch butterfly numbers decreasing? (Habitat loss and fragmentation, climate and weather changes, pollution, pesticides/herbicides — some of this was addressed in earlier lessons)	**¿Por qué está disminuyendo el número de mariposas monarca?** (Pérdida y fragmentación del hábitat, cambios climáticos y meterológicos, contaminación, pesticidas/herbicidas; algo de esto se abordó en lecciones anteriores)
Question 2	**Pregunta 2**
What is the relationship between our natural resources and monarch butterflies? (Students should struggle more with this question. Traditional instruction tends to separate the physical and life sciences. Here we begin to see if there are consequences, intended or not, to our actions (needs and wants))	**¿Cuál es la relación entre nuestros recursos engergéticos natruales y las mariposas monarca)?** (Los estudiantes deberían luchar más con esta pregunta. La instrucción tradicional tiendo a separar las cinecas fisicas de las de la vida. Aqui comenzamos a ver que hay consecuencias, intencionales o no, de nuestras acciones (necesidades y deseos))

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

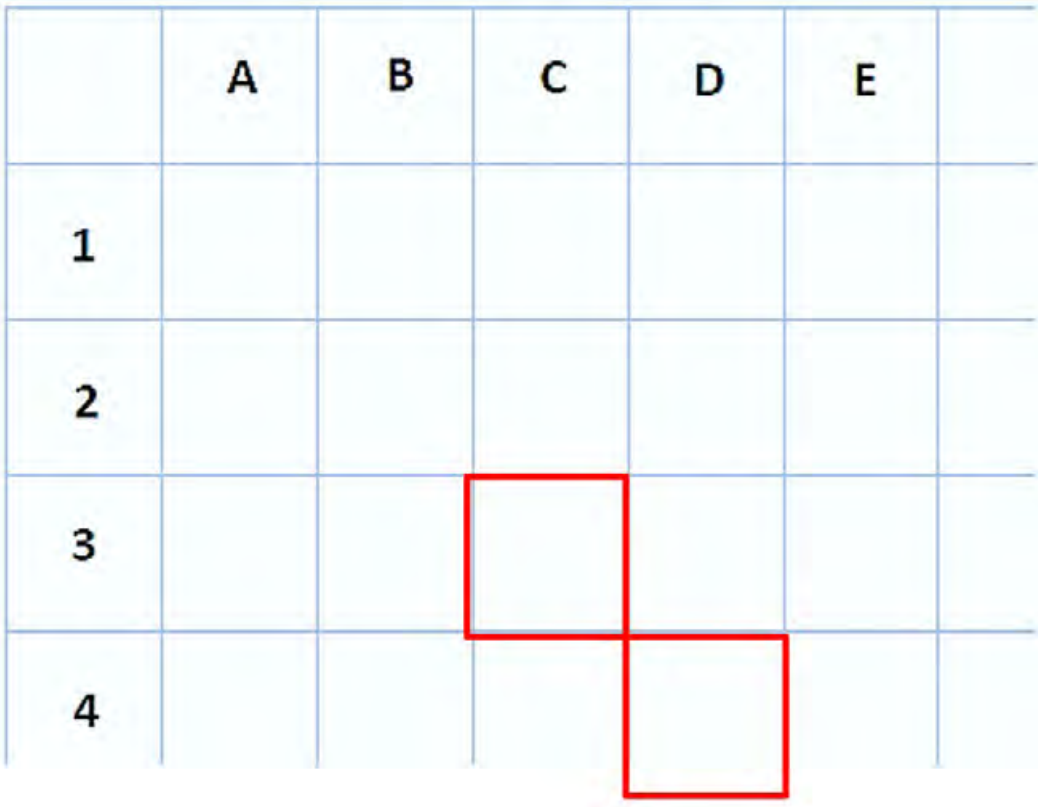
SCIENCE
3.2(B), 3.5(B), 3.5(G), 3.12(A), 3.12(C)
4.2(B), 4.5(B), 4.5(G), 4.12
5.2(B), 5.5(B), 5.5(G), 5.12(B), 5.12(C)

See Appendix G-1 for full descriptions of TEKS.

NOTE: It is critical students begin to see the cause and effect relationship between our use of energy resources and habitat loss, increases in air and water pollution, and an increased reliance on pesticides and herbicides.

NOTES

2. For this activity you will need one inch grid paper copied on a transparency. Students will be looking at change over time. You can do this as a whole class or if you have enough resources allow each pair of students to have their own photos and transparency grid. Share the pictures on page 224 and 225.
3. Create a grid on your transparency (refer to the materials section for a link to one inch grid paper). Label the X-axis A-O and Y-axis 1-18. Line up the transparency and the image and use a piece of tape to hold it in place. With a red marker choose 4 random squares to look at more closely. You will do the exact same thing and mark the exact same squares for both the 1991 and 2010 images. For example, if you mark A5, B2, D9 and E4 on the 1991 map, then you mark A5, B2, D9 and E4 on the 2010 map.
4. Explain to students that San Antonio is a major "highway" for monarch butterflies as they migrate into and out of Mexico. Ask, "What has changed in your squares?" and "What could such a significant change in this city's geography mean for the monarch"? [Habitat loss due to loss of green space, loss of biodiversity/**the plants the monarchs rely on (remember without native milkweed, monarchs will not be able to make their migrations very far north**). Monarchs are having to travel longer distances to reach safety because of the fragmentation of their habitat.]



CONTINUE TO THE NEXT PAGE.

CHANGING CITIES | CIUDADES CAMBIANTES

KEY

Greens: green space of some type, like park systems, darker greens tend to be forested undisturbed natural areas

Blues: dark blues are waters, such as lakes, rivers and oceans out past the shore and drop offs, the lighter blues are streams, creeks and ponds or shallow areas of the larger water bodies above

Whites: represent clouds or smoke if irregularly shaped, but if white and symmetrical, then it is an urban structure

Grays: on the ground represent urban areas, including highways, streets, schools, businesses, etc., but if in the sky above the surface the color represents haze and pollution

Yellows/Browns: represent soil, clear-cut forests and mountains and/or agriculture (crops)

LLAVE

Verdes: espacios verdes de algún tipo, como los sistemas de parques, los verdes más oscuros tienden a ser áreas naturales boscosas no perturbadas

Azules: aguas profundas de color azul oscuro, como lagos, ríos y océanos más allá de la costa y los desniveles, los azules más claros son arroyos, arroyos y estanques o áreas poco profundas de los cuerpos de agua más grandes que se encuentran arriba

Blancos: representan nubes o humo si tienen forma irregular, pero si son blancos y simétricos, entonces es una estructura urbana

Grises: en el suelo representan áreas urbanas, incluidas carreteras, calles, escuelas, negocios, etc., pero si en el cielo sobre la superficie el color representa neblina y contaminación

Amarillos/Marrones: representan suelo, bosques y montañas talados y/o agricultura (cultivos)

CHANGING CITIES | CIUDADES CAMBIANTES

KEY

Greens: green space of some type, like park systems, darker greens tend to be forested undisturbed natural areas

Blues: dark blues are waters, such as lakes, rivers and oceans out past the shore and drop offs, the lighter blues are streams, creeks and ponds or shallow areas of the larger water bodies above

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Amarillos/Marrones: representan suelo, bosques y montañas talados y/o agricultura (cultivos)

CHANGING CITIES | CIUDADES CAMBIANTES

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Have students compare their answers orally. They will show their points of view and findings and practice oral vocabulary. If needed, add sentence starters for the students to use.

decreasing	decreciente
habitat	habitat
climate	clima
fragmentation	fragmentación
physical	físico

VOCABULARY	VOCABULARIO
community	comunidad
wildlife	fauna silvestre
habitat	habitat
species	especies

BILINGUAL STRATEGIES

Students will practice oral vocabulary by describing verbally how the city has changed. Ask students to incorporate some newly learned cognates.

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

ENGLISH LANGUAGE PROFICIENCY SKILLS (ELPS):

1.A, 1.C
2.C, 2.G
4.K

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. Provide the guiding questions and the sentence stems on a sheet of paper. Students can fill out the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

CHANGING CITIES | CIUDADES CAMBIANTES

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. How do our needs and wants impact monarch butterflies?

Our needs and wants impact monarch butterflies by _____.

1. **¿Cómo afectan nuestras necesidades y deseos a las mariposas monarca?**

Nuestras necesidades y deseos afectan a las mariposas monarca en _____.

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Activity 2

The Oyamel Fir Forest
El Bosque de Abetos de Oyamel

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What impact does logging have on the environment and how is logging impacting the monarchs where they overwinter? What role does logging play in the Mexican communities surrounding the Sierra Madre Mountains?
¿Qué impacto tiene la tala en el medio ambiente y cómo afecta la tala a la mariposa monarca donde pasa el invierno? ¿Qué papel juega la tala en las comunidades mexicanas que rodean la Sierra Madre?

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

SCIENCE
3.2(B), 3.5(B), 3.5(G), 3.12(A), 3.12(C)
4.2(B), 4.5(B), 4.5(G), 4.12
5.2(B), 5.5(B), 5.5(G), 5.12(B), 5.12(C)

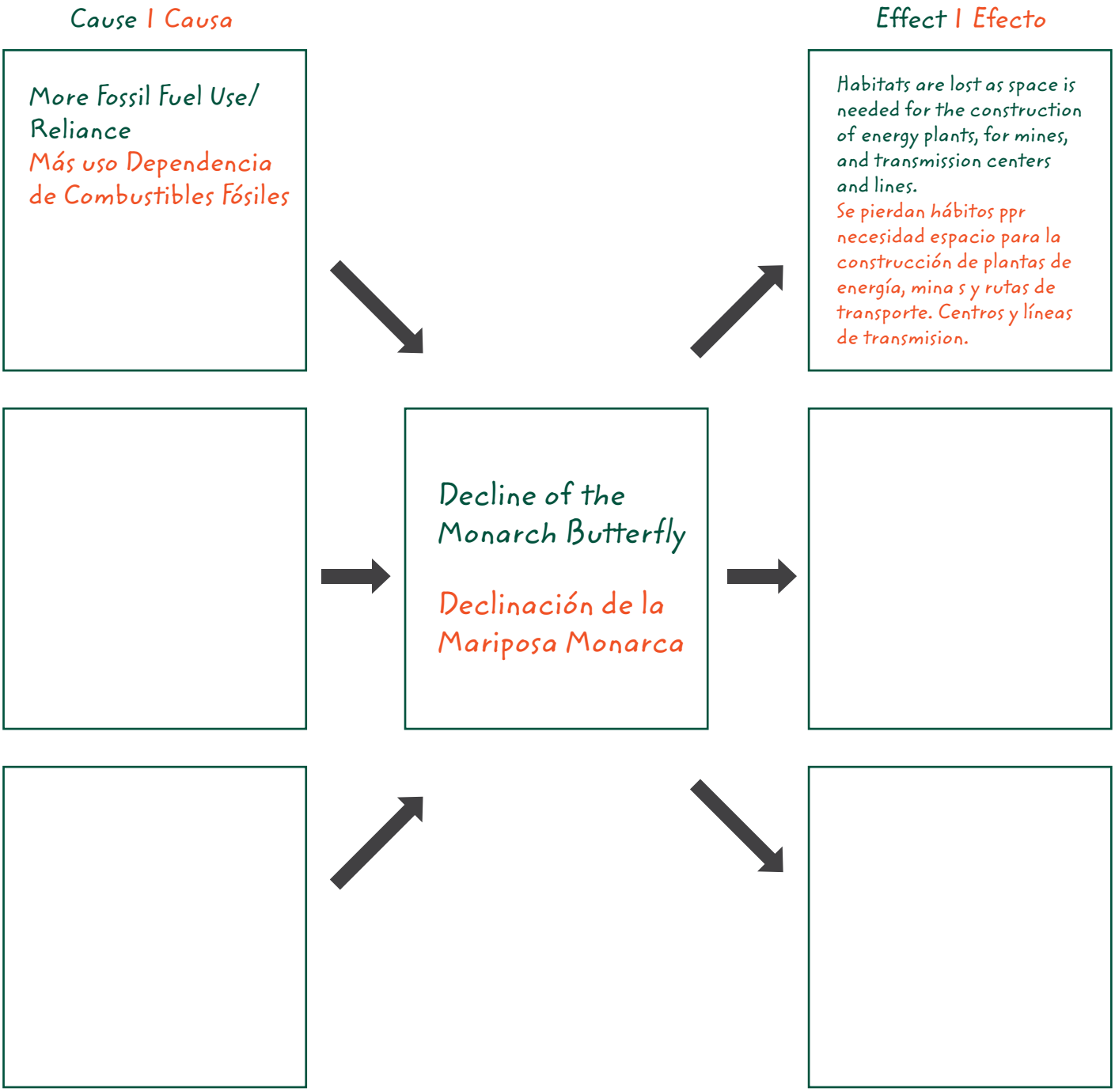
See Appendix G-1 for full descriptions of TEKS.

NOTES

1. Another example for students to look at is the spread of logging operations, around the overwintering grounds for the monarch butterfly. The Oyamel Fir Forests of the Mexican Sierra Madre Mountains are some of the rarest habitats in the world. Students can watch a ten minute video, https://youtu.be/Sw6Ug6RUPTQ, about the La Cruz Habitat Protection Project which highlights how the forest has changed over time, how community leaders are working together to make changes to preserve existing habitats and plans for the future in hopes of increasing monarch butterfly numbers all while preserving the way of life for the families who live there. While students will see the obvious changes to the landscape, the habitat loss and fragmentation along the monarch migratory path, what they don't see are the minute changes, such as atmospheric pollution, pollution to waterways and groundwater, etc.
2. Talk about the environmental impacts of logging. For background associated with logging impacts see, https://sciencing.com/about-6103371-logging-its-effect-ecosystem.html. Have students use a graphic organizer to show cause and effect relationships between the monarch butterfly and our natural resources.
3. Ask students to reply again to the two questions asked on p. 222. You could use this as a post-assessment to see how students' understanding has changed.

THE OYAMEL FIR FOREST | EL BOSQUE DE ABETOS DE OYAMEL

NAME | NOMBRE: _____ DATE | FECHA: _____



THE OYAMEL FIR FOREST | EL BOSQUE DE ABETOS DE OYAMEL

ANSWER KEY | LLAVE DE RESPUESTAS

Cause | Causa

Logging for firewood and furniture.

Tala para leña y muebles.

Habitat loss or fragmentation due to urbanization.

Pérdia o fragmentación de hábitat por urbanizacion.

Population or community growth.

Pérdia o fragmentación de hábitat por urbanizacion.

Decline of the Monarch Butterfly

Declinación de la Mariposa Monarca

Effect | Efecto

Monarch habitats are lost when oyamel trees are cut down. Without the overwintering habitats for the monarchs, the species will not survive.

Los hábitos de la mariposa monarca se pierdan cuando se cortan los árboles de oyamel. Sin los hábitat de invierno de la mariposa monarca, la especie no sobrevivirá.

Fewer numbers of monarchs make it safely from one habitat to the next as our cities expand.

Menos números de mariposas monarcas hacen un traslado seguro de un hábitat al siguente a medida que nuestras ciudades se expanden.

As cities expand, the demand for natural resources also grows, leaving fewer habitats for monarchs. Increased reliance on pesticides and herbicides to control for pests or plant growth. This causes problems for beneficial insects too.

A medida que las ciudades se expanden, la demanda de recursos natruales crece dejando menos habitat para las mariposas monarcas. Mayor conifianza en plaguicidas y herbicidas para controlar plagas o crecimiento de plantas. Esto tambien causa problemas para los insectos beneficiosos.

CHANGING CITIES | CIUDADES CAMBIANTES

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Have students compare their answers orally. They will show their points of view and findings and practice oral vocabulary. If needed, add sentence starters for the students to use.

fossil	fósil
habitat	habitat
protection	protección
project	proyecto
preserve	preservar
migratory	migratoria
mountains	montañas

VOCABULARY	VOCABULARIO
forest	bosque
logging	explotación forestal
overwintering	hibernando
preserving	conservación

BILINGUAL STRATEGIES

Write the cognates on popsicle sticks and pair up students. Have the students ask each other questions based on Bloom's taxonomy using the cognates. Example: ¿Qué puedes decirme sobre las montañas? Teachers may refer to the Blooms taxonomy table listed below to originate questions for students.

ENGLISH LANGUAGE PROFICIENCY SKILLS (ELPS):

1.A, 1.C
2.C

See Appendix H-1 for full descriptions of ELPS.

NOTES

Procesos cognitivos de orden inferior ⟵ ⟶ Procesos cognitivos de orden superior

RECORDAR	COMPRENDER	APLICAR	ANALIZAR	EVALUAR	CREAR
Recordar hechos/datos sin necesidad de entender. Se muestra material aprendido previamente mediante el recuerdo de términos, conceptos básicos y respuestas.	Mostrar entendimiento a la hora de encontrar información del texto. Se demuestra comprensión básica de hechos e ideas.	Usar en una nueva situación. Resolver problemas mediante la aplicación de conocimiento, hechos o técnicas previamente adquiridas en una manera diferente.	Examinar en detalle. Examinar y descomponer la información en partes identificando los motivos o causas; realizar inferencias y encontrar evidencias que apoyen las generalizaciones.	Justificar. Presentar y defender opiniones realizando juicios sobre la información, la validez de ideas o la calidad de un trabajo basándose en una serie de criterios.	Cambiar o crear algo nuevo. Recopilar información de una manera diferente combinando sus elementos en un nuevo modelo o proponer soluciones alternativas.
PALABRAS CLAVE:	**PALABRAS CLAVE:**	**PALABRAS CLAVE:**	**PALABRAS CLAVE:**	**PALABRAS CLAVE:**	**PALABRAS CLAVE:**
Elegir, observar, mostrar, Copiar, omitir, deletrear, Definir, rastrear, afirmar, Decir, cuándo, duplicar, Citar, repetir, qué, leer, relacionar, nombrar, Quién, listar, repetir, Recitar, escribir, localizar, Cómo, dónde, Memorizar, Por qué, reconocer	Preguntar, esquematizar, Generalizar, predecir, Clasificar, dar ejemplos, Comparar, relacionar, Contrastar, ilustrar, Parafrasear, demostrar, Informar, discutir, Inferir, revisar, Interpretar, mostrar, Explicar, resumir, Expresar, observar, Traducir	Actuar, emplear, practicar, Identificar, seleccionar, agrupar, Calcular, elegir, resumir, Entrevistar, planear, desarrollar, Enseñar, transferir, interpretar, Usar, demostrar, categorizar, Conectar, dramatizar, construir, Planear, manipular, resolver, Simular, seleccionar, unir, Hacer uso, organizar	Examinar, priorizar, encontrar, Centrarse, agrupar, asumir, Razonar, destacar, causa-efecto, Inferencia, separar, aislar, Comparar, distinguir, reorganizar, Dividir, motivar, diferenciar, Buscar similitudes, descomponer, Inspeccionar, investigar, Simplificar, categorizar, Preguntar, ordenar, Elegir, poner a prueba, Establecer, observar, Encuestar	Medir, opinar, argumentar, Evaluar, premiar, testar, Decidir, debatir, convencer, Apoyar, explicar, seleccionar, Defender, comparar, deducir, Justificar, percibir, recomendar, Criticar, probar, estimar, Juzgar, influir, persuadir, Valorar, demostrar	Adaptar, estimar, planear, Añadir, experimentar, testar, Construir, extender, sustituir, Cambiar, formular, reescribir, Combinar, hipotetizar, suponer, Componer, innovar, teorizar, Compilar, mejorar, pensar, Componer, maximizar, simplificar, Crear, minimizar, proponer, Descubir, modelar, visualizar, Diseñar, modificar, Desarrollar, originar, Elaborar, transformar
ACCIONES / RESULTADO	**ACCIONES / RESULTADO**	**ACCIONES / RESULTADO**	**ACCIONES / RESULTADO**	**ACCIONES / RESULTADO**	**ACCIONES / RESULTADO**
Describir, Definición Encontrar, Hechos Identificar, Etiquetado Listar, Listado Localizar, Cuestionario Nombrar, Reproducción Reconocer, Test Recuperar, Cuaderno Fotocopia	Clasificar, Colección Comparar, Ejemplos Ejemplificar, Explicación Explicar, Etiquetado Inferir, Listado Interpretar, Esquema Parafrasear, Cuestionario Resumir, Resumen Muestra y cuenta	Desempeñar, Demostración Ejecutar, Diario Implementar, Ilustraciones Usar, Entrevista Emplear, Interpretación Realizar, Simulación Presentación Dibujo	Atribuir, Reseña Deconstruir, Gráfica Integrar, Lista de control Organizar, Base de datos Esquematizar, Gráfico Estructurar, Informe Encuesta Hoja de cálculo	Atribuir, reseña Comprobar, gráfica Deconstruir, base de datos Integrar, informe Organizar, hoja de cálculo Esquematizar, encuesta Estructurar	Construir, anuncio Diseñar, película Trazar, juego Idear, dibujar Planificar, plan Producir, proyecto Hacer, canción Historia Producto audiovisual
PREGUNTAS	**PREGUNTAS**	**PREGUNTAS**	**PREGUNTAS**	**PREGUNTAS**	**PREGUNTAS**
¿Puedes enumerar...? ¿Puedes recordar...? ¿Puedes seleccionar...? ¿Cómo ocurrió...? ¿Cómo es...? ¿Cómo describirías...? ¿Podrías explicar...? ¿Cómo mostrarías...? ¿Qué es...? ¿Cuál...? ¿Quién fue...? ¿Quiénes fueron los principales ...? ¿Por qué...?	¿Puedes explicar que está ocurriendo...? ¿Cómo clasificarías...? ¿Cómo compararías/contrastarías...? ¿Cómo podrías parafrasear el significado de...? ¿Cómo resumirías...? ¿Qué puedes decir sobre...? ¿Cuál es la mejor respuesta...? ¿Qué afirmaciones apoyan...? ¿Podrías afirmar o interpretar en tus propias palabras...?	¿Cómo usarías...? ¿Qué ejemplos sobre... puedes encontrar? ¿Cómo organizarías... para presentar...? ¿Cómo aplicarías lo que has aprendido para desarrollar...? ¿Qué enfoque usarías para...? ¿Qué aspectos seleccionarías para mostrar...? ¿Qué preguntas harías en una entrevista a...?	¿Cuáles son las partes o rasgos de...? ¿En qué aspectos está... ¿Relacionado/a con...? ¿Por qué opinas que...? ¿Qué motivo hay para...? ¿Puedes hacer un listado de las partes...? ¿Qué ideas justifican...? ¿Qué conclusiones extraes de...? ¿Qué evidencias de... encuentras? ¿Puedes distinguir entre...? ¿Cuál es la relación entre...? ¿Cuál es la función de...?	¿Estás de acuerdo con...? ¿Cuál es tu opinión sobre...? ¿Cómo comprobarías...? ¿Sería mejor si...? ¿Por qué ese personaje...? ¿Cómo valorarías...? ¿Cómo determinarías...? ¿Cómo priorizarías...? ¿Qué información podrías para apoyar tu punto de vista? ¿Cómo justificarías...? ¿Qué datos te llevaron a esa conclusión? ¿Qué seleccionarías para...? ¿Qué elección hubieras tomado si...?	¿Qué cambios harías para...? ¿Cómo mejorarías...? ¿Qué pasaría si...? ¿Podrías proponer una alternativa? ¿Puedes elaborar... basándote en...? ¿De qué forma evaluarías...? ¿Podrías formular una teoría alternativa? ¿Qué harías para maximizar/minimizar...? ¿Cómo pondrías a prueba...? ¿Podrías construir un modelo que cambie...? ¿Se te ocurre un modo original para...? ¿Cómo cambiarías el guión/plan? ¿Cómo adaptarías... para...?

https://www3.gobiernodecanarias.org/medusa/edublog/cprofestenerifesur/wp-content/uploads/sites/105/2015/12/Captura-de-pantalla-2015-12-03-a-las-22-12-56.png

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. Provide the guiding questions and the sentence stems on a sheet of paper. Students can fill out the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

CHANGING CITIES | CIUDADES CAMBIANTES

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. What impact does logging have on the environment and how is logging impacting the monarchs where they overwinter?

Forest clearing affects the environment in _____ and also affects the monarch butterfly in _____.

1. **¿Qué impacto tiene la tala en el medio ambiente y cómo afecta la tala a la mariposa monarca donde pasa el invierno?**

La tala de bosques afecta al medio ambiente en _____ y también afecta a la mariposa monarca en _____.

2. What role does logging play in the Mexican communities surrounding the Sierra Madre Mountains?

Forest clearing in the communities surrounding the Sierra Madre plays an important role because _____.

2. **¿Qué papel juega la tala en las comunidades mexicanas que rodean la Sierra Madre?**

La tala de bosques en las comunidades que rodean a la Sierra Madre juega un papel importante porque _____.

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Activity 3

Modeling Before and After
Modelado Antes y Después

INVESTIGATING QUESTION
PREGUNTA DE INVESTIGACIÓN:

What native plants need to be included in our Monarch Recovery Garden?
¿Qué plantas nativas deben incluirse en nuestro jardín de recuperación monarca?

TEXAS ESSENTIAL KNOWLEDGE AND SKILLS (TEKS):

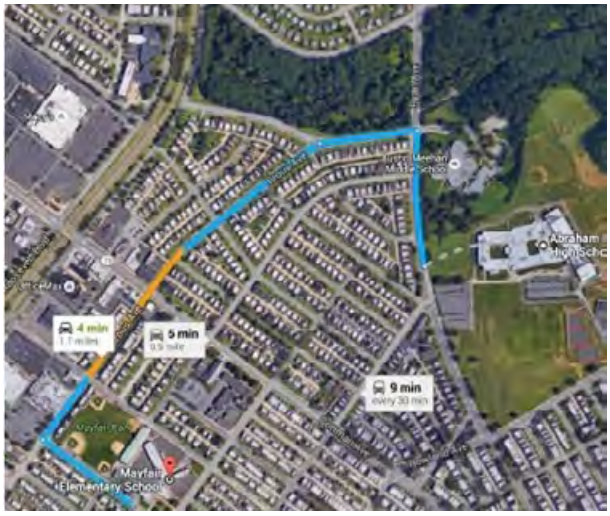
SCIENCE
3.1(G), 3.2(A), 3.3(A), 3.3(B), 3.5(C), 3.5(G), 3.11(A), 3.12(A)
4.1(G), 4.2(A), 4.3(A), 4.3(B), 4.5(C), 4.5(G), 4.11(A), 4.11(B), 4.12
5.1(G), 5.2(A), 5.3(A), 5.3(B), 5.5(C), 5.5(G), 5.11, 5.12(C)

See Appendix G-1 for full descriptions of TEKS.

1. Review with students if needed, what the needs are for the monarch butterfly.
2. Have student pairs or groups conduct a basic site inventory. Students will need their science notebook and a pencil, along with their smartphone or tablet to inventory their schoolyard.
3. Have student groups use Google Maps or Google Earth to pinpoint an area of the community they'd like to focus on for their *today and tomorrow* model. Below are three examples. Students can pinpoint their community or neighborhood focus and then dive in further for a more detailed look at specific points along their pathway of choice. For example, in the following communities where would the best habitat be located? What business or neighborhood associations could students engage in habitat restoration? For locations or areas with impervious surfaces, what solutions can students come up with to create habitat?
4. Resources:
   - **Monarch Way Stations:** http://monarchwatch.org/waystations/
   - **National Wildlife Federation Educational Resources – The Monarch Butterfly:** https://www.nwf.org/Educational-Resources/Wildlife-Guide/Invertebrates/Monarch-Butterfly
   - **Schoolyard Habitats:** https://www.nwf.org/schoolyard/
   - **Community Wildlife Habitats:** https://www.nwf.org/sitecore/content/Home/Garden-for-Wildlife/Create/Communities
5. Have student groups design a physical blueprint of their *today and tomorrow* model and develop a materials list. Use the sketch from their site inventory to develop their "today" blueprint. Encourage students to incorporate LEGO's in their design as well as natural materials from the schoolyard and reuse recyclable materials.
6. Allow student groups to find materials they want to use for their model at home and school and allow time in class, before school and after school for students to have ample time to go through the design process and have meaningful discussions.
7. Display in the library or other common area(s). Allow students to present their projects and conclusions to a variety of audiences, such as at a staff meeting, PTA/PTO meeting, school and/or city board meeting.

Urban Texas community between a local elementary school and high school. Community population: 383,000

Comunidad urbana de Texas entre una escuela primaria y secundaria local. Población de la comunidad: 383.000



Officially listed as an urban city, this local elementary and high school sit on the outskirts of Philadelphia, PA and could be considered more suburban. Community Population: 1.57 million

Esta escuela primaria y secundaria, catalogada oficialmente como una ciudad urbana, se encuentra en las afueras de Filadelfia, Pensilvania, y podría considerarse más suburbana. Población de la comunidad: 1,57 millones

Rural community housed on the Minnesota Chippewa Tribe Reservation. Community Population: 580

Comunidad rural ubicada en la Reserva de la Tribu Chippewa de Minnesota. Población de la comunidad: 580

FOLLOW-UP QUESTIONS

Question 1
What are the limitations of your model?

Question 2
What can you do to make your model come to life?

Question 3
What or who do you need to make your model come to life?

Question 4
Besides restoring monarch butterfly habitat, what other positive impacts will your project have?

PREGUNTAS DE SEGUIMIENTO

Pregunta 1
¿Cuáles son las limitaciones de tu modelo?

Pregunta 2
¿Qué puedes hacer para que tu modelo cobre vida?

Pregunta 3
¿Qué o quién necesitas para que tu modelo cobre vida?

Pregunta 4
Además de restaurar el hábitat de la mariposa monarca, ¿qué otros impactos positivos tendrá su proyecto?

MODELING BEFORE AND AFTER | MODELADO ANTES Y DESPUÉS

Basic Site Inventory: Monarch Butterfly Garden
Inventario Básico del Sitio: Jardín de Mariposas de Monarca

SCHOOL NAME | NOMBRE DE ESCUELA: _____

GROUP MEMBERS' NAMES | NOMBRES DE LOS MIEMBROS DEL GRUPO:

_____

DATE SURVEY CONDUCTED | FECHA EN QUE SE REALIZÓ LA ENCUESTA: _____

LATITUDE | LATITUD: _____ LONGITUDE | LONGITUD: _____

Talk as a group and come up with a vision for the garden. My Group's Vision for the monarch garden...

Hablen en grupo y propongan una visión para el jardín. La visión de mi grupo para la monarca jardín...

_____

_____

_____

Use this site to find your pollinator ecoregion using your zip code, http://www.pollinator.org/guides.html. Pages 18-20 list plants and habitat hints. Find the milkweed and nectar plants that are native to your region for inclusion in your Monarch Recovery Garden.

Use este sitio para encontrar su ecoregión de polinizadores usando su código postal, http://www.pollinator.org/guides.htm. Las páginas 18-20 enumeran plantas y sugerencias de hábitat. Encuentre las plantas de algodoncillo y néctar que son nativas de su región para incluirlas en su Jardín de Recuperación Monarca.

NATIVE MILKWEED FOR MY REGION | ALGODONCILLO NATIVO PARA MI REGIÓN

Milkweed Name / Nombre Del Algodoncillo	We Have Tenemos	We Don't Have No Tenemos
1.		
2.		
3.		
4.		
5.		

Why is it important to have more than one variety of milkweed?
¿Por qué es importante tener más de una variedad de algodoncillo?

NATIVE NECTAR PLANTS FOR MY REGION | PLANTAS NATIVAS DE NÉCTARES PARA MI REGIÓN

Nectar Plant Name / Nombre De La Planta Néctar	We Have Tenemos	We Don't Have No Tenemos
1.		
2.		
3.		
4.		
5.		

What month(s) is the best time to plant? Why?
¿Qué mes (es) es el mejor momento para plantar? ¿Por qué?

What is puddling and why is it important for monarchs? https://www.nwf.org/-/media/Documents/PDFs/Garden-for-Wildlife/Tip-Sheets/Water-Butterfly-Gardens.ashx?la=en&hash=D9A20D85AF989296AB12F800E9BCF2B15B372AF0
¿Qué es el pudelado y por qué es importante para las monarcas?

In your science notebook or on another sheet of paper, sketch the garden or selected site as it looks now. Include a compass rose and a key using symbols to represent trees, plants, walkways, rocks, etc. Why does the group think this is a good site for the Monarch Recovery Garden?

En tu cuaderno de ciencias o en otra hoja de papel, dibuja el jardín o el sitio seleccionado como se ve ahora. Incluye una rosa de los vientos y una llave usando símbolos para representar árboles, plantas, senderos, rocas, etc. ¿Por qué cree el grupo que este es un buen sitio para el Jardín de Recuperación Monarca?

MODELING BEFORE AND AFTER | MODELADO ANTES Y DESPUÉS

Bilingual Strategies

Essential Strategies for Teaching in a Bilingual Classroom

COGNATE LIST

Have students compare their answers orally. They will show their points of view and findings and practice oral vocabulary. If needed, add sentence starters for the students to use.

urban	urban
region	región
plants	plantas
inventory	inventario
audiences	audiencias
projects	proyectos
conclusions	conclusiones
region	región

VOCABULARY	VOCABULARIO
restoration	restauración
impervious	impermeable
decline	disminución
neighborhood	vecindario

BILINGUAL STRATEGIES

Students will play a journalist role by interviewing team members and writing down the answers to the questions.

INSTRUCTIONS

Go over the cognate list with students with the following repetitions:

1. students listen as you say the word,
2. students repeat the word after you, and
3. students say the word by themselves.

ENGLISH LANGUAGE PROFICIENCY STANDARDS (ELPS):

1.A, 1.C
2.C, 2.G
4.K

See Appendix H-1 for full descriptions of ELPS.

NOTES

NOTEBOOK | LIBRO DE NOTAS:

Students can write the cognate word(s) and lesson vocabulary in their journal. Provide the guiding questions and the sentence stems on a sheet of paper. Students can fill out the piece of paper and paste it in their journal. During this activity students can work with a partner, can refer back to cognate words and/or write the answer in Spanish or English whatever they feel more comfortable with. Teacher can also decide what language students will write depending on the Bilingual model or the students' English level.

MODELING BEFORE AND AFTER | MODELADO ANTES Y DESPUÉS

Journal Sheet

Guiding Questions/Sentence Stems

Instructions

The student can work with a partner to complete the sentence. They can see the anchor charts, (poster boards made with students with important points of the lesson), or the wall of cognates, and the teacher can write their answer to model the writing.

Instrucciones

El estudiante puede trabajar con un compañero para completar la oración, puede ver los anclajes (carteles hechos con los estudiantes con puntos importantes de la lección), o la pared de cognados y la maestra puede escribir su respuesta para modelar la escritura.

1. What native plants need to be included in our Monarch Recovery Garden?

The native plants that need to be included in our Monarch Recovery Garden are _____.

1. **¿Qué plantas nativas deben incluirse en nuestro jardín de recuperación Monarch?**

Las plantas nativas que pueden incluirse en nuestro jardín de recuperación monarca son _____.

HTTPS://MONARCHJOINTVENTURE.ORG/MONARCH-BIOLOGY/LIFE-CYCLE

Appendix

Who's Who in the Study of the Monarch Butterfly?

DR. LINCOLN BROWER

Dr. Lincoln Brower was an entomologist and research professor at Sweetbriar College in Virginia, who passed away in 2018 at the age of 86. He spent six decades studying the remarkable migratory lifecycle of the monarch butterfly and urging action to protect it. https://en.wikipedia.org/wiki/Lincoln_Brower

Dr. Brower's contributions include research on the overwintering, migration and conservation biology of the monarch butterfly. https://texasbutterflyranch.com/2015/02/16/q-a-dr-lincoln-brower-talks-ethics-endangered-species-milkweed-and-monarchs/

DR. KAREN OBERHAUSER

Dr. Karen Oberhouser currently serves as the Director of the University of Wisconsin – Madison Arboretum. She also serves as an adjunct Professor, Department of Fisheries, Wildlife and Conservation Biology at the University of Minnesota. Previously, she worked as a director of the Monarch Lab at the University of Minnesota. Karen has been studying monarch butterflies since 1984. She has worked with teachers and pre-college students in Minnesota and throughout the United States using monarchs to teach about biology, conservation and the process of science. https://monarchjointventure.org/about-us/leadership-and-staff

DR. CHIP TAYLOR

Dr. Chip Taylor is an insect ecologist, a Professor of Ecology and Evolutionary Biology at the University of Kansas and the Founder and Director of Monarch Watch, an outreach program focused on education, research and conservation related to monarch butterflies. Watch this short documentary, *Saving the Migration* https://www.youtube.com/watch?v=maM2gl30cJc to learn more about his work and the plight of the Monarch.

CATALINA AGUADO TRAIL

Catalina Aguado Trail was a community scientist from the state of Michoacán in México, and part of the original team who discovered the monarchs' over-wintering grounds. Under the guidance of Dr. Urquhart, Catalina and her husband Ken Brugger spent two years searching the mountains in central México for the monarchs' winter destination. Their discovery graced the cover of the national geographic magazine in August 1976. https://texasbutterflyranch.com/2012/07/10/founder-of-the-monarch-butterfly-roosting-sites-in-mexico-lives-a-quiet-life-in-austin-texas/

XERCES SOCIETY

The Xerces Society is a nonprofit organization that protects wildlife through the conservation of invertebrates and their habitat. For over 50 years, the Society has been at the forefront of invertebrate protection worldwide, harnessing the knowledge of scientists and the enthusiasm of community members to implement conservation programs. View or download their comprehensive report on the Conservation and Ecology of the Monarch Butterfly in the United States. http://www.xerces.org/publications/scientific-reports/conservation-status-and-ecology-of-monarch-butterfly-in-us

U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service (USFWS) works to conserve, protect and enhance fish, wildlife and plants and their habitats for the continuing benefit of the American people. USFWS has committed to work with its partners, including National Wildlife Federation, to restore and enhance more than 200,000 acres of habitat for the monarch butterfly. https://www.fws.gov/savethemonarch

NATIONAL WILDLIFE FEDERATION'S BUTTERFLY HEROES

This campaign is part of NWF's Garden for Wildlife program. Butterfly Heroes seeks to bring awareness to the declining population of monarchs and other pollinators and connect gardeners, kids and families alike to help these species. To take the pledge to become a butterfly hero by creating habitat for monarch butterflies, follow this link: https://www.nwf.org/Butterfly-Heroes/Pledge

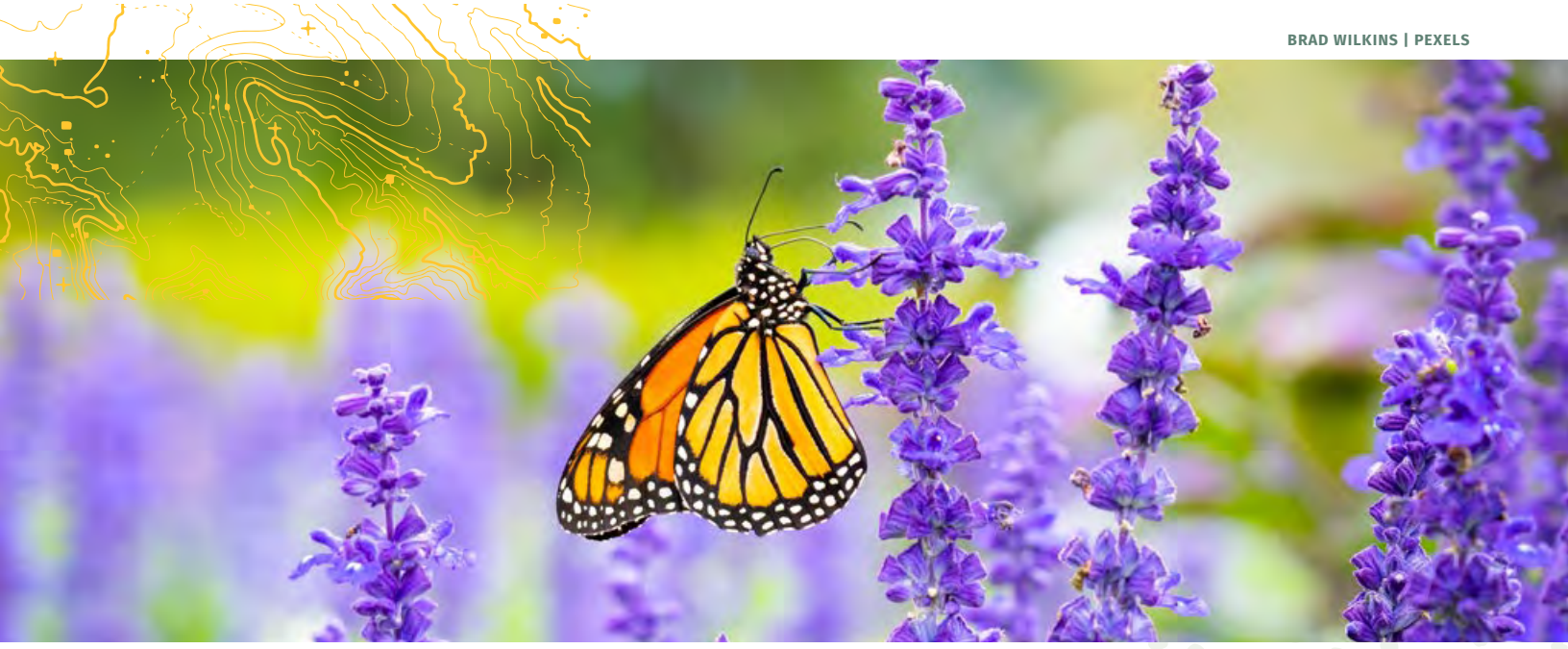
MILLION POLLINATOR GARDEN CHALLENGE

A campaign to register a million public and private gardens and landscapes to support pollinators. www.millionpollinatorgardens.org

MONARCH JOINT VENTURE

The Monarch Joint Venture (MJV), http://monarchjointventure.org/about-us, is a partnership of federal and state agencies, non-governmental organizations, and academic programs that are working together to support and coordinate efforts to protect the monarch migration across the lower 48 United States. The MJV is committed to a science-based approach to monarch conservation work, guided by the North American Monarch Conservation Plan (2008).

BRAD WILKINS | PEXELS



Resources for Developing your Monarch Garden

NATIONAL WILDLIFE FEDERATION SCHOOLYARD HABITATS PLANNING GUIDE

Site selection is key to any successful gardening project. For a great class activity to help you choose the right site while engaging your students in meaningful science and math applications refer to the Schoolyard Site Inventory Activity in *Step 3. Assess the Site* of the National Wildlife Federation Schoolyard Habitats Planning Guide. https://www.nwf.org/schoolyard

MONARCH JOINT VENTURE SCHOOLYARD BUTTERFLY GARDENS

For tips on designing and installing your garden refer to the Monarch Join Venture Schoolyard Butterfly Gardens Fact sheet: https://monarchjointventure.org/images/uploads/documents/Schoolyard_gardens.pdf. To learn more about Monarch Join Venture education programs visit: https://monarchjointventure.org/mjvprograms/education

NATIONAL WILDLIFE FEDERATION

Curriculum Resources

MONARCHS AND MORE (GRADES K-2, 3-6 AND MIDDLE SCHOOL)

Available for purchase from the Monarch Joint Venture store, this is a comprehensive curriculum guide, a containing grade appropriate lessons on monarch behavior, life cycle, a focus on features, adaptations and migration. It is aligned to the Next Generation Science Standards. https://monarchjointventure.org/store/product/monarchs-and-more-curriculum-guides-4th-edition

U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service and Protección de la Fauna Mexicana A.C. (Profauna A.C.), a Mexican non-governmental organization, developed ***The Monarch Butterfly Manual, Royal Mail: A Manual for the Environmental Educator***. This manual was developed for grades Pre-K through 12 and offers activities that promote conservation of the Monarch Butterfly. https://www.fs.fed.us/wildflowers/pollinators/Monarch_Butterfly/teacherandstudent/index.shtml

JOURNEY NORTH

Categorized by season, and then by topics such as Community Science, Background, Conservation, migration, life cycle, video clips and food, **Journey North's** educational resources allows your study of the Monarch Butterfly to be relevant to the season you are in. (https://journeynorth.org/monarchs)

- Follow the migration in real time: https://maps.journeynorth.org/maps
- Teacher Resources: https://journeynorth.org/tm/index.html

JOURNEY NORTH'S SYMBOLIC MIGRATION

A terrific way to engage your students and help create cross-cultural connections is through **Journey North's Symbolic Migration**. Each year over 60,000 students in the United States and Canada create symbolic paper butterflies and send to them to Mexico for the winter. The children who live in Mexico near the monarch's winter sanctuaries protect the butterflies and send them north in the spring. https://journeynorth.org/symbolic-migration

REARING MONARCHS IN THE CLASSROOM

Raising Monarchs. Why or Why Not? There is no scientific evidence that monarch rearing actually results in overall population increases, and it is known to carry risks. Many experts do not support large scale captive rearing for conservation purposes. Potential risks include releasing monarchs that are adapted to captive conditions, increasing parasites and disease in wild monarch populations, and making it more difficult to understand natural monarch distributions. To learn about the risks involved in raising monarch in your classroom visit: https://monarchjointventure.org/blog/revised-handout-raising-monarchs-why-or-why-not

Note: The National Wildlife Federation recommends simply observing monarch butterflies in the garden.

Community Science Programs

Community science involves everyday people - just like you and your students - who volunteer to help scientists with their research. Using Community Science in your study of the monarch butterfly is a meaningful way to involve students in data collection. Students realize that their observations are contributing to real research that is being used to help scientists better understand the behavior, biology and migration of the monarch butterfly.

JOURNEY NORTH

Help scientists learn more about the monarch butterfly. Track the monarch migration each fall and spring. Record your observations on real-time migration maps.

- Live monarch updates throughout migration: https://maps.journeynorth.org/map/?map=monarch-peak-migration&year=2021
- Weekly Monarch Migration News: https://journeynorth.org/monarchs

MONARCH WATCH – MIGRATION AND TAGGING

Monarch Watch engages in research on monarch migration biology and monarch population dynamics to better understand how to conserve the monarch migration.

- https://monarchwatch.org/tagging/

JOSÉ ANDRÉS ARREDONDO

Funding your Garden

Funding your monarch garden can be a great way to connect to your larger school community and spread the word about the work you are doing on your campus to help the monarch butterfly while providing innovative learning opportunities for your students. Below are just a few organizations that provide funding for school gardens.

MONARCH WATCH

Free milkweeds for schools and non-profits: https://monarchwatch.org/bring-back-the-monarchs/milkweed/free-milkweeds-schools-nonprofits/

NATIVE PLANT SOCIETIES

Every state and region have their own unique native plants. The native plant societies in your area can help you find answers to your questions and sometimes have funding available. Identify a chapter near your at this link: https://ahsgardening.org/gardening-resources/societies-clubs-organizations/native-plant-societies/

KIDS GARDENING.ORG

Youth Gardening Grants: https://kidsgardening.org/grants/

KEEP AMERICA BEAUTIFUL

KAB works with millions of volunteers across the country to help keep communities green and beautiful. Find an affiliate near you to help with your school greening efforts: https://kab.org/goals/beautify-communities/

LADY BIRD JOHNSON WILDFLOWER CENTER

The Lady Bird Johnson Wildflower Center has partnered with Native American Seed to provide Seed Grants of $100-$500 to Texas schools, nonprofits, and other worthy educational or child-centered organizations for creating wildflower demonstration areas on their campuses, enhancing existing wildflower plantings or other educationally directed projects: https://www.wildflower.org/seed-grants

WHOLE KIDS FOUNDATION

Food garden grants available: https://www.wholekidsfoundation.org/programs/school-gardens-grant

CAPTAIN PLANET FOUNDATION.

Educators, both K-12 classroom and informal, who are interested in receiving support for students to design and implement hands-on environmental solutions are eligible for project funding: https://captainplanetfoundation.org/programs/project-learning-garden/

NATIONAL WILDLIFE FEDERATION TREES FOR WILDLIFE

National Wildlife Federation Trees for Wildlife is a program providing adult leaders with hands-on, science-based activities to help young people learn about the importance of trees and how to plant and care for them. Request trees here: https://www.nwf.org/Trees-for-Wildlife/Request-Trees

National Science Teachers Association

NSTA Position Statement: Early Childhood Science Education

Introduction

At an early age, all children have the capacity and propensity to observe, explore, and discover the world around them (NRC 2012). These are basic abilities for science learning that can and should be encouraged and supported among children in the earliest years of their lives. The National Science Teachers Association (NSTA) affirms that learning science and engineering practices in the early years can foster children's curiosity and enjoyment in exploring the world around them and lay the foundation for a progression of science learning in K-12 settings and throughout their entire lives.

This statement focuses primarily on children from age 3 through preschool. NSTA recognizes, however, the importance of exploratory play and other forms of active engagement for younger children from birth to age 3 as they come to explore and understand the world around them. This document complements NSTA's position statement on elementary school science (NSTA 2002) that focuses on science learning from kindergarten until students enter middle or junior high.

Current research indicates that young children have the capacity for constructing conceptual learning and the ability to use the practices of reasoning and inquiry (NRC 2007, 2012). Many adults, including educators, tend to underestimate children's capacity to learn science core ideas and practices in the early years and fail to provide the opportunities and experiences for them to foster science skills and build conceptual understanding (NRC 2007,p. vii). Also underestimated is the length of time that young children are able to focus on science explorations. Effective science investigations can deeply engage young children for extended periods of time, beyond a single activity or session.

The National Science Teachers Association (NSTA) affirms that learning science and engineering practices in the early years can foster children's curiosity and enjoyment in exploring the world around them and lay the foundation for a progression of science learning in K-12 settings and throughout their entire lives.

NSTA supports the learning of science among young children that will create a seamless transition for learning in elementary school.

Young Children and Science Learning

NSTA identifies the following key principles to guide the learning of science among young children.

Children have the capacity to engage in scientific practices and develop understanding at a conceptual level.

Current research shows that young children have the capacity for conceptual learning and the ability to use the skills of reasoning and inquiry as they investigate how the world works (NRC 2007, NRC 2012). For example, their play with blocks, water, and sand shares some science-relevant characteristics. Young children also can learn to organize and communicate what they learn, and know the difference between concrete and abstract ideas (Carey 1985). Adults who engage children in science inquiry through the process of asking questions, investigating, and constructing explanations can provide developmentally appropriate environments that take advantage of what children do as part of their everyday life prior to entering formal school settings (NAEYC 2013, p. 17; NRC 2007). These skills and abilities can provide helpful starting points for developing scientific reasoning (NRC 2007, p. 82).

Adults play a central and important role in helping young children learn science.

Everyday life is rich with science experiences, but these experiences can best contribute to science learning when an adult prepares the environment for science exploration, focuses children's observations, and provides time to talk about what was done and seen (NAEYC 2013, p. 18). It is important that adults support children's play and also direct their attention, structure their experiences, support their learning attempts, and regulate the complexity and difficulty of levels of information (NRC 2007, p. 3). It's equally important for adults to look for signs from children and adjust the learning experiences to support their curiosity, learning, and understanding.

Young children need multiple and varied opportunities to engage in science exploration and discovery (NAEYC 2013).

Young children develop science understanding best when given multiple opportunities to engage in science exploration and experiences through inquiry (Bosse, Jacobs, and Anderson 2009; Gelman, Brenneman, Macdonald, and Roman 2010). The range of experiences gives them the basis for seeing patterns, forming theories, considering alternate explanations, and building their knowledge. For example, engaging with natural environments in an outdoor learning center can provide opportunities for children to examine and duplicate the habitats of animals and insects, explore how things move, investigate the flow of water, recognize different textures that exist, make predictions about things they see, and test their knowledge.

Young children develop science skills and knowledge in both formal and informal settings.

Opportunities to explore, inquire, discover, and construct within the natural environment and with materials that are there need to be provided in formal education settings, such as preschool and early care and education programs through intentional lessons planned by knowledgeable adults. In addition, children need to have opportunities to engage in science learning in informal settings, such as at home with cooking activities and outdoor play or in the community exploring and observing the environment.

Young children develop science skills and knowledge over time.

To effectively build science understanding, young children need opportunities for sustained engagement with materials and conversations that focus on the same set of ideas over weeks, months, and years (NRC 2007, p. 3). For example, investigating the concept of light and shadows over several weeks indoors and out with a variety of materials and multiple activities will allow children to re-visit and re-engage over time, building on observations and predictions from day to day.

Young children develop science skills and learning by engaging in experiential learning.

Young children engage in science activities when an adult intentionally prepares the environment and the experiences to allow children to fully engage with materials. The activities allow children to question, explore, investigate, make meaning, and construct explanations and organize knowledge by manipulating materials.

Declarations

NSTA recommends that teachers and other education providers who support children's learning in any early childhood setting should:

- Recognize the value and importance of nurturing young children's curiosity and provide experiences in the early years that focus on the content and practices of science with an understanding of how these experiences connect to the science content defined in the *Next Generation Science Standards (NGSS)* (NGSS Lead States 2013);
- Understand that science experiences are already a part of what young children encounter every day through play and interactions with others, but that teachers and other education providers need to provide a learning environment that encourages children to ask questions, plan investigations, and record and discuss findings;
- Tap into, guide, and focus children's natural interests and abilities through carefully planned open-ended, inquiry-based explorations;
- Provide numerous opportunities every day for young children to engage in science inquiry and learning by intentionally designing a rich, positive, and safe environment for exploration and discovery;
- Emphasize the learning of science and engineering practices, including asking questions and defining problems; developing and using models; planning and carrying out investigations; analyzing and interpreting data; using mathematics and computational thinking; constructing explanations and designing solutions; engaging in argument from evidence; and obtaining, evaluating, and communicating information (NRC 2012, NGSS Lead States 2013);
- Recognize that science provides a purposeful context for developing literacy skills and concepts, including speaking, listening, vocabulary development, and many others; and
- Recognize that science provides a purposeful context for use of math skills and concepts.

NSTA recommends that teachers and other providers who support the learning of science in young children be given professional development experiences that:

- Engage them in learning science principles in an interactive, hands-on approach, enabling them to teach about science principles appropriately and knowledgeably;
- Are ongoing and science-specific;
- Help them understand how children learn science and engineering practices (NRC 2012, NGSS Lead States 2013);
- Inform them about a range of strategies for teaching science effectively; and
- Include the use of mentors to provide ongoing support for educators for the application of new learning.

NSTA recommends that those in a position to provide financial, policy, and other support for early childhood education should:

- Provide appropriate resources for teachers and children;
- Ensure a positive and safe environment for exploration and discovery;
- Ensure teachers receive sustained science-specific professional development that includes how children learn and how to teach science;
- Provide mentoring; and
- Establish a coherent system of science standards, instruction, appropriate assessment, and curriculum.

Parents and other caregivers can nurture children's natural curiosity about the world around them, creating a positive and safe environment at home for exploration and discovery. These recommendations can be found in NSTA's position statement, Parent Involvement in Science Learning (NSTA 2009), found at www.nsta.org.

-Adopted by the NSTA Board of Directors,
January 2014

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Visioning Worksheet
Hoja de trabajo visioning

Group members and their role in the project: | Miembros del grupo y su rol en el proyecto:

Please respond briefly. | Por favor responde brevemente.

1. **Describe how your schoolyard currently looks. Take pictures and attach to this page.**
   Describe cómo luce actualmente el patio de tu escuela. Toma fotografías y adjuntarlas a esta página.

2. **How is the schoolyard currently used? | ¿Cómo se usa actualmente el patio de la escuela?**

3. **Describe your ideal schoolyard – what would it look like? Sound like? How would it be used?**
   Describe el patio de tu escuela ideal: ¿cómo sería? ¿Suena como? ¿Cómo se usaría?

In working towards creating a wildlife habitat(s) on the school grounds, consider these questions. | Al trabajar para crear un (os) hábitat (s) de vida silvestre en los terrenos de la escuela, considera estas preguntas.

4. **Where on the schools grounds will the habitat be located and what evidence do you have to support this location?**
   ¿En qué parte de los terrenos de la escuela se ubicará el hábitat y qué evidencia tienes para respaldar esta ubicación?

5. What should the size and shape of the garden site be?
¿Cuál debe ser el tamaño y la forma del jardín?

6. What will this habitat provide for the monarch butterfly?
¿Qué proporcionará este hábitat a la mariposa monarca?

7. What type of ecosystem are you restoring or recreating?
¿Qué tipo de ecosistema estás restaurando o recreando?

8. What will the source of water be in your habitat?
¿Cuál será la fuente de agua en su hábitat?

9. How will students be involved in the design and development of the habitat site?
¿Cómo participarán los estudiantes en el diseño y desarrollo del sitio del hábitat?

10. How will classes use the completed site? What special features will the site need to accommodate these uses? | ¿Cómo usarán las clases el sitio completo?
¿Qué características especiales necesitará el sitio para adaptarse a estos usos?

11. **Which community members, businesses and organizations might be of assistance, labor or financial, with this project?**
¿Qué miembros de la comunidad, empresas y organizaciones podrían ser de ayuda, laboral o financiera, con este proyecto?

12. **Sketch how the site will look after it is constructed. In the summer. In the winter. After a year.**
Dibuja cómo se verá el sitio después de que esté construido. En el verano. En el invierno. Después de un año.

IMMEDIATELY AFTER PLANTING INMEDIATAMENTE DESPUÉS DE LA PLANTACIÓN	IN THE SUMMER | EN EL VERANO
IN THE WINTER | EN EL INVIERNO	AFTER ONE YEAR | DESPUÉS DE UN AÑO

13. Use the above ideas and information to form a vision statement for the Monarch Recovery Garden. This statement should include:
Utiliza las ideas y la información anteriores para formar una declaración de visión para Monarch Recovery Garden. Esta declaración debe incluir:

- Wildlife for which the garden(s) is designed
  Vida silvestre para la que está diseñado el jardín(s)
- Location and reason for selecting the area
  Ubicación y motivo de la selección de la zona
- Size of the habitat project
  Tamaño del proyecto de hábitat
- Other details that will help the school and community understand and "see" the project better
  Otros detalles que ayudarán a la escuela y la comunidad a comprender y "ver" mejor el proyecto

Monarch Recovery Garden Vision
Visión De Jardín De Recuperación De Monarca

SCHOOL | ESCUELA _____ DATE | FECHA _____

OUR MONARCH RECOVERY GARDEN VISION IS:
NUESTRA VISIÓN DEL JARDÍN DE RECUPERACIÓN DE MONARCA ES:

Habitat Team Planning Worksheet
Hoja de Trabajo de Planificación del Equipo de Hábitat

This form lists the members of our Monarch Recovery Garden Team. Each participant recognizes their role as a member of this team. Many others will be involved in the project, but those listed below take responsibility for the specific project areas listed below.

Este formulario enumera los miembros de nuestro equipo de Monarch Recovery Garden. Cada participante reconoce su rol como miembro de este equipo. Muchos otros participarán en el proyecto, pero los que se enumeran a continuación asumen la responsabilidad de las áreas específicas del proyecto que se enumeran a continuación.

NAME NOMBRE	HABITAT TEAM NOMBRE DE EQUIPO DE HÁBITAT	EMAIL CORREO ELECTRÓNICO
1. 2. 3.	Habitat Team Leader Habitat Lideres de equipo	1. 2. 3.
1. 2. 3.	Budget Coordinators Coordinadores de presupuesto	1. 2. 3.
1. 2. 3.	Curriculum Coordinators Coordinadores de plan de estudios	1. 2. 3.
1. 2. 3.	Historians Historiadores/as	1. 2. 3.

1. 2. 3.	**Maintenance** **Mantenimiento**	1. 2. 3.
1. 2. 3.	**Volunteer Coordinators** **Coordinadores voluntarios**	1. 2. 3.
1. 2. 3.	**Communications and Marketing** **Comunicaciones y marketing**	1. 2. 3.
1. 2. 3.	**Student Liaisons** **Enlaces estudiantiles**	1. 2. 3.

I acknowledge and support the creation of the Monarch Recovery Garden.
Reconozco y apoyo la creación del Monarch Recovery Garden.

Principal/Director Signature | Firma de la/ del directora/director _____

Date | Fecha _____

Habitat Team Leaders | Líderes del equipo de hábitat _____

Date | Fecha _____

Schoolyard Habitats Action Plan
Actividades para un Hábitat en el Patio Escolar

What is the issue? ¿Cuál es el problema?	What action will we take? ¿Qué acción tomaremos?	Who will do it? ¿Quién lo hará?	When will it be done? ¿Cuándo se hará?	How will we monitor progress? ¿Cómo monitoreamos el progreso?	How will we know if we succeeded? ¿Cómo sabremos si tuvimos éxito?	What will it cost? ¿Cuál es el costo?
K-2 Example We don't see many birds in our schoolyard.	We will find what the habitat needs of our local birds are and work with older grades to create the right habitat.	» Eco-Action Team » Master Naturalist » Master Gardeners » Interested school and volunteers	» Research in the fall and winter. » Take Junior Master Naturalist program in Winter » Bed prep in the spring » Build and plant in spring	We will use our Eco-Action Team meetings to learn, brainstorm and find ways to share our work with the school, our families and the community.	We will see an increase in the types and kinds of birds we see in our schoolyard.	We will look for donations of time and materials for the build of the garden. Student garden tools, plants/trees/shrubs, compost, feeders/seed, approx -$300-$500
Ejemplo de K-2. No se observan muchas aves en el patio de la escuela	Encontraremos cuáles son las necesidades de hábitat de nuestras aves locales y trabajaremos con los grados más viejos para crear el hábitat adecuado.	» Equipo de Eco-Action » Maestro naturalista » Jardineros maestros » Escuela y voluntarios interesados	» Investiga en otoño e invierno. » Toma el programa Junior Master Naturalist en invierno » Preparación de la cama en primavera » Construir y plantar en primavera	Durante las reuniones con el Equipo Eco-Acción, vamos a aprender y compartir formas para compartir nuestro trabajo con la escuela, nuestras familias y la comunidad en general.	Veremos un aumento en los tipos de aves que vemos en nuestra escuela.	Buscaremos voluntarios que quieran donar su tiempo para trabajar en el jardín, y también donaciones en especie, como materiales para construir el jardín. Estimamos que el costo de: las herramientas de jardinería para los estudiantes, las plantas, árboles, arbustos, composta, comederos, y semillas es entre $300 y $500 dólares

3-5 Example We study a lot about ecosystems and we want to install a garden and plant trees and bushes so we can study ecosystems outside.	We will plan a garden and learning area using native plants and trees and natural elements.	» Eco-Action Team » Master Naturalist » Master Gardeners » City Parks Dept. » School/Community volunteers	» Research local flora and fauna in the fall » Secure approval for garden site in the fall » Take Junior Master Naturalist program in Winter. » Plant in the spring	We will use our Eco-Action Team meetings to check progress on our goals and create a project plant to help us stay on track.	Our school's students will be able to use the school gardens for learning no less than twice a year	We will look for donations of time and materials for the build of the gardens. Student garden tools, plants, trees, shrubs, compost, field investigation tools -approx $500.
3-5 Ejemplo Estudiamos mucho sobre ecosistemas y queremos instalar un jardín y plantar árboles y arbustos para poder estudiar ecosistemas en el exterior.	Planificaremos un jardín y un área de aprendizaje utilizando plantas y árboles nativos y elementos naturales.	» Equipo de Eco-Action » Maestro naturalista » Jardineros maestros » Departamento de Parques de la Ciudad » Voluntarios escolares / comunitarios	» Investiga la flora y fauna local en el otoño. » Aprobación segura para jardín en otoño » Toma el programa Junior Master Naturalista en invierno. » Plantar en primavera	Usaremos nuestras reuniones Equipo de Eco-Acción para verificar el progreso de nuestras metas y crear una planta de proyecto que nos ayude a mantener el rumbo.	Los estudiantes de nuestra escuela podrán utiliza los jardines de la escuela para aprender no menos de dos veces al año.	Buscaremos voluntarios que quieran donar su tiempo para trabajar en el jardín, y también donaciones en especie, como materiales para construir el jardín. Estimamos que el costo de: las herramientas de jardinería para los estudiantes, las plantas, árboles, arbustos, composta, y trabajo de investigación en campo es de $500 dólares aproximadamente
6-12 Example The principal at the CTE building has asked us to install gardens that their culinary arts and horticulture program students can use.	We will develop a series of gardens that students can use for learning and as a way to engage the community in the education programs offered by the school district.	» Eco-Action Team » Master Gardeners » University/College horticulture dept. » Local chefs	» Schedule meetings early fall with stake-holders » Secure approval for garden sites in winter » Bed prep in spring » Plant in the spring	We will rely on our Eco-Action Team meetings to check in on committee progress and our project plan timeline toward our goals.	Culinary and horticulture students will be able to use the gardens to deepen their learning by providing authentic learning experiences.	We will look for donations of time and materials for the guild of the gardens. If no donations, we will budget approx. $800 for Garden tools, plants, amendments and compost, building materials.
6-12 Ejemplo El director del edificio CTE nos ha pedido que instalemos jardines que los estudiantes del programa de artes culinarias y horticultura puedan usar.	Desarrollaremos una serie de jardines que los estudiantes pueden usar para aprender y como una forma de involucrar a la comunidad en los programas educativos que ofrece el distrito escolar.	» Equipo de Eco-Action » Jardineros maestros » Departamento de horticultura de la universidad/ colegio. » Chefs locales	» Programar reuniones a principios del otoño con las partes interesadas » Aprobación segura para jardines en invierno » Preparación de la cama en primavera » Plantar en primavera	Utilizaremos en nuestras reuniones del Equipo de Eco-Acción para verificar el progreso del comité y el cronograma del plan de nuestro proyecto hacia nuestras metas.	Los estudiantes de artes culinarias y horticultura podrán utilizar los jardines para profundizar su aprendizaje a través de experiencias auténticas y tangibles.	Buscaremos voluntarios que quieran donar su tiempo para trabajar en el jardín, y también donaciones en especie, como materiales para construir el jardín. En caso de que no existan donaciones, estimamos que el costo total de las herramientas de jardinería, las plantas, aditivos para el suelo, y materiales de construcción es de $800 dólares aproximadamente

Remember these are just examples. Your Eco-Action Team may have one issue or you may have three. You may have one issue and three solutions. There is not a required number of issues to address or solutions to be completed. It is only required that the action plan be measurable and realistic.

Recuerda que estos son sólo ejemplos. Tu equipo Eco-Acción puede empatizar con uno o incluso tres de los problemas ejemplificados. Pero pueden empatizar con un solo problema e implementar tres soluciones. No hay un número específico de problemas a resolver o de soluciones a implementar. Solo se requiere que el plan de acción sea realista y pueda ser mensurable.

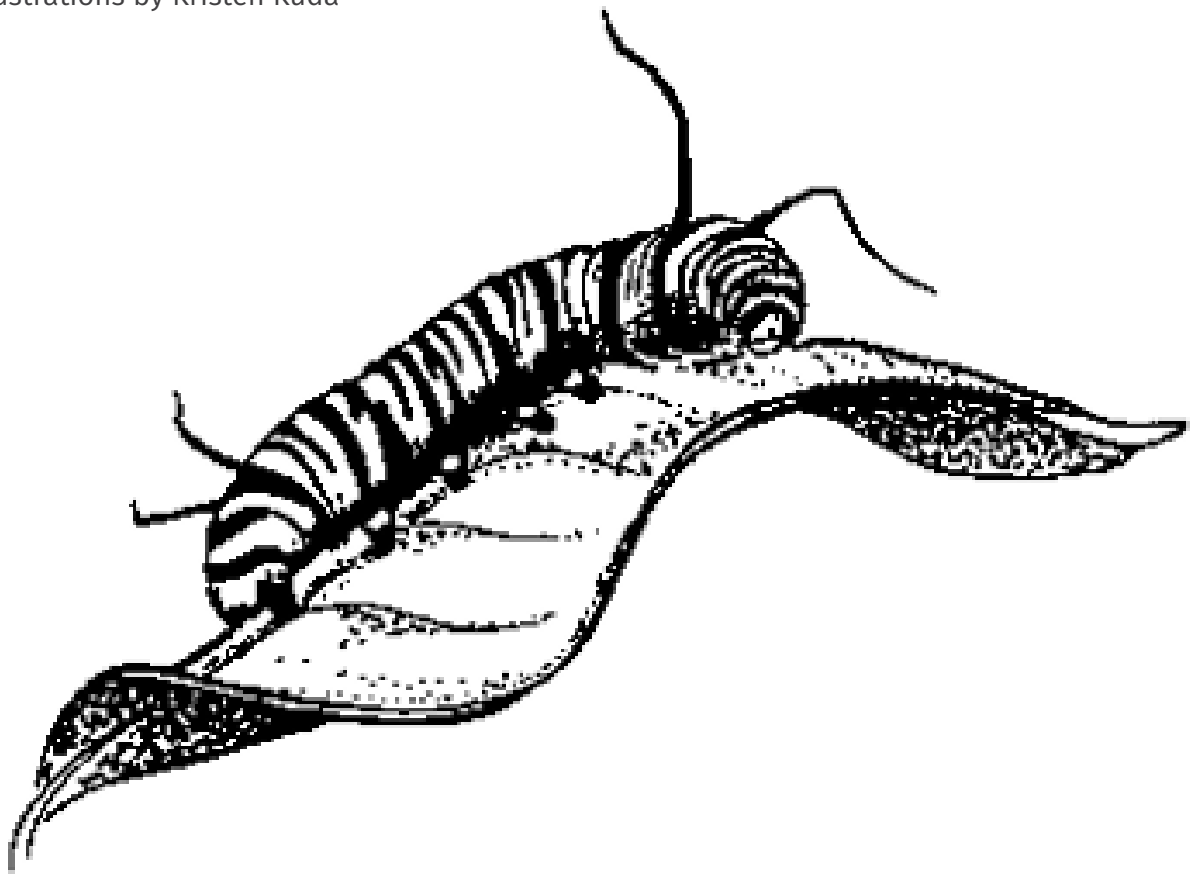
Schoolyard Habitats Action Plan
Acción de hábitats en el patio de la escuela

What is the issue? ¿Cual es el problema?	What action will we take? ¿Qué acción tomaremos?	Who will do it? ¿Quién lo hará?	When will it be done? ¿Cuándo se hará?	How will we monitor progress? ¿Cómo monitorea-mos el progreso?	How will we know if we succeeded? ¿Cómo sabremos si tuvimos éxito?	What will it cost? ¿Cuál es el costo?

A Field Guide to Monarch Caterpillars *(Danaus plexippus)*

Karen Oberhauser and Kristen Kuda

Illustrations by Kristen Kuda



Produced with the support of the National Science Foundation. Opinions expressed are those of the authors and not necessarily those of the Foundation.

Introduction

This guide will aid in recognizing eggs and distinguishing larval (caterpillar) instars of monarch butterflies (*Danaus plexippus*) in the field. We assume that readers have some familiarity with monarch larvae already, and will recognize their bold yellow, white and black stripes on or near their host plants.

Several clues will help you find monarch eggs and larvae. Look for them on plants in the genus *Asclepias* (milkweeds), or on the closely-related *Cynanchum laeve* (Sand Vine) found in the central U.S. Females usually lay eggs on the underside of young milkweed plants, and this is often a productive location to search. A characteristic sign of a new larva is a minute hole in the middle of a leaf, while older larvae tend to eat on the margins of leaves. Learning to recognize "monarch-eaten" leaves will increase your success at finding larvae. They can also be located by the presence of their frass, or fecal matter. If you see adult monarchs (butterflies) in an area with milkweed, there is a good chance you'll find eggs or larvae as well.

Before going into the field to look at monarchs, we recommend reading the anatomy, molting, and distinguishing instars sections of this field guide. After these sections, there are detailed descriptions and drawings of eggs and each of the five instars.

HAPPY MONARCH HUNTING!

Anatomy

The diagram below shows a generic butterfly larva, with three parts to its body — the *head, thorax* and *abdomen*. The thorax and abdomen each have several segments, which are numbered in the diagram. Many of these segments contain small holes called *spiracles*. The spiracles are connected to a network of airtubes called *tracheae*, which carry oxygen throughout the larva's body. Monarch larvae have two sets of *tentacles* or *filaments* (front and back); these are not antennae, and are not found on all butterfly larvae. They function as sense organs. The thoracic segments each have a pair of jointed *true legs*, and there are five pairs of false legs, or *prolegs,* on the abdomen.

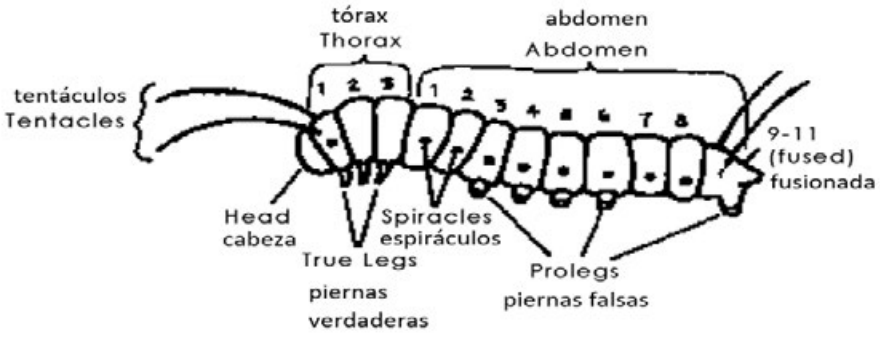


FIGURE 1. Larva anatomy

The head has a pair of short *antennae*, mouthparts, and six pairs of very simple eyes, called *ocelli.* The *spinneret* produces silk that small larvae use when they drop off a leaf and hang suspended in the air. Larvae in all instars use the silk to anchor themselves during molting, and fifth instar larvae make a "silk button" to which the pupa is attached. The *maxillary palps* are sensory, and also help direct food into the jaws. These features can be seen with the aid of a hand lens, but are difficult to see with the naked eye.

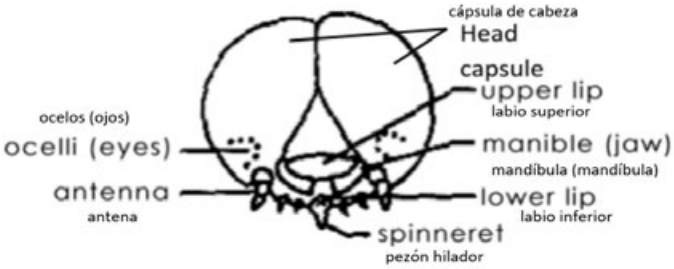


FIGURE 2. Butterfly Larva head

Molting

Monarchs have five larval *instars*, or stages between shedding their *cuticle* (outer layer of skin). The cuticle is made of long protein chains and chitin. It is rigid and hard, and serves to support and protect monarchs and other arthropods. It also restricts water loss. However, the cuticle limits growth and must thus be replaced periodically. The process of replacing the old cuticle is called molting. Molting is controlled by a hormone called *ecdysone* produced in glands in the thorax. It actually involves a whole sequence of events, beginning with the separation of the old cuticle from the epidermal (skin) cells that underlie it, a process called *apolysis*, and ending with the shedding of the old cuticle, a process called *ecdysis*. The old cuticle is partially broken down by enzymes, and some of its constituents recycled.

When it is first secreted, the new cuticle is protected from these enzymes by a layer of wax. The new cuticle is soft and flexible, thus permitting expansion before it undergoes *sclerotization*, or hardening.

TABLE 1. SEQUENCE OF EVENTS IN MOLTING

1. apolysis (separation of old cuticle)	5. ecdysis (shedding of old cuticle)
2. new cuticle production	6. expansion of the new cuticle
3. wax secretion (protects new cuticle)	7. sclerotization (hardening of new cuticle)
4. activation of molting enzymes	

Monarch larvae remain very still during all the steps of molting, the older instars often move off the milkweed at this time. The first thing that you will notice, besides their motionlessness, is the separation of the part of the cuticle that covers their head from the rest of the cuticle. This *head capsule* is the first part of the old cuticle to be shed, and the larva then crawls out of the rest of the skin. The shed skin is called the *exuvia*. After molting, monarch larvae (and the larvae of many other insects) usually eat the exuvia, thus recycling useful nutrients that it still contains.

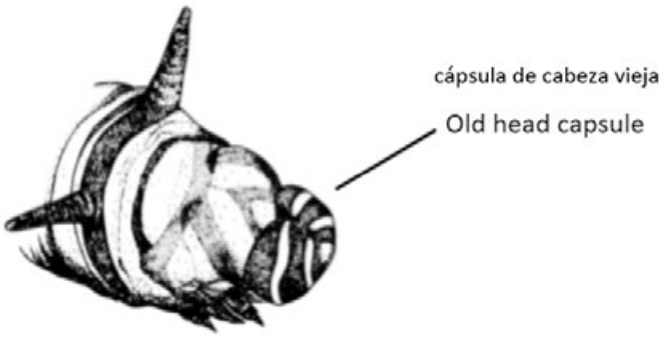


FIGURE 3. Third instar larva about to shed its head capsule.

While most of the cuticle is quite hard, larvae still grow quite a bit within each instar. This is possible because of the flexibility of the new cuticle, and because parts of the cuticle contain a rubber-like protein which permits it to stretch. Therefore, distinguishing instars by size is not very accurate. Look at the drawings of a first instar larva, all drawn to the same scale, to see how much it changed in size within an instar!

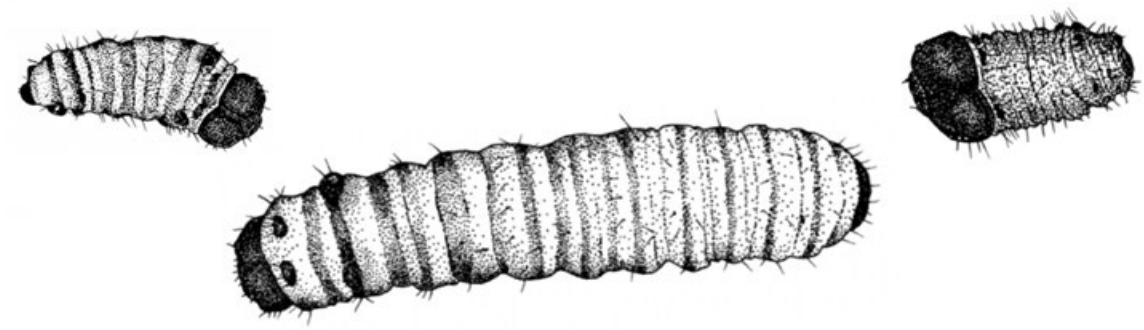


FIGURE 4. Three drawings of the same first instar larva over a period of 2 days (x25).

The easiest way to distinguish larval instars is by head capsule and tentacle size, since these do not grow during an instar. For example, the front tentacles on a fourth instar larva are about half the length of those on a fifth instar. Also, the size of the tentacles relative to the head capsule and the rest of the body increases with later instars. We have included estimates of the sizes of head capsules and tentacles for each instar in the table on the next page. However, individual monarchs vary in size just like humans do, so the larvae you find may not be exactly the sizes given.

The drawings below compare head capsule sizes in the five instars. Of course, real larvae have much smaller heads! The lines above each drawing give the actual measurement of the real heads. We measured several larvae with a calipers accurate to 0.1 mm, then took the average size, to get these measurements. Note that the head capsules increase in size by a factor of from 1.3 to 1.6 between each instar.

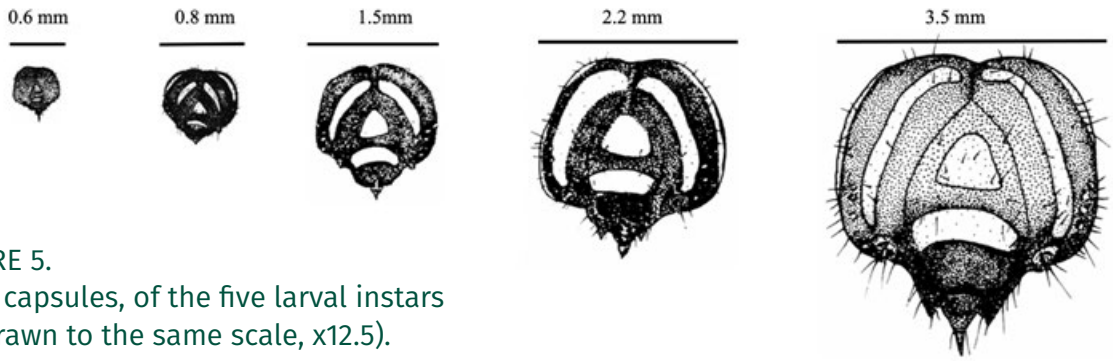


FIGURE 5.
Head capsules, of the five larval instars (all drawn to the same scale, x12.5).

A NOTE ON MEASUREMENT. We report the sizes of monarch eggs and larvae in millimeters (mm). There are 10 mm in a centimeter, so when something is 13 mm long, it is also 1.3 cm long. Sizes of body parts are most useful in distinguishing third and higher instars, since it is difficult to distinguish 0.6 from 0.8 mm (the sizes of head capsules on first and second instars) with the naked eye. It is best to use other characteristics described in the guide for the younger instars. The lines on the table below show the actual head widths and tentacle lengths for each instar. Whenever we show a drawing of a larva, we tell you how many times it has been magnified. For example, the heads shown on the previous page are 12.5 times larger than actual heads; we noted this by putting x12.5 in the figure caption.

TABLE 2. Comparison of head and tentacle sizes from the five instars. Lines show the actual length of these body parts, and numbers show how long the lines are (in mm). Starred spaces for the tentacles mean that these are too short to measure accurately.

	INSTAR				
	1	2	3	4	5
Head	(0.6)	(0.8)	(1.5)	(2.2)	(3.5)
Front tentacle	*	(0.3)	(1.7)	(5.0)	(11.0)
Back tentacle	*	*	(0.9)	(2.0)	(4.0)

Egg

Height: 1.2 mm

Width: 0.9 mm

APPEARANCE:

Monarch eggs are usually attached to the underside of young milkweed leaves. They are laid singly, and it is uncommon (though not unheard of) to find more than one on a single plant. The eggs look off-white or yellow, and are marked with a series of longitudinal ridges. The hard outer shell, or *chorion*, protects the developing larva.

FIGURE 6. Scanning electron microscope (SEM) image of a monarch egg

First Instar

Body Length: 2 to 6 mm

Body Width: 0.5 to 1.5 mm

Front Tentacles: Small bumps

Back Tentacles: Barely visible

Head Capsule: 0.6 mm in diameter

APPEARANCE:

A newly-hatched monarch larva is pale green or grayish-white, shiny and almost translucent. It has no stripes or other markings. The head looks black, with lighter spots around the antennae and below the mouthparts, and may be wider than the body. There is a pair of dark triangular patches between the head and front tentacles which contain setae, or hairs. The body is covered with sparse setae. Older first instar larvae have dark stripes on a greenish background.

After hatching, the larva eats its eggshell (chorion). It then eats clusters of fine hairs on the bottom of the milkweed leaf before starting in on the leaf itself. It feeds in a circular motion, often leaving a characteristic, arc-shaped hole in the leaf. First (and second) instar larvae often respond to disturbance by dropping off the leaf on a silk thread, and hang suspended in the air.

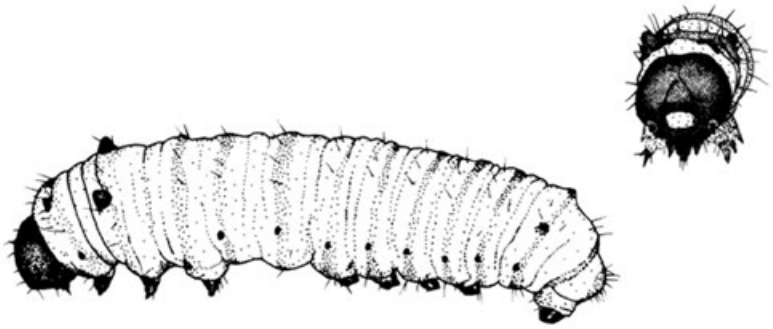


FIGURE 7.
Body and head of first instar (x20)

Second Instar

Body Length: 6 mm to 9 mm

Body Width: 1 to 2 mm

Front Tentacles: 0.3 mm

Back Tentacles: Small knobs

Head Capsule: 0.8 mm diameter

APPEARANCE:

Second instar larvae have a clear pattern of black (or dark brown), yellow and white bands, and the body no longer looks transparent and shiny. An excellent characteristic to use in distinguishing first and second instar larvae is a yellow triangle on the head and two sets of yellow bands around this central triangle. The triangular spots behind the head do not have the long setae present in the spots on the first instar larvae. The setae on the body are more abundant, and look shorter and more stubble-like than those on first instar larvae.

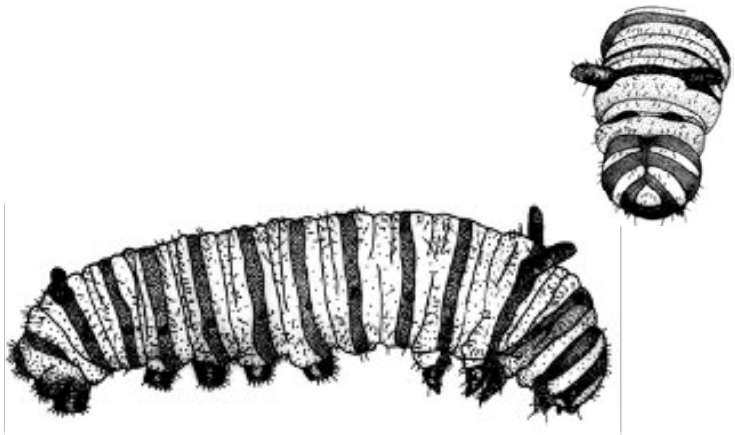


FIGURE 8.
Body and head of second instar (x12.5)

Third Instar

Body Length: 10 to 14 mm

Body Width: 2 to 3.5 mm

Front Tentacles: 1.7 mm

Back tentacles: 0.9 mm

Head Capsule: 1.5 mm in diameter

APPEARANCE:

The black and yellow bands on the abdomen of a third instar larva are darker and more distinct than those of the second instar, but the bands on the thorax are still indistinct. The triangular patches behind the head are gone, and have become thin lines that extend below the spiracle. The yellow triangle on the head is larger, and the yellow stripes are more visible. The first set of thoracic legs are smaller than the other two, and are closer to the head.

Third instar larvae usually feed using a distinct cutting motion on leaf edges. Unlike first and second instar larvae, third (and later) instars respond to disturbance by dropping off the leaf and curling into a tight ball. Monarch biologist Fred Urquhart called this behavior “playing possum.”

FIGURE 9.
Body and head of third instar (x6)

Forth Instar

Body Length: 13 to 25 mm

Body Width: 2.5 to 5 mm

Front Tentacles: 5 mm

Back Tentacles: 2 mm

Head Capsule: 2.2 mm in diameter

APPEARANCE:

There is a distinct banding pattern on the thorax which is not present in the third instar larvae. The first pair of legs is even closer to the head, and there are white spots on the prolegs that were less conspicuous in the third instar.

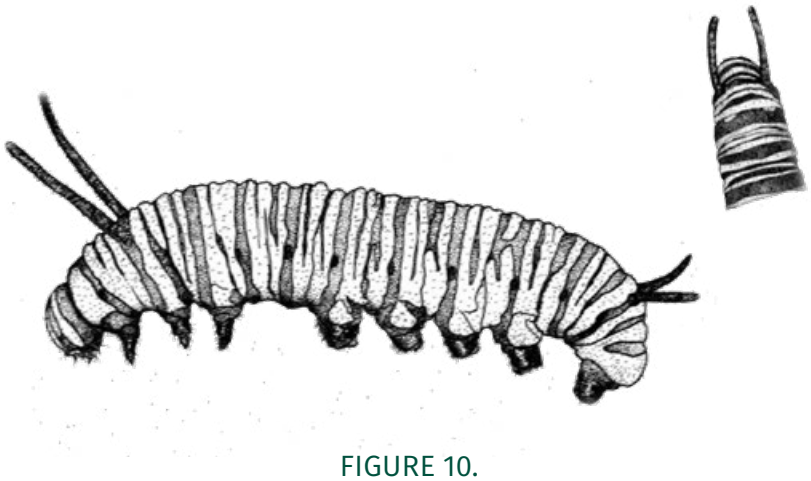


FIGURE 10.
Body and head of fourth instar (x5)

Fifth Instar

Body Length: 25 to 45 mm

Body Width: 5 to 8 mm

Front Tentacles: 11 mm

Back Tentacles: 4 mm

Head Capsule: 3.5 mm in diameter

APPEARANCE:

The body pattern and colors are even more vivid that they were in the fourth instar, and the black bands look wider and almost velvety. The front legs look much smaller than the other two pairs, and are even closer to the head. There are distinct white dots on the prolegs, and the body looks quite plump, especially just prior to pupating.

Fifth instar monarch larvae often chew a shallow notch in the petiole of the leaf they are eating, which causes the leaf to fall into a vertical position. They move much farther and faster than other instars, and are often found far from milkweed plants as they seek a site for pupating.

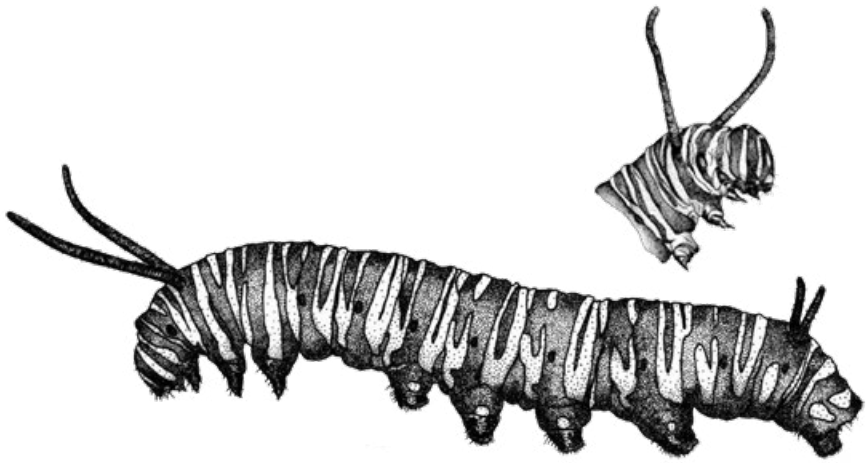


FIGURE 11.
Body and head of fifth instar (x2.5)

Example Gardens

KUENTZ 2021

LINDER ES

POE ES

TRAVIS ES

WOOLDRIDGE ES

BERRY ES

Alignment Index - TEKS (Texas Essential Knowledge and Skills) – Grades PK-5

PRE-KINDERGARTEN

SCIENCE

PK4.VI.A.1: Child observes, investigates describes, and discusses properties and characteristics of common objects.

- Gardens-Habitats for the Monarch Butterfly (Activity 1, 2, 3, 4)
- Getting to Know Monarch Butterflies (Activity 3)

PK4.VI.A.3: Child uses simple scientific tools to learn about objects.

- Gardens-Habitats for the Monarch Butterfly (Activity 2, 3, 5)
- Monarch Migration-A Unique Journey (Activity 1)

PK4.VI.A.4: Child observes, investigates, describes, and discusses sources of energy including light, heat, and electricity.

- Gardens-Habitats for the Monarch Butterfly (Activity 5)

PK4.VI.B.1: Child observes, investigates, describes, and discusses the characteristics of organisms.

- Gardens-Habitats for the Monarch Butterfly (Activity 2)
- Getting to Know Monarch Butterflies (Activity 1, 4)

PK4.VI.B.2: Child observes, describes, and discusses the life cycles of organisms.

- Getting to Know Monarch Butterflies (Activity 2)

PK4.VI.B.3: Child observes, investigates, describes and discusses the relationship of organisms in their environments.

- Monarch Migration-A Unique Journey (Activity 2, 3)

PK4.VI.C.1: Child observes, investigates, describes and discusses earth materials, and their properties and uses.

- Gardens-Habitats for the Monarch Butterfly (Activity 1, 3, 5)
- Monarch Migration-A Unique Journey (Activity 1)

PK4.VI.C.2: Child identifies, observes, and discusses objects in the sky.

- Gardens-Habitats for the Monarch Butterfly (Activity 5)
- Monarch Migration-A Unique Journey (Activity 1)

PK4.VI.C.3: Child observes and describes what happens during changes in the earth and sky.

- Gardens-Habitats for the Monarch Butterfly (Activity 5)
- Monarch Migration-A Unique Journey (Activity 1)

MATH

PK3.V.A.2: Child counts up to 5 objects with one-to-one correspondence.

- Monarch Migration-A Unique Journey (Activity 2)

PK3.V.A.5: Child recognizes numerals 0-5.

- Gardens-Habitats for the Monarch Butterfly (Activity 5)
- Getting to Know Monarch Butterflies (Activity 1)

PK3.V.E.1: Child sorts objects that are the same and different.

- Gardens-Habitats for the Monarch Butterfly (Activity 1)

PK3.V.E.2: Child participates in group activities of collecting data and organizing it into graphic representations.

- Monarch Migration-A Unique Journey (Activity 1, 3)

PK3.V.E.3: Child recognizes and duplicates patterns.

- Getting to Know Monarch Butterflies (Activity 2, 4)

PK4.V.A.2: Child counts up to 10 objects with one-to-one correspondence.

- Monarch Migration-A Unique Journey (Activity 2)

PK4.V.A.5: Child recognizes numerals 0-10.

- Gardens-Habitats for the Monarch Butterfly (Activity 5)
- Getting to Know Monarch Butterflies (Activity 1)

PK4.V.E.1: Child sorts objects that are the same and different into groups and uses language to describe how the groups are similar and different.

- Gardens-Habitats for the Monarch Butterfly (Activity 1)

PK4.V.E.2: Child collects data and organizes it in a graphic representation.

» Monarch Migration-A Unique Journey (Activity 1, 3)

PK4.V.E.3: Child recognizes, duplicates, extends, and creates patterns.

» Getting to Know Monarch Butterflies (Activity 2, 4)

FINE ARTS DOMAIN

PK4.VIII.A.1: Child uses a variety of art materials and activities for sensory experience and exploration.

» Gardens-Habitats for the Monarch Butterfly (Activity 4)

» Getting to Know Monarch Butterflies (Activity 1, 2, 3)

KINDER

SCIENCE

K.1(A): Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

» Lesson 4: Building a Monarch Habitat (Activity 3)

K.1(D): Use tools, including hand lenses, goggles, trays, cups, bowls, sieves or sifters, notebooks, terrariums, aquariums, samples (rocks, sand, soil, loam, gravel, clay, seeds, and plants), windsock, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, blocks or cubes, tuning fork, various flashlights, small paper cups, items that roll, noise makers, hot plate, opaque objects, transparent objects, foil pie pans, foil muffin cups, wax paper, Sun-Moon-Earth model, and plant life cycle model to observe, measure, test, and compare.

» Lesson 1: The Monarch Butterfly (Activity 1)

» Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 2)

K.1(E): Collect observations and measurements as evidence.

» Lesson 1: The Monarch Butterfly (Activity 1, 3)

» Lesson 2: What Do Plants Need to Survive? (Activity 2)

» Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 2)

» Lesson 4: Building a Monarch Habitat (Activity 1, 2)

K.1(F): Record and organize data using pictures, numbers, words, symbols, and simple graphs.

- Lesson 2: What Do Plants Need to Survive? (Activity 1, 3)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.1(G): Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

- Lesson 1 *(Engineering Option)*: The Monarch Butterfly (Activity 2)
- Lesson 1: The Monarch Butterfly (Activity 3)
- Lesson 3 *(Engineering Option)*: Properties of Matter in a Monarch Garden (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 3)

K.2(B): Analyze data by identifying significant features and patterns.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.2(D): Evaluate a design or object using criteria to determine if it works as intended.

- Lesson 2 *(Engineering Option)*: What Do Plants Need to Survive? (Activity 3)
- Lesson 4 *(Engineering Option)*: Building a Monarch Habitat (Activity 3)

K.3(A): Develop explanations and propose solutions supported by data and models.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.3(B): Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

- Lesson 1: The Monarch Butterfly (Activity 3)
- Lesson 4: Building a Monarch Habitat (Activity 2, 3)

K.3(C): Listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

- Lesson 1: The Monarch Butterfly (Activity 3)

K.5(B): Investigate and predict cause-and-effect relationships in science.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.5(D): Examine the parts of a whole to define or model a system.

- Lesson 1: The Monarch Butterfly (Activity 2)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2)

K.5(E): Identify forms of energy and properties of matter.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.5(F): Describe the relationship between structure and function of objects, organisms, and systems.

- Lesson 1: The Monarch Butterfly (Activity 2, 3)

K.5(G): Describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

- Lesson 2: What Do Plants Need to Survive? (Activity 2)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 3)

K.6: Identify and record observable physical properties of objects, including shape, color, texture, and material, and generate ways to classify objects.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 2)

K.9(B): Observe, describe, and illustrate the Sun, Moon, stars, and objects in the sky such as clouds.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.10(A): Describe and classify rocks by the observable properties of size, shape, color, and texture.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 2)

K.10(B): Observe and describe weather changes from day to day and over seasons.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.12(A): Observe and identify the dependence of plants on air, sunlight, water, nutrients in the soil, and space to grow.

- Lesson 2: What Do Plants Need to Survive? (Activity 1, 2, 3)
- Lesson 4: Building a Monarch Habitat (Activity 1, 3)

K.12(B): Observe and identify the dependence of animals on air, water, food, space, and shelter.

- Lesson 1: The Monarch Butterfly (Activity 1)
- Lesson 2: What Do Plants Need to Survive? (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2, 3)

K.13(B): Identify the different structures that animals have that allow them to interact with their environment such as seeing, hearing, moving, and grasping objects.

- Lesson 1: The Monarch Butterfly (Activity 1, 2, 3)

MATH

K.1(E): Create and use representations to organize, record, and communicate mathematical ideas.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.1(F): Analyze mathematical relationships to connect and communicate mathematical ideas.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.8(A): Collect, sort, and organize data into two or three categories.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.8(B): Use data to create real-object and picture graphs.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

K.8(C): Draw conclusions from real-object and picture graphs.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1ST GRADE

SCIENCE

1.1(A): Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

- Lesson 4: Building a Monarch Habitat (Activity 3)

1.1(D): Use tools, including hand lenses, goggles, heat-resistant gloves, trays, cups, bowls, beakers, sieves/sifters, tweezers, primary balance, notebooks, terrariums, aquariums, stream tables, soil samples (loam, sand, gravel, rocks, and clay), seeds, plants, windsock, pinwheel, student thermometer, demonstration thermometer, rain gauge, straws, ribbons, non-standard measuring items, flashlights, sandpaper, wax paper, items that are magnetic, non-magnetic items, a variety of magnets, hot plate, aluminum foil, Sun-Moon-Earth model, and plant and animal life cycle models to observe, measure, test, and compare.

- Lesson 1: The Monarch Butterfly (Activity 1)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 2)

1.1(E): Collect observations and measurements as evidence.

- Lesson 1: The Monarch Butterfly (Activity 1, 3)
- Lesson 2: What Do Plants Need to Survive? (Activity 2)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 2)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2)

1.1(F): Record and organize data using pictures, numbers, words, symbols, and simple graphs.

- Lesson 2: What Do Plants Need to Survive? (Activity 1, 3)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.1(G): Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

- Lesson 1 *(Engineering Option)*: The Monarch Butterfly (Activity 2)
- Lesson 1: The Monarch Butterfly (Activity 3)
- Lesson 3 *(Engineering Option)*: Properties of Matter in a Monarch Garden (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 3)

1.2(B): Analyze data by identifying significant features and patterns.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.2(D): Evaluate a design or object using criteria to determine if it works as intended.

- Lesson 2 *(Engineering Option)*: What Do Plants Need to Survive? (Activity 3)
- Lesson 4 *(Engineering Option)*: Building a Monarch Habitat (Activity 3)

1.3(A): Develop explanations and propose solutions supported by data and models.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.3(B): Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

- Lesson 1: The Monarch Butterfly (Activity 3)
- Lesson 4: Building a Monarch Habitat (Activity 2, 3)

1.3(C): Listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

- Lesson 1: The Monarch Butterfly (Activity 3)

1.5(B): Investigate and predict cause-and-effect relationships in science.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.5(D): Examine the parts of a whole to define or model a system.

- Lesson 1: The Monarch Butterfly (Activity 2)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2)

1.5(E): Identify forms of energy and properties of matter.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 3)

1.5(F): Describe the relationship between structure and function of objects, organisms, and systems.

- Lesson 1: The Monarch Butterfly (Activity 2)

1.5(G): Describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

- Lesson 2: What Do Plants Need to Survive? (Activity 2)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 3)

1.6(A): Classify objects by observable physical properties, including, shape, color, and texture, and attributes such as larger and smaller and heavier and lighter.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 2)

1.10(A): Investigate and document the properties of particle size, shape, texture, and color and the components of different types of soils such as topsoil, clay, and sand.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 2)

1.10(D): Describe and record observable characteristics of weather, including hot or cold, clear or cloudy, calm or windy, and rainy or icy, and explain the impact of weather on daily choices.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.11(A): Identify and describe how plants, animals, and humans use rocks, soil, and water.

- Lesson 4: Building a Monarch Habitat (Activity 3)

1.12(A): Classify living and nonliving things based upon whether they have basic needs and produce young.

- Lesson 2: What Do Plants Need to Survive? (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2)

1.12(B): Describe and record examples of interactions and dependence between living and nonliving components in terrariums or aquariums.

- Lesson 2: What Do Plants Need to Survive? (Activity 2, 3)
- Lesson 4: Building a Monarch Habitat (Activity 3)

1.13(A): Identify the external structures of different animals and compare how those structures help different animals live, move, and meet basic needs for survival.

- Lesson 1: The Monarch Butterfly (Activity 1, 2, 3)

1.13(B): Record observations of and describe basic life cycles of animals, including a bird, a mammal, and a fish.

- Lesson 1: The Monarch Butterfly (Activity 3)

MATH

1.1(E): Create and use representations to organize, record, and communicate mathematical ideas.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.1(F): Analyze mathematical relationships to connect and communicate mathematical ideas.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.8(A): Collect, sort, and organize data in up to three categories using models/representations such as tally marks or T-charts.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.8(B): Use data to create picture and bar-type graphs.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

1.8(C): Draw conclusions and generate and answer questions using information from picture and bar-type graphs.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2ND GRADE

SCIENCE

2.1(A): Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

- Lesson 4: Building a Monarch Habitat (Activity 3)

2.1(D): Use tools, including hand lenses, goggles, heat-resistant gloves, trays, cups, bowls, beakers, notebooks, stream tables, soil, sand, gravel, flowering plants, student thermometer, demonstration thermometer, rain gauge, flashlights, ramps, balls, spinning tops, drums, tuning forks, sandpaper, wax paper, items that are flexible, non-flexible items, magnets, hot plate, aluminum foil, Sun-Moon-Earth model, and frog and butterfly life cycle models to observe, measure, test, and compare.

- Lesson 1: The Monarch Butterfly (Activity 1)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 2)

2.1(E): Collect observations and measurements as evidence.

- Lesson 1: The Monarch Butterfly (Activity 1, 3)
- Lesson 2: What Do Plants Need to Survive? (Activity 2)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1, 2)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2)

2.1(F): Record and organize data using pictures, numbers, words, symbols, and simple graphs.

- Lesson 2: What Do Plants Need to Survive? (Activity 1, 3)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.1(G): Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

- Lesson 1 *(Engineering Option)*: The Monarch Butterfly (Activity 2)
- Lesson 1: The Monarch Butterfly (Activity 3)
- Lesson 3 *(Engineering Option)*: Properties of Matter in a Monarch Garden (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 3)

2.2(B): Analyze data by identifying significant features and patterns.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.2(D): Evaluate a design or object using criteria to determine if it works as intended.

- Lesson 2 *(Engineering Option)*: What Do Plants Need to Survive? (Activity 3)

2.3(A): Develop explanations and propose solutions supported by data and models.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.3(B): Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

- Lesson 1: The Monarch Butterfly (Activity 3)
- Lesson 4: Building a Monarch Habitat (Activity 2, 3)

2.3(C): Listen actively to others' explanations to identify important evidence and engage respectfully in scientific discussion.

- Lesson 1: The Monarch Butterfly (Activity 3)

2.5(B): Investigate and predict cause-and-effect relationships in science.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.5(D): Examine the parts of a whole to define or model a system.

- Lesson 1: The Monarch Butterfly (Activity 2)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2)

2.5(E): Identify forms of energy and properties of matter.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.5(F): Describe the relationship between structure and function of objects, organisms, and systems.

- Lesson 1: The Monarch Butterfly (Activity 2, 3)

2.5(G): Describe how factors or conditions can cause objects, organisms, and systems to either change or stay the same.

- Lesson 2: What Do Plants Need to Survive? (Activity 2)
- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)
- Lesson 4: Building a Monarch Habitat (Activity 3)

2.6(A): Classify matter by observable physical properties, including texture, flexibility, and relative temperature, and identify whether a material is a solid or liquid.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 2)

2.9(A): Describe the Sun as a star that provides light and heat and explain that the Moon reflects the Sun's light.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.10(B): Measure, record, and graph weather information, including temperature and precipitation.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.12(A): Describe how the physical characteristics of environments, including the amount of rainfall, support plants and animals within an ecosystem.

- Lesson 2: What Do Plants Need to Survive? (Activity 1, 2, 3)
- Lesson 4: Building a Monarch Habitat (Activity 1, 2, 3)

2.13(B): Record and compare how the structures and behaviors of animals help them find and take in food, water, and air.

- Lesson 1: The Monarch Butterfly (Activity 1, 2, 3)

2.13(D): Investigate and describe some of the unique life cycles of animals where young animals do not resemble their parents, including butterflies and frogs.

- Lesson 1: The Monarch Butterfly (Activity 3)

MATH

2.1(E): Create and use representations to organize, record, and communicate mathematical ideas.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.1(F): Analyze mathematical relationships to connect and communicate mathematical ideas.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.10(B): Organize a collection of data with up to four categories using pictographs and bar graphs with intervals of one or more.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.10(D): Draw conclusions and make predictions from information in a graph.

- Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

3RD GRADE

SCIENCE

3.1(A): Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2)

3.1(B): Use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

3.1(D): Use tools, including hand lenses; metric rulers; Celsius thermometers; wind vanes; rain gauges; graduated cylinders; beakers; digital scales; hot plates; meter sticks; magnets; notebooks; Sun, Earth, Moon system models; timing devices; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras, to observe, measure, test, and analyze information.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

3.1(E): Collect observations and measurements as evidence.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

3.1(F): Construct appropriate graphic organizers to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 2)
- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2)

3.1(G): Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

- Lesson 1 *(Technology & Engineering Option)*: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)
- Lesson 4: Community Change (Activity 3)

3.2(A): Identify advantages and limitations of models such as their size, scale, properties, and materials.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)
- Lesson 4: Community Change (Activity 3)

3.2(B): Analyze data by identifying any significant features, patterns, or sources of error.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)
- Lesson 4: Community Change (Activity 1, 2)

3.2(C): Use mathematical calculations to compare patterns and relationships.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

3.3(A): Develop explanations and propose solutions supported by data and models.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1, 3)
- Lesson 4: Community Change (Activity 3)

3.3(B): Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 2)
- Lesson 1 *(Technology & Engineering Option)*: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 2, 3)
- Lesson 4: Community Change (Activity 3)

3.3(C): Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)

3.5(A): Identify and use patterns to explain scientific phenomena or to design solutions.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

3.5(B): Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2)

3.5(C): Use scale, proportion, and quantity to describe, compare, or model different systems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)
- Lesson 4: Community Change (Activity 3)

3.5(D): Examine and model the parts of a system and their interdependence in the function of the system.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

3.5(E): Investigate the flow of energy and cycling of matter through systems.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Background, Activity 2)

3.5(F): Explain the relationship between the structure and function of objects, organisms, and systems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 2, 3)

3.5(G): Explain how factors or conditions impact stability and change in objects, organisms, and systems.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2, 3)

3.11(A): Explore and explain how humans use natural resources such as in construction, in agriculture, in transportation, and to make products.

- Lesson 4: Community Change (Activity 3)

3.12: Describes patterns, cycles, systems, and relationships within environments.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

3.12(A): Explain how temperature and precipitation affect animal growth and behavior through migration and hibernation and plant responses through dormancy.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2, 3)
- Lesson 4: Community Change (Activity 1, 2, 3)

3.12(B): Identify and describe the flow of energy in a food chain and predict how changes in a food chain such as removal of frogs from a pond or bees from a field affect the ecosystem.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Background)

3.12(C): Describe how natural changes to the environment such as floods and droughts cause some organisms to thrive and others to perish or move to new locations.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2)

3.13: The student knows that organisms undergo similar life processes and have structures and behaviors that help them survive within their environments.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 3)

3.13(A): Explore and explain how external structures and functions of animals such as the neck of a giraffe or webbed feet on a duck enable them to survive in their environment.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 2)

MATH

3.1(E): Create and use representations to organize, record, and communicate mathematical ideas.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

4TH GRADE

SCIENCE

4.1(A): Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2)

4.1(B): Use scientific practices to plan and conduct descriptive investigations and use engineering practices to design solutions to problems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

4.1(D): Use tools, including hand lenses; metric rulers; Celsius thermometers; calculators; laser pointers; mirrors; digital scales; balances; graduated cylinders; beakers; hot plates; meter sticks; magnets; notebooks; timing devices; sieves; materials for building circuits; materials to support observation of habitats of organisms such as terrariums, aquariums, and collecting nets; and materials to support digital data collection such as computers, tablets, and cameras, to observe, measure, test, and analyze information.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

4.1(E): Collect observations and measurements as evidence.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

4.1(F): Construct appropriate graphic organizers to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 2)
- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2)

4.1(G): Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

- Lesson 1 *(Technology & Engineering Option)*: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)
- Lesson 4: Community Change (Activity 3)

4.2(A): Identify advantages and limitations of models such as their size, scale, properties, and materials.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)
- Lesson 4: Community Change (Activity 3)

4.2(B): Analyze data by identifying any significant features, patterns, or sources of error.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)
- Lesson 4: Community Change (Activity 1, 2)

4.2(C): Use mathematical calculations to compare patterns and relationships.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

4.3(A): Develop explanations and propose solutions supported by data and models.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1, 3)
- Lesson 4: Community Change (Activity 3)

4.3(B): Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 2)
- Lesson 1 *(Technology & Engineering Option)*: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 2, 3)
- Lesson 4: Community Change (Activity 3)

4.3(C): Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)

4.5(A): Identify and use patterns to explain scientific phenomena or to design solutions.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

4.5(B): Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2)

4.5(C): Use scale, proportion, and quantity to describe, compare, or model different systems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)
- Lesson 4: Community Change (Activity 3)

4.5(D): Examine and model the parts of a system and their interdependence in the function of the system.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

4.5(E): Investigate the flow of energy and cycling of matter through systems.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Background, Activity 2)

4.5(F): Explain the relationship between the structure and function of objects, organisms, and systems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 2, 3)

4.5(G): Explain how factors or conditions impact stability and change in objects, organisms, and systems.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2, 3)

4.11(A): Identify and explain advantages and disadvantages of using Earth's renewable and nonrenewable natural resources such as wind, water, sunlight, plants, animals, coal, oil, and natural gas.

- Lesson 4: Community Change (Activity 3)

4.11(B): Explain the critical role of energy resources to modern life and how conservation, disposal, and recycling of natural resources impact the environment.

- Lesson 4: Community Change (Activity 3)

4.12: Describes patterns, cycles, systems, and relationships within environments.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)
- Lesson 4: Community Change (Activity 1, 2, 3)

4.12(A): Investigate and explain how most producers can make their own food using sunlight, water, and carbon dioxide through the cycling of matter.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 3)

4.12(B): Describe the cycling of matter and flow of energy through food webs, including the roles of the Sun, producers, consumers, and decomposers.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Background, Activity 1, 2)

4.13(A): Explore and explain how structures and functions of plants such as waxy leaves and deep roots enable them to survive in their environment.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 2, 3)

MATH

4.1(E): Create and use representations to organize, record, and communicate mathematical ideas.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

5TH GRADE

SCIENCE

5.1(A): Ask questions and define problems based on observations or information from text, phenomena, models, or investigations.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2)

5.1(B): Use scientific practices to plan and conduct descriptive and simple experimental investigations and use engineering practices to design solutions to problems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

5.1(D): Use tools, including calculators, microscopes, hand lenses, metric rulers, Celsius thermometers, prisms, concave and convex lenses, laser pointers, mirrors, digital scales, balances, spring scales, graduated cylinders, beakers, hot plates, meter sticks, magnets, collecting nets, notebooks, timing devices, materials for building circuits, materials to support observations of habitats or organisms such as terrariums and aquariums, and materials to support digital data collection such as computers, tablets, and cameras to observe, measure, test, and analyze information.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

5.1(E): Collect observations and measurements as evidence.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

5.1(F): Construct appropriate graphic organizers to collect data, including tables, bar graphs, line graphs, tree maps, concept maps, Venn diagrams, flow charts or sequence maps, and input-output tables that show cause and effect.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 2)
- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2)

5.1(G): Develop and use models to represent phenomena, objects, and processes or design a prototype for a solution to a problem.

- Lesson 1 *(Technology & Engineering Option)*: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)
- Lesson 4: Community Change (Activity 3)

5.2(A): Identify advantages and limitations of models such as their size, scale, properties, and materials.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)
- Lesson 4: Community Change (Activity 3)

5.2(B): Analyze data by identifying any significant features, patterns, or sources of error.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)
- Lesson 4: Community Change (Activity 1, 2)

5.2(C): Use mathematical calculations to compare patterns and relationships.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

5.3(A): Develop explanations and propose solutions supported by data and models.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 1, 3)
- Lesson 4: Community Change (Activity 3)

5.3(B): Communicate explanations and solutions individually and collaboratively in a variety of settings and formats.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 2)
- Lesson 1 *(Technology & Engineering Option)*: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 2, 3)
- Lesson 4: Community Change (Activity 3)

5.3(C): Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 3)

5.5(A): Identify and use patterns to explain scientific phenomena or to design solutions.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

5.5(B): Identify and investigate cause-and-effect relationships to explain scientific phenomena or analyze problems.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2)

5.5(C): Use scale, proportion, and quantity to describe, compare, or model different systems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)
- Lesson 4: Community Change (Activity 3)

5.5(D): Examine and model the parts of a system and their interdependence in the function of the system.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1)

5.5(E): Investigate the flow of energy and cycling of matter through systems.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Background, Activity 2)

5.5(F): Explain the relationship between the structure and function of objects, organisms, and systems.

- Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 2, 3)

5.5(G): Explain how factors or conditions impact stability and change in objects, organisms, and systems.

- Lesson 3: Cycling Matter and Habitat Loss (Activity 2)
- Lesson 4: Community Change (Activity 1, 2, 3)

5.11: Design and explain solutions such as conservation, recycling, or proper disposal to minimize environmental impact of the use of natural resources.

- Lesson 4: Community Change (Activity 3)

5.12(A): Observe and describe how a variety of organisms survive by interacting with biotic and abiotic factors in a healthy ecosystem.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1, 2, 3)

5.12(B): Predict how changes in the ecosystem affect the cycling of matter and flow of energy in a food web.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 1, 2, 3)
- Lesson 3: Cycling Matter and Habitat Loss (Background, Activity 2)
- Lesson 4: Community Change (Activity 1, 2)

5.12(C): Describe a healthy ecosystem and how human activities can be beneficial or harmful to an ecosystem.

- Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 3)
- Lesson 3: Cycling Matter and Habitat Loss (Activity 1, 2, 3)
- Lesson 4: Community Change (Activity 1, 2, 3)

5.13(A): Analyze the structures and functions of different species to identify how organisms survive in the same environment.

» Lesson 1: Structure and Function: Animals vs. Plants (Activity 1, 2, 3)

MATH

5.1(E): Create and use representations to organize, record, and communicate mathematical ideas.

» Lesson 1: Structure and Function: Animals vs. Plants (Activity 1)

Alignment Index - ELPS (English Language Proficiency Standards)

Note: *Texas ELPS are general standards for grades K-12, however there are direct connections with prekindergarten as well so those lessons and activities are also included in this index.*

1.A: Use prior knowledge and experiences to understand meanings in English.

- PreK: Gardens – Habitats for the Monarch Butterfly (Activities 1, 2, 3, 4, 5)
- PreK: Getting to Know Monarch Butterflies (Activities 1, 2, 3, 4)
- PreK: Monarch Migration – A Unique Journey (Activities 1, 2, 3)
- K-2: Lesson 1: The Monarch Butterfly (Activity 1)
- 3-5: Lesson 1: Structure and Function: Animals vs. Plants (Activities 1, 2, 3)
- 3-5: Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activities 1, 2, 3)
- 3-5: Lesson 3: Cycling Matter and Habitat Loss (Background, Activities 1, 2, 3)
- 3-5: Lesson 4: Community Change (Activities 1, 2, 3)

1.C: Use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary.

- PreK: Gardens – Habitats for the Monarch Butterfly (Activities 1, 2, 3, 4, 5)
- PreK: Getting to Know Monarch Butterflies (Activities 1, 2, 3, 4)
- PreK: Monarch Migration – A Unique Journey (Activities 1, 2, 3)
- K-2: Lesson 1: The Monarch Butterfly (Activities 1, 2)
- K-2: Lesson 2: What Do Plants Need to Survive? (Activities 2, 3)
- K-2: Lesson 3: Properties of Matter in a Monarch Garden (Activity 2)
- K-2: Lesson 4: Building a Monarch Habitat (Activity 1)
- 3-5: Lesson 1: Structure and Function: Animals vs. Plants (Activities 1, 2, 3)
- 3-5: Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activities 1, 2, 3)
- 3-5: Lesson 3: Cycling Matter and Habitat Loss (Background, Activities 1, 2, 3)
- 3-5: Lesson 4: Community Change (Activities 1, 2, 3)

1.E: Internalize new basic and academic language by using and reusing it in meaningful ways in speaking and writing activities that build concept and language attainment.

- PreK: Gardens – Habitats for the Monarch Butterfly (Activity 5)
- PreK: Getting to Know Monarch Butterflies (Activities 1, 2, 3, 4)
- PreK: Monarch Migration – A Unique Journey (Activities 1, 2, 3)
- K-2: Lesson 1: The Monarch Butterfly (Activity 3)
- K-2: Lesson 3: Properties of Matter in a Monarch Garden (Activity 1)

2.C: Learn new language structures, expressions, and basic and academic vocabulary heard during classroom instruction and interactions.

- K-2: Lesson 4: Building a Monarch Habitat (Activity 2)
- 3-5: Lesson 1: Structure and Function: Animals vs. Plants (Activities 1, 2, 3)
- 3-5: Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activities 1, 2, 3)
- 3-5: Lesson 3: Cycling Matter and Habitat Loss (Background, Activities 1, 2, 3)
- 3-5: Lesson 4: Community Change (Activities 1, 2, 3)

2.E: Use visual, contextual, and linguistic support to enhance and confirm understanding of increasingly complex and elaborated spoken language reviewing to acquire basic and grade-level vocabulary.

- K-2: Lesson 1: The Monarch Butterfly (Activities 2, 3)
- K-2: Lesson 2: What Do Plants Need to Survive? (Activities 1, 2, 3)
- K-2: Lesson 3: Properties of Matter in a Monarch Garden (Activities 1, 2)
- K-2: Lesson 4: Building a Monarch Habitat (Activity 1)

2.G: Understand the general meaning, main points, and important details of spoken language ranging from situations in which topics, language, and contexts are familiar to unfamiliar.

- 3-5: Lesson 3: Cycling Matter and Habitat Loss (Background, Activities 1, 2, 3)
- 3-5: Lesson 4: Community Change (Activities 1, 3)

3.B: Use new vocabulary in stories, descriptions, and classroom communication.

- PreK: Gardens – Habitats for the Monarch Butterfly (Activities 2, 3)

3.H: Narrate, describe, and explain with increasing specificity and detail as more English is acquired.

- K-2: Lesson 4: Building a Monarch Habitat (Activity 3)
- 3-5: Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 3)

4.F: Use visual and contextual support and support from peers and teachers to read grade-appropriate content area text, enhance and confirm understanding, and develop vocabulary, grasp of language structures, and background knowledge needed to comprehend increasingly challenging language.

- K-2: Lesson 2: What Do Plants Need to Survive? (Activity 1)

4.H: Read silently with increasing ease and comprehension for longer periods.

- 3-5: Lesson 1: Structure and Function: Animals vs. Plants (Activity 3)

4.K: Demonstrate English comprehension and expand reading skills by employing analytical skills such as evaluating written information and performing critical analyses commensurate with content area and grade-level needs.

- 3-5: Lesson 3: Cycling Matter and Habitat Loss (Background, Activities 1, 2, 3)
- 3-5: Lesson 4: Community Change (Activities 1, 3)

5.B: Write using newly acquired basic vocabulary and content-based grade-level vocabulary.

- 3-5: Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 2)

5.D: Edit writing for standard grammar and usage, including subject-verb agreement, pronoun agreement, and appropriate verb tenses commensurate with grade-level expectations as more English is acquired.

- 3-5: Lesson 2: The Sun: Feeding Ecosystems Everywhere (Activity 3)