twig Science



Designed for the NGSS: Foundations Teacher Support Evidence Chart

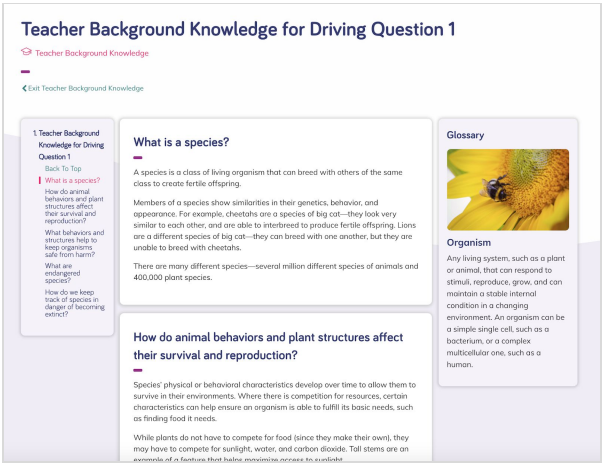
Teacher materials...	Strong	Adequate	Weak
F1. Presence of Phenomena/Problems. Identify and provide background information about the phenomena/problems in the unit and how they match the targeted learning goals.	✓		
F2. Presence of Three Dimensions. Identify and provide background information about the each of the three dimensions in the unit. Also take note of any support for nature of science and engineering, technology, and applications of science. ● the SEPs ● the DCIs (including engineering) ● the CCCs ● *also note* NoS and ETS	✓		
F3. Presence of Logical Sequence. Identify and provide background information on the sequence of learning in the unit.	✓		

Strengths related to these Teacher Supports

F1. Presence of Phenomena/Problems.
The module is strong at identifying and providing background information about the phenomena/problems in the unit and how they match the targeted learning goals.

Evidence

- An overview online and in print (TE pi) sets out at high level how students will solve the Module Phenomenon.
- **Teacher Background Knowledge** on the phenomena/problems and DCIs addressed in every Driving Question is explained simply in Q&A format with supporting diagrams and visuals. A glossary of scientific terms is also provided. For example, DQ3 provides background information on 'nature vs nurture' and how environmental factors alter organisms, while DQ4 explains conservation and the factors that cause a species to become endangered.



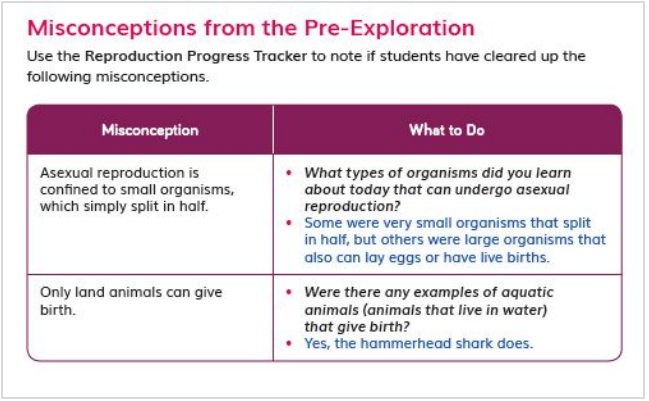
Teacher Background Knowledge

F2. Presence of Three Dimensions.
The module is strong at identifying and providing background information about each of the three dimensions in the unit. It also supports opportunities to connect to the nature of science and engineering, technology, and applications of science.

Evidence

- A digital guide to SEPs and CCCs provides a clear explanation for each practice and concept with guidance on what these skills should look like in a 6th grade classroom, with specific reference to how students use mathematics and computational thinking (SEP-5), engage in argument from evidence (SEP-7), and consider cause and effect (CCC-2) in Grade 6 Module 3.

- Additional module-specific support is frequently given at point of use in the instructional materials for all dimensions, often in the Connect. For example, the teacher is guided to connect to LS1.B (Growth and Development of Organisms) in DQ2L9 TE p. 167, and SEP-6 (Constructing Explanations and Designing Solutions) in DQ3L5 TE p. 221. The teacher is also guided to connect to the Nature of Science (Science Is Based on Empirical Evidence) in DQ2L2 TE p. 110.

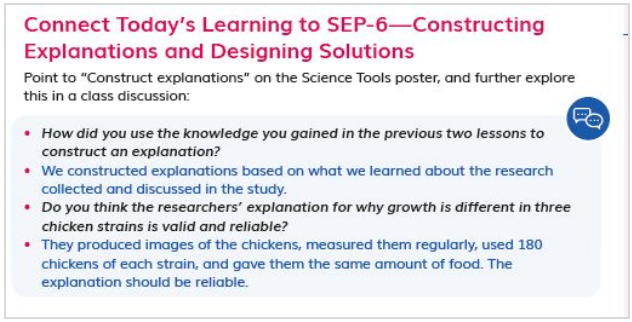


Misconceptions from the Pre-Exploration

Use the Reproduction Progress Tracker to note if students have cleared up the following misconceptions.

Misconception	What to Do
Asexual reproduction is confined to small organisms, which simply split in half.	• *What types of organisms did you learn about today that can undergo asexual reproduction?* • Some were very small organisms that split in half, but others were large organisms that also can lay eggs or have live births.
Only land animals can give birth.	• *Were there any examples of aquatic animals (animals that live in water) that give birth?* • Yes, the hammerhead shark does.

DQ2L9 TE p. 167

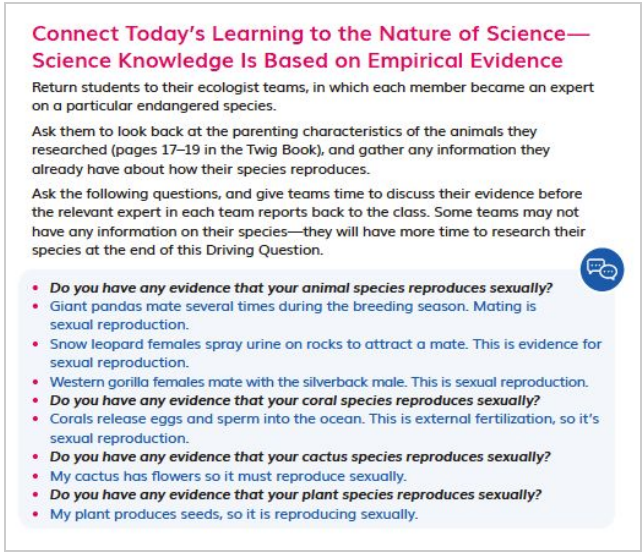


Connect Today's Learning to SEP-6—Constructing Explanations and Designing Solutions

Point to "Construct explanations" on the Science Tools poster, and further explore this in a class discussion:

- *How did you use the knowledge you gained in the previous two lessons to construct an explanation?*
- We constructed explanations based on what we learned about the research collected and discussed in the study.
- *Do you think the researchers' explanation for why growth is different in three chicken strains is valid and reliable?*
- They produced images of the chickens, measured them regularly, used 180 chickens of each strain, and gave them the same amount of food. The explanation should be reliable.

DQ3L5 TE p. 221



Connect Today's Learning to the Nature of Science—Science Knowledge Is Based on Empirical Evidence

Return students to their ecologist teams, in which each member became an expert on a particular endangered species.

Ask them to look back at the parenting characteristics of the animals they researched (pages 17–19 in the Twig Book), and gather any information they already have about how their species reproduces.

Ask the following questions, and give teams time to discuss their evidence before the relevant expert in each team reports back to the class. Some teams may not have any information on their species—they will have more time to research their species at the end of this Driving Question.

- ***Do you have any evidence that your animal species reproduces sexually?***
- Giant pandas mate several times during the breeding season. Mating is sexual reproduction.
- Snow leopard females spray urine on rocks to attract a mate. This is evidence for sexual reproduction.
- Western gorilla females mate with the silverback male. This is sexual reproduction.
- ***Do you have any evidence that your coral species reproduces sexually?***
- Corals release eggs and sperm into the ocean. This is external fertilization, so it's sexual reproduction.
- ***Do you have any evidence that your cactus species reproduces sexually?***
- My cactus has flowers so it must reproduce sexually.
- ***Do you have any evidence that your plant species reproduces sexually?***
- My plant produces seeds, so it is reproducing sexually.

DQ2L2 TE p. 110

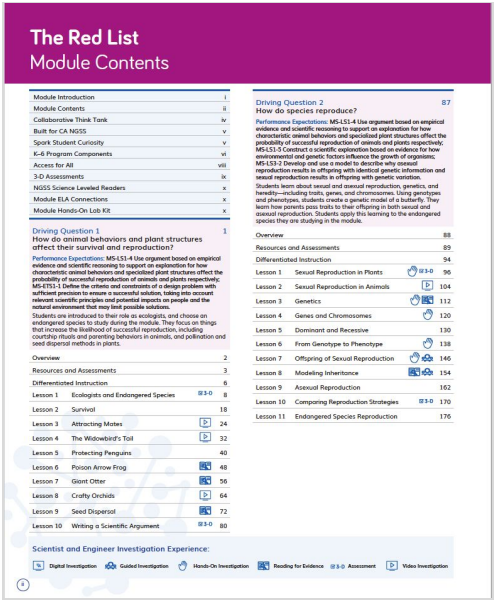
F3. Presence of Logical Sequence.
The module is strong at identifying and providing background information on the sequence of learning in the unit.

Evidence

- A **Module Introduction video** provides the teacher with an engaging overview on the phenomenon explored in The Red List, the sequence of learning, and an explanation of how the Performance Expectations are addressed and how they build on each other.

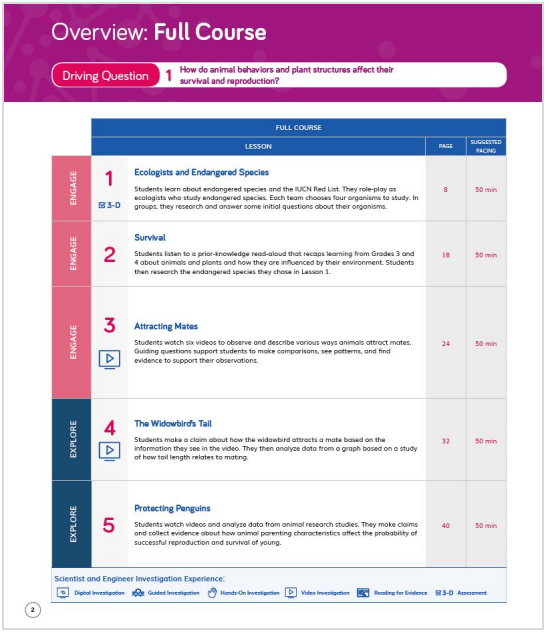
Module Introduction video

- The **Module Contents** helps teachers identify the sequence of three dimensions addressed in The Red List and states how they build on each other. For example, students begin by researching patterns of behavior that increase the likelihood of successful reproduction. They go on to learn about genetics and heredity, creating a chromosome model of a butterfly, and understand how parents pass traits to their offspring. They analyze scientific studies showing how environmental factors affect growth in populations, and finally use their learning from the module to develop a conservation plan for their chosen species.



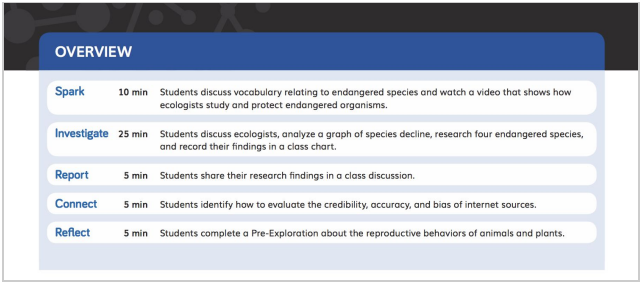
Module Contents

- More detail is provided in each **Driving Question Overview** which tells the story of how the students will sequentially use the three dimensions in each lesson in the Driving Question to answer the question posed. For example, in DQ2, students use texts and videos to learn about the structure and function of reproductive parts, and build chromosome models that help them understand about the inheritance of traits. This knowledge prepares them for obtaining, evaluating, and communicating information about how their endangered species reproduces.



Driving Question Overview

- The **Lesson Overview** page identifies the dimensions used in each lesson, while the graphic organizer details how the dimensions relate to the learning experience. For example, in DQ2L3 TE p. 112, the overview explains that students will develop a model of Mendel's pea plant breeding experiments. They will share their models, discuss how genetics affect plants and animals, and reflect on whether Mendel's pea plants reproduce sexually or asexually.



OVERVIEW

Spark	10 min	Students discuss vocabulary relating to endangered species and watch a video that shows how ecologists study and protect endangered organisms.
Investigate	25 min	Students discuss ecologists, analyze a graph of species decline, research four endangered species, and record their findings in a class chart.
Report	5 min	Students share their research findings in a class discussion.
Connect	5 min	Students identify how to evaluate the credibility, accuracy, and bias of internet sources.
Reflect	5 min	Students complete a Pre-Exploration about the reproductive behaviors of animals and plants.

Lesson Overview TE p. 112

Designed for the NGSS: Foundations Teacher Support Evidence Chart

Teacher materials...	Strong	Adequate	Weak
SW1. Phenomena/Problems. Provide support and strategies for how to help students figure out/solve authentic and relevant phenomena/problems using the three dimensions.	✓		
SW2. Three-dimensional Conceptual Framework. Provide support and strategies for how teachers help students develop a conceptual framework of scientifically accurate understandings and abilities related to ○ DCIs, SEPs, and CCCs ○ NoS and ETS ○ ELA and math ● create a learning environment that values students' ideas, motivates learning, and helps students negotiate new meaning as they interact with others' ideas, new information, and new experiences.	✓		
SW3. Prior Knowledge. Provide support and strategies to leverage students' prior knowledge and experiences to motivate learning.	✓		
SW4. Metacognitive Abilities. Provide support and strategies for how to help students develop metacognitive abilities.	✓		
SW5. Equitable Learning Opportunities. Provide resources and strategies for how to ensure that ***all*** students, including those from non-dominant groups and with diverse learning needs, have access to the targeted learning goals and experiences.	✓		

Strengths related to these Teacher Supports
SW1. Phenomena/Problems. The module is strong at providing support and strategies for how to help students figure out authentic and relevant phenomena using the three dimensions.

Evidence

- The instructional materials have been designed to support the teacher to guide students on a scaffolded learning journey to solve the Module Phenomenon: How do the environment and genetics affect animals and plants? They tackle the problem one Driving Question at a time, applying the three dimensions with increasing sophistication, building the skills and knowledge they need through a series of investigations.
- The teacher is supported in the instructional material to connect their learning experiences back to the central problem at strategic points, culminating in a class symposium where students present research on endangered species, addressing the Module Phenomenon.

SW2. Three-Dimensional Conceptual Framework.
The module provides strong support and strategies for how teachers help students build conceptual flow and creates a positive learning environment for students.

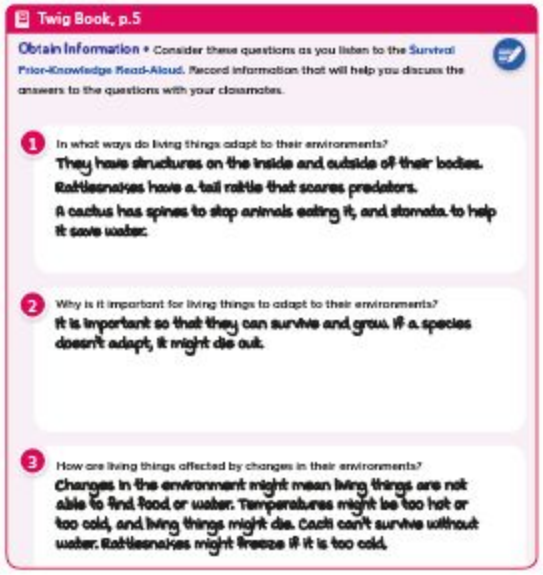
Evidence

- The instructional materials are designed to elicit students' understanding of how the environment and genetics affect animals and plants and develop their understanding over time, through hands-on, text, and video investigations. Students follow a sequence of Driving Questions designed to progressively build their skills and scientifically accurate understandings.
- Opportunities for students to articulate, question, and revise their conceptual framework are woven into the instructional resources supporting teachers to assess the progression of their scientifically accurate understandings. Strategies on how to tailor instruction for students requiring more support is provided for teachers. For example, in DQ4 students consider the question: How do we protect endangered or threatened species? They research their chosen endangered species and apply what they learned during the module about reproduction, genetics, and environmental factors to devise conservation plans. They share their plans in their teams, evaluate which of the approaches is strongest and why, and work together to create a list of ways to protect their species. Each team presents their collaborate conservation plan to the class. Students assess their own work and that of two classmates. Once the teacher has completed their own assessment, they compare their rubric to students' evaluations, checking if students could identify strengths and weaknesses in their and their classmates' work. This all allows teachers to gain an understanding of how much progress students have made.
- Support is given for how to create a positive learning environment where all contributions are valued along with activities that support teamwork and collaboration. Many of the activities involve students working in pairs and teams and they understand what effective teamwork looks and feel like having completed the 3-D Team Challenge at the start of Grade 6 (contained within Module 1, Biotech Systems Worldwide, TE p. 1). Throughout The Red List, students are given many opportunities to support each other. For example, students provide feedback as classmates present their models, and the teacher is supported to emphasize that constructive comments can improve models and that students should always be respectful of their classmates and their work (DQ2L3 TE p. 118).

SW3. Prior Knowledge.
The module provides strong support and strategies to leverage students' prior knowledge and experiences to motivate learning.

Evidence

- Teachers are supported with strategies to leverage prior knowledge of the relationship between living things and their environment through resources such as a Prior Knowledge Read-Aloud in **DQ1L2 TE p. 20**.



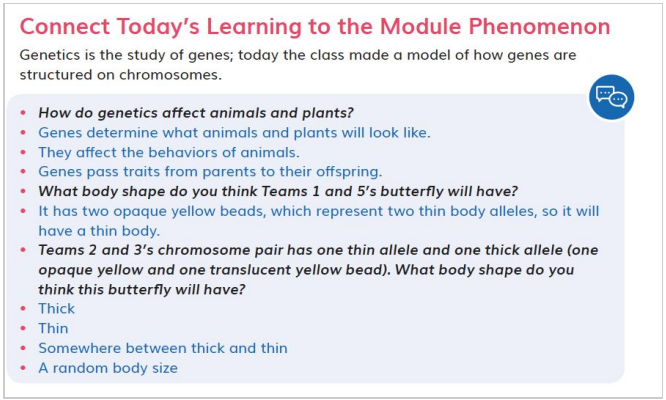
Twig Book, p.5

Obtain Information • Consider these questions as you listen to the Survival Prior-Knowledge Read-Aloud. Record information that will help you discuss the answers to the questions with your classmates.

1. In what ways do living things adapt to their environments?
   They have structures on the inside and outside of their bodies. Rattlesnakes have a tail rattle that scares predators. A cactus has spines to stop animals eating it, and stomata to help it save water.
2. Why is it important for living things to adapt to their environments?
   It is important so that they can survive and grow. If a species doesn't adapt, it might die out.
3. How are living things affected by changes in their environments?
   Changes in the environment might mean living things are not able to find food or water. Temperatures might be too hot or too cold, and living things might die. Cacti can't survive without water. Rattlesnakes might freeze if it is too cold.

DQ1L2 TE p. 20

- Additional support is provided at point of use for strategies to leverage prior knowledge and solve the Module Phenomenon. For example, the teacher is prompted to remind students that what they have learned today will help them as they further investigate the traits caused by inherited genes (**DQ2L4 TE p. 128**).



Connect Today's Learning to the Module Phenomenon

Genetics is the study of genes; today the class made a model of how genes are structured on chromosomes.

- ***How do genetics affect animals and plants?***
- Genes determine what animals and plants will look like.
- They affect the behaviors of animals.
- Genes pass traits from parents to their offspring.
- ***What body shape do you think Teams 1 and 5's butterfly will have?***
- It has two opaque yellow beads, which represent two thin body alleles, so it will have a thin body.
- ***Teams 2 and 3's chromosome pair has one thin allele and one thick allele (one opaque yellow and one translucent yellow bead). What body shape do you think this butterfly will have?***
- Thick
- Thin
- Somewhere between thick and thin
- A random body size

DQ2L4 TE p. 128

SW4. Metacognitive Abilities.
The module provides strong support and strategies for how to help students develop metacognitive abilities.

Evidence

- Support is given at point of use for how to develop students' metacognitive abilities. The Connect of the lesson often guides the teacher to draw students' attention to their growing use of the SEPs and CCCs, understanding of the Driving Question, or ability to solve the Module Phenomenon. For example, the teacher is supported to help students identify their use of SEP-8 **(DQ1L8 TE p. 70)** and their use of SEP-2 (DQ2L6 TE p. 144), and in DQ2 L9 students connect their learning to the Driving Question (**DQ2L9 TE p. 168**).

Connect Today's Learning to SEP-8—Obtaining, Evaluating, and Communicating Information

Remind students that in this lesson they obtained, evaluated, and communicated information.

Work as a class to fill out the chart you created before the lesson.

Obtaining Information	Evaluating Information	Communicating Information
We obtained information from the videos and visuals.	We evaluated information in our charts.	We communicated information when discussing with our partner.

DQ1L8 TE p. 70

Connect Today's Learning to DCI LS1.B—Growth and Development of Organisms

Ask students to examine the information on pages 75–76 in their Twig Books about asexual reproduction in plants and animals. They should highlight the words or phrases that provide evidence that the organism reproduces asexually.

Twig Book, p. 75

Organism	Description	Type(s) of Reproduction
Hydra	Hydras are a freshwater animal related to jellyfish and sea anemones. Hydras reproduce by [illegible] and by budding. These polyps break off from the parent to [illegible] in a process called budding.	Asexual reproduction
Starfish	Starfish gather to mate by spawning, which means they release egg and sperm cells into the water. When a starfish loses an arm along with part of its central disk, [illegible]	Sexual reproduction and asexual reproduction

Twig Book, p. 76

Organism	Description	Type(s) of Reproduction
Hammerhead Shark	Hammerhead sharks mate to produce offspring, which are born live. In captivity, [illegible]	Sexual reproduction and asexual reproduction
Many Grasses	Rhizomes are responsible for the growth of many grasses. [illegible] and invade the [illegible] nearby soil. [illegible]	Asexual reproduction

DQ2L9 TE p. 168

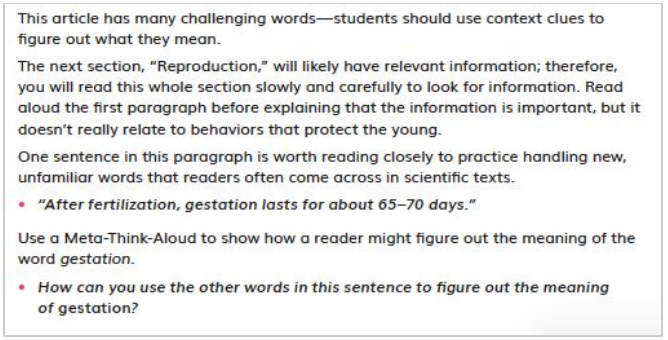
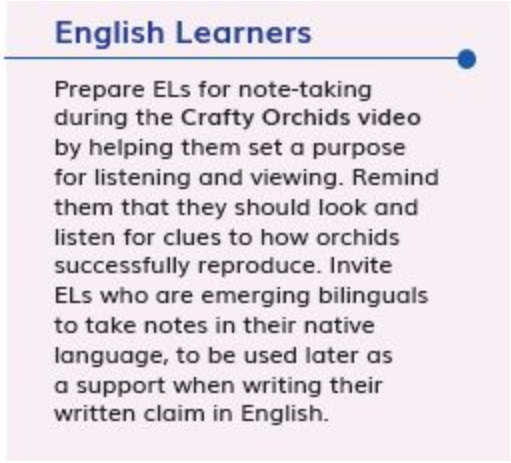
- Discussions following diagnostic pre-assessments (Pre-Explorations) in DQ1L1, DQ2L1, and DQ3L1 support teachers to track students' understanding of the three dimensions that make up the module's Performance Expectations. See for example DQ1L8 Investigate TE p. 68, **DQ2L9 Connect TE p. 167**, DQ3L7 Report TE p. 234.

Misconceptions from the Pre-Exploration

Use the **Reproduction Progress Tracker** to note if students have cleared up the following misconceptions.

Misconception	What to Do
Asexual reproduction is confined to small organisms, which simply split in half.	• *What types of organisms did you learn about today that can undergo asexual reproduction?* • Some were very small organisms that split in half, but others were large organisms that also can lay eggs or have live births.
Only land animals can give birth.	• *Were there any examples of aquatic animals (animals that live in water) that give birth?* • Yes, the hammerhead shark does.

DQ2L9 Connect TE p. 167

• Meta-Think-Aloud language routines support teachers in helping students develop an understanding of how they learn particular concepts or why they approach activities in certain ways. For example, guidance is provided to help the teacher show how a reader might figure out the meaning of the word *gestation* **(DQ1L7 TE p. 59)**.	 This article has many challenging words—students should use context clues to figure out what they mean. The next section, "Reproduction," will likely have relevant information; therefore, you will read this whole section slowly and carefully to look for information. Read aloud the first paragraph before explaining that the information is important, but it doesn't really relate to behaviors that protect the young. One sentence in this paragraph is worth reading closely to practice handling new, unfamiliar words that readers often come across in scientific texts. • *"After fertilization, gestation lasts for about 65–70 days."* Use a Meta-Think-Aloud to show how a reader might figure out the meaning of the word *gestation*. • *How can you use the other words in this sentence to figure out the meaning of gestation?* **DQ1L7 TE p. 59**
SW5. Equitable Learning Opportunities. This module provides strong resources and strategies to ensure that all students have access to the targeted learning goals and experiences.	
Evidence • Frequent support is given at point of use in all lessons on strategies to ensure that all students have access to the targeted learning goals. Numerous scaffolds are provided for Special Needs, English Learner, and Standard English Learner students, for example, in **DQ1L8 TE p. 68**, DQ2L8 TE p. 157, and DQ3L5 TE p. 218.	 **English Learners** Prepare ELs for note-taking during the Crafty Orchids video by helping them set a purpose for listening and viewing. Remind them that they should look and listen for clues to how orchids successfully reproduce. Invite ELs who are emerging bilinguals to take notes in their native language, to be used later as a support when writing their written claim in English. **DQ1L8 TE p. 68**

• The **Biomes Leveled Reader** that complements the module is provided at four levels—Above, On, Below and English Learner—with matching lesson instruction in the TEs/online. • Digital versions of the Twig Book and readers have text to speech functions.	 **Biomes Leveled Reader (Front Cover)**
• Short, high quality films that will engage and support learners with diverse learning needs are frequently provided to spark interest, summarize key concepts, and make the ideas relevant to this age group. For example, **Courtship Rituals: Puffer Fish** (DQ1L3), Whitebark Pine Tree (DQ1L9), **Asexual Reproduction in Animals** (DQ2L9), and Saving Sea Turtles (DQ4L3).	 **Courtship Rituals: Puffer Fish**  **Asexual Reproduction in Animals**

Designed for the NGSS: Foundations Teacher Support Evidence Chart

Teacher materials...	Strong	Adequate	Weak
SP1. Three-dimensional Performances. Provide support with a range of sample student responses and/or rubrics for interpreting evidence of student learning across the three dimensions, specific to the element of each dimension, and related to the phenomenon/problem that provides context for the student performance.	✓		
SP2. Variety of Measure. Provide guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.	✓		
SP3. Student Progress Over Time. Provide guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; prompting students to consider what and how they've learned.	✓		
SP4. Equitable Access. Provide support and strategies for ensuring that assessments are accessible to students from diverse backgrounds and with diverse learning needs.	✓		

Strengths related to these Teacher Supports
SP1. Three-dimensional Performances. The module provides strong support with a range of sample student responses and rubrics for interpreting evidence of student learning across the three dimensions. These are specific to the element of each dimension and related to the Module Phenomenon that provides the context for the student performance.

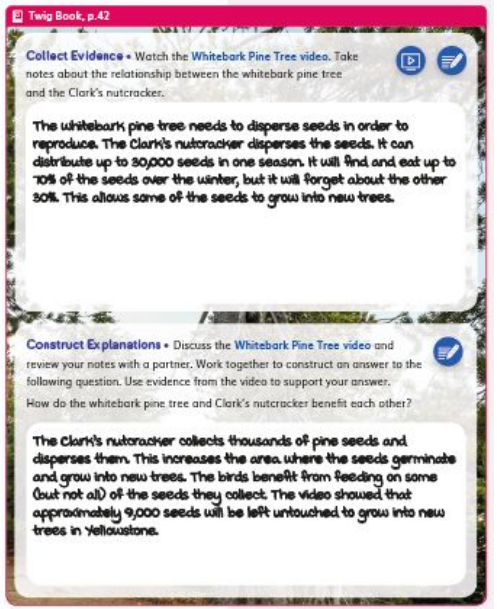
Evidence

- Rubrics are provided for the Performance Tasks and the Benchmark Assessment. The rubrics provide sample answers in the form of "Look Fors" that support teachers to interpret evidence of student attainment of the four different levels—Emerging, Developing, Proficient, and Advanced. The rubrics are specific to certain Performance Expectations with the assessed dimensions highlighted. The assessment tasks are well connected to the problems, phenomena, and dimensions being assessed. For example, in the Benchmark Assessment Survival of the Fittest Flower (TE pp. 236–243), Rubric 1 assesses all three dimensions of PE MS-LS1-4 (SEP-7, LS1.B, CCC-2), Rubric 3 assesses all three dimensions of PE MS-LS1-5 (SEP-6, LS1.B, CCC-2), and Rubrics 2 and 4 between them assess SEP-2, LS3.A, LS3.B, and CCC-2 (all part of PE MS-LS3-2). Rubric 2 details that a student with developing mastery of these dimensions would create a partial model, with some inaccuracies. It says that, for example, the student might accurately use arrows to show where the offspring gets their petal alleles, but misplace the arrows for the root system alleles.

SP2. Variety of Measure.
The module provides strong guidance and scoring tools for using a variety of measures matched to the targeted learning goals to help students monitor their progress toward learning goals and reflect on what they have learned, how they learn it, and how to use metacognition productively.

Evidence

- Teacher support for guidance and scoring tools matched to the learning goals is integrated through the module. In addition to the rubrics mentioned above and answer guides for the module multiple choice assessment, the printed Teacher Edition contains Twig Book reduxes with sample student answers, so at a glance teachers have guidance on what student understanding looks like (for example, **DQ1L9 TE p. 77**, **DQ2L3 TE p. 119**, DQ2L11 TE p. 182, DQ3L1 TE p. 193, DQ4L2 TE p. 265). A digital version of this completed Twig Book is available online.


Twig Book, p.42

Collect Evidence • Watch the Whitebark Pine Tree video. Take notes about the relationship between the whitebark pine tree and the Clark's nutcracker.

The whitebark pine tree needs to disperse seeds in order to reproduce. The Clark's nutcracker disperses the seeds. It can distribute up to 30,000 seeds in one season. It will find and eat up to 70% of the seeds over the winter, but it will forget about the other 30%. This allows some of the seeds to grow into new trees.

Construct Explanations • Discuss the Whitebark Pine Tree video and review your notes with a partner. Work together to construct an answer to the following question. Use evidence from the video to support your answer.

How do the whitebark pine tree and Clark's nutcracker benefit each other?

The Clark's nutcracker collects thousands of pine seeds and disperses them. This increases the area where the seeds germinate and grow into new trees. The birds benefit from feeding on some (but not all) of the seeds they collect. The video showed that approximately 9,000 seeds will be left untouched to grow into new trees in Yellowstone.

DQ1L9 TE p. 77

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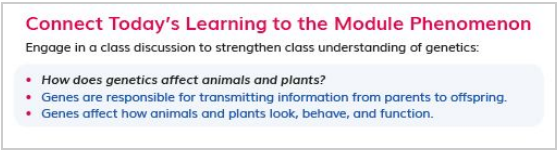
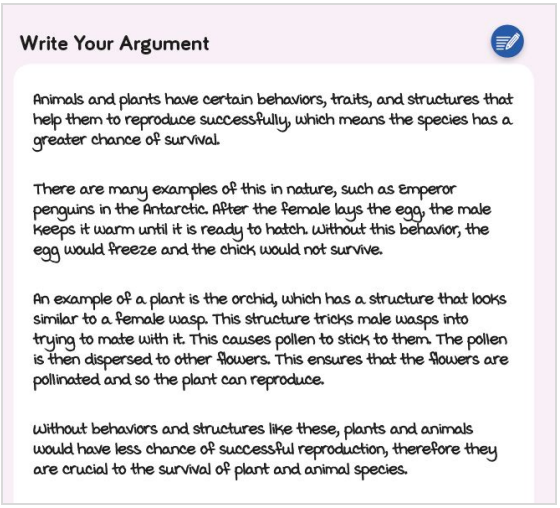
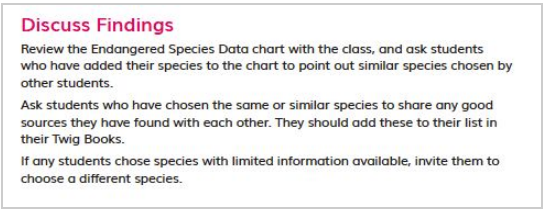
<tr><td></td><td> 

DQ2L3 TE p. 119</td></tr>
<tr><td>● Assessments are multimodal and support a variety of learning styles and abilities. They include:
○ Performance Tasks (constructed response, written and filling in charts DQ1L10 TB pp. 47–48, DQ2L10 TE pp. 78–79, DQ3 L3–5 TE pp. 140–148)</td><td> 

DQ1L10 TB pp. 47–48</td></tr>
<tr><td>○ Discussions (TE DQ1 L1 p. 16, DQ1L6 TE p. 55, DQ1L8 TE p. 69, DQ2L7 TE p. 152)</td><td> 

TE DQ1 L1 p. 16</td></tr>
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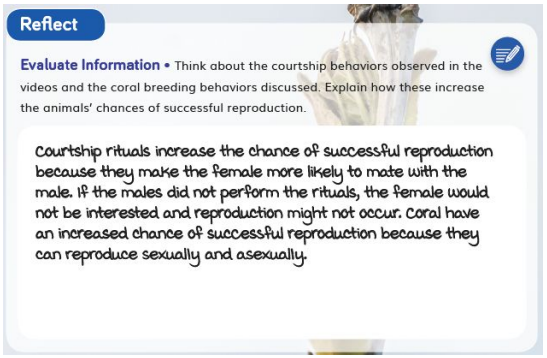
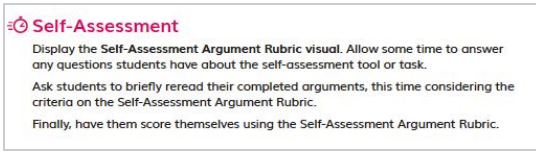
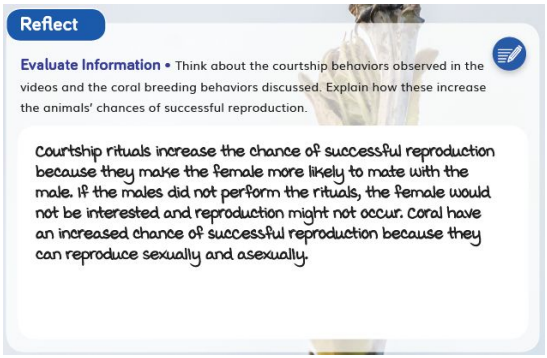
○ Constructed response (written, filling in charts, drawn, and multiple choice **DQ1L3 TB pp. 8–11**, DQ1L6 TB p. 24, DQ2L4 TB pp. 61–62, DQ2L8 TB pp. 72–73, DQ3L1 TB p. 90)	 **DQ1L3 TB pp. 8–11**
○ Self and peer assessment (**DQ1L10 TE p. 86**, DQ4L3 TB p. 143, DQ4L5 TE p. 280)	 **DQ1L10 TE p. 86**
○ **Multiple Choice Assessment (DQ4 digital)**	 **Multiple Choice Assessment (DQ4 digital)**
• Text to speech function is provided for all digital assets. • Class discussions are supported with suggested question scaffolds and sample answers (for example, DQ1L2 TE p. 20, DQ1L8 TE p. 66, **DQ2L2 TE p. 108**, DQ2L4 TE p. 128, DQ4L1 TE p. 255)	**DQ2L2 TE p. 108**

- The Reflect of most lessons integrates assessment opportunities for students to reflect on what they have learned and how they used the three dimensions to grow their understanding of the module phenomena and problems (**DQ1L3 TB p. 11**, DQ1L9 TB p. 44, DQ2L4 TB p. 63, DQ4TB p. 73, DQ3L5 TB p. 114).



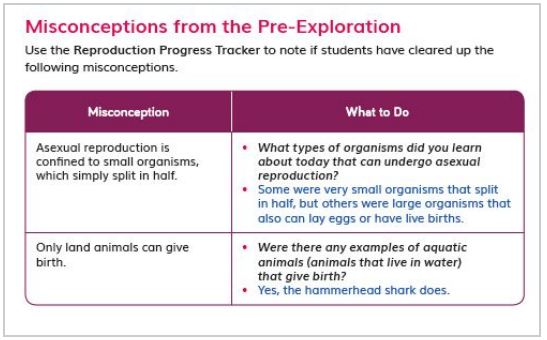
DQ1L3 TB p. 11,

SP3. Student Progress Over Time.
The module provides strong guidance for using formative and summative assessments to monitor student progress over time. Examples include support for: capturing student growth; interpreting results; adjusting instruction and planning for future instruction; providing feedback to students; prompting students to consider what and how they've learned.

Evidence

- Teachers can elect to administer the Pre-Explorations, Benchmark Assessment, and Multiple Choice assessment digitally or in print. As answers are tagged to specific dimensions, if administered digitally, teachers will be able to track student growth in level of attainment of the dimensions over time and tailor instruction accordingly. Teachers can feedback to students digitally. Teachers can opt to add the scores manually for all non-digital assessment tasks.

- The downloadable Progress Trackers support teachers to track students' mastery of their misconceptions assessed in the Pre-Explorations and the results of Formative Assessment of the three dimensions across the DQs. Guidance for teachers on how to adjust instruction for students who need more support to dispel their misconceptions is provided at point of use in the instructions (DQ1L5 TE p. 42, DQ2L3 TE p. 117, **DQ2L9 TE p. 167**, DQ3L7 TE p. 234).



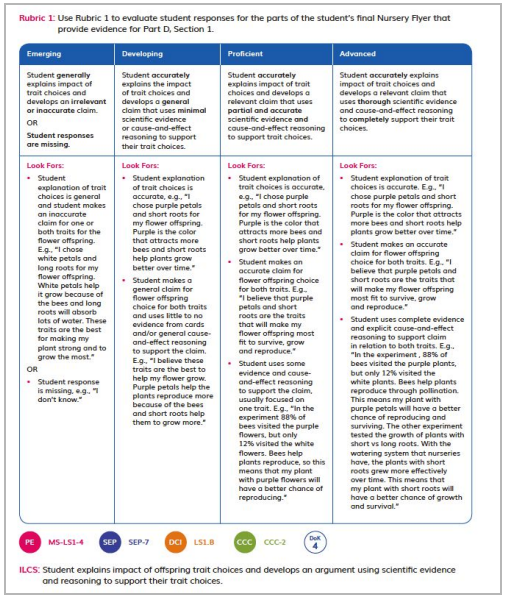
DQ2L9 TE p. 167

SP4. Equitable Access.
The module provides strong support and strategies for ensuring that assessments are accessible to students from diverse backgrounds and with diverse learning needs.

Evidence

- Assessments of the three dimensions are multimodal and include multiple choice, writing, drawing, physical models, and oral presentations, allowing all students to access a range of assessment types to suit their learning style and/or reading level.
- The digital Twig Book and digital assessment items (Benchmark, Multiple Choice, Rubrics) have a text to speech function allowing students of all reading levels to access the assessments.

- The rubrics for the Performance Tasks (**DQ1L10 TE pp. 80–86**, DQ2L10 TE pp. 170–175, DQ4L3–5 TE pp. 266–280) and Benchmark Assessment (DQ3 TE pp. 236–243 and online) have four levels—Emerging, Developing, Proficient, and Advanced—allowing all students to demonstrate their current level of attainment.



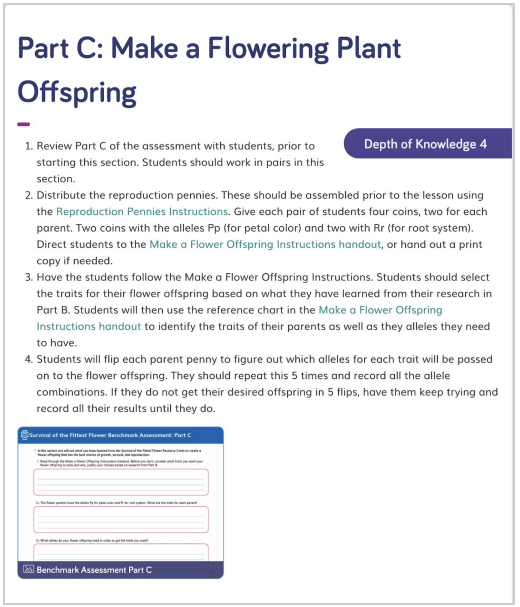
Rubric 1: Use Rubric 1 to evaluate student responses for the parts of the student's final Nursery Flyer that provide evidence for Part D, Section 1.

Emerging	Developing	Proficient	Advanced
Student **generally** explains impact of trait choices and develops an **irrelevant** or **inaccurate** claim. OR **Student responses are missing.**	Student **accurately** explains the impact of trait choices and develops a **general** claim that uses **minimal** scientific evidence or cause-and-effect reasoning to support their trait choices.	Student **accurately** explains impact of trait choices and develops a relevant claim that uses **partial and accurate** scientific evidence **and** cause-and-effect reasoning to support trait choices.	Student **accurately** explains impact of trait choices and develops a relevant claim that uses **thorough** scientific evidence and cause-and-effect reasoning to **completely** support their trait choices.
Look Fors: • Student explanation of trait choices is general and student makes an inaccurate claim for one or both traits for the flower offspring. E.g., "I chose white petals and long roots for my flower offspring. White petals help it grow because of the bees and long roots will absorb lots of water. These traits are the best for making my plant strong and to grow the most." OR • Student response is missing, e.g., "I don't know."	**Look Fors:** • Student explanation of trait choices is accurate, e.g., "I chose purple petals and short roots for my flower offspring. Purple is the color that attracts more bees and short roots help plants grow better over time." • Student makes a general claim for flower offspring choice for both traits and uses little to no evidence from cards and/or general cause-and-effect reasoning to support the claim. E.g., "I believe these traits are the best to help my flower grow. Purple petals help the plants reproduce more because of the bees and short roots help them to grow more."	**Look Fors:** • Student explanation of trait choices is accurate, e.g., "I chose purple petals and short roots for my flower offspring. Purple is the color that attracts more bees and short roots help plants grow better over time." • Student makes an accurate claim for flower offspring choice for both traits. E.g., "I believe that purple petals and short roots are the traits that will make my flower offspring most fit to survive, grow and reproduce." • Student uses some evidence and cause-and-effect reasoning to support the claim, usually focused on one trait. E.g., "In the experiment 88% of bees visited the purple flowers, but only 12% visited the white flowers. Bees help plants reproduce, so this means that my plant with purple flowers will have a better chance of reproducing."	**Look Fors:** • Student explanation of trait choices is accurate. E.g., "I chose purple petals and short roots for my flower offspring. Purple is the color that attracts more bees and short roots help plants grow better over time." • Student makes an accurate claim for flower offspring choice for both traits. E.g., "I believe that purple petals and short roots are the traits that will make my flower offspring most fit to survive, grow and reproduce." • Student uses complete evidence and explicit cause-and-effect reasoning to support claim in relation to both traits. E.g., "In the experiment , 88% of bees visited the purple plants, but only 12% visited the white plants. Bees help plants reproduce through pollination. This means my plant with purple petals will have a better chance of reproducing and surviving. The other experiment tested the growth of plants with short vs long roots. With the watering system that nurseries have, the plants with short roots grew more effectively over time. This means that my plant with short roots will have a better chance of growth and survival."

PE MS-LS1-4 SEP SEP-7 DCI LS1.B CCC CCC-2 Dok 4

ILCS: Student explains impact of offspring trait choices and develops an argument using scientific evidence and reasoning to support their trait choices.

- The **Multiple Choice Assessment Part C (DQ4 digital)** (DQ4) contains questions targeting different DOK levels, with an extended section available to further challenge GATE students.



Part C: Make a Flowering Plant Offspring

Depth of Knowledge 4

1. Review Part C of the assessment with students, prior to starting this section. Students should work in pairs in this section.
2. Distribute the reproduction pennies. These should be assembled prior to the lesson using the Reproduction Pennies Instructions. Give each pair of students four coins, two for each parent. Two coins with the alleles Pp (for petal color) and two with Rr (for root system). Direct students to the Make a Flower Offspring Instructions handout, or hand out a print copy if needed.
3. Have the students follow the Make a Flower Offspring Instructions. Students should select the traits for their flower offspring based on what they have learned from their research in Part B. Students will then use the reference chart in the Make a Flower Offspring Instructions handout to identify the traits of their parents as well as they alleles they need to have.
4. Students will flip each parent penny to figure out which alleles for each trait will be passed on to the flower offspring. They should repeat this 5 times and record all the allele combinations. If they do not get their desired offspring in 5 flips, have them keep trying and record all their results until they do.

Benchmark Assessment Part C

Multiple Choice Assessment Part C (DQ4 digital)

- Writing, Reading, Listening, and Speaking domain tasks dedicated to assessing science-relevant English language development are integrated into the core instructional resources (**DQ1L7 TE p. 63,** DQ3L3 TE p. 209) and the On-Level reader lessons **(Chapter 3 Second Read TE p. 299)**.

Formative Assessment

Have students reflect on their learning by responding to the prompt on page 33 in their Twig Books. Invite some students to share their thoughts with the class.

Reflect

Construct Explanations • Explain how the otters' behavior improves the chances of their young surviving.

Otters live in family groups of 5–8, and build dens to keep cubs safe when they are young. By working as a group, they can scare off other animals, like jaguars, that might attack their cubs. If they need to move to a different location, the adults will carry the cubs in their mouths. These behaviors all increase the cubs' chances of survival.

Extention

Vocabulary Strategy and Focus on Text Features—Glossary

Revisit the "Giant Otter" article on page 28 in the Twig Book. Explain that when reading scientific articles, students will often encounter new and unfamiliar terms. There are many strategies readers can use to address unknown terms, but this particular article has an attached resource that is very helpful—a glossary.

Glossary

- Generally includes the page numbers where terms occur in longer texts
- Gives the content-specific definition of the term. This means that there may be more than one definition; the one given is the one that is appropriate for its use in the text.

Model how to read and connect the term *neotropical*. Locate the term in the third paragraph under "Other Comments" at the end of the article. First, read the term in context, thinking aloud the strategies you might use to determine its meaning:

- ***The word parts are neo (new) and tropical (tropical). You've probably heard the word tropical before, so this will help you figure out that the term has something to do with a tropical location.***

Read the glossary definition of the term, which explains that it describes organisms that live in southern parts of the New World (Central and South America). Note how the glossary describes exactly what the term means in the context of the article.

In future writing tasks, encourage students to include a glossary or list of key terms for their readers. Going through the process of creating a list of potentially confusing words and defining them will help students better understand how to use the text feature when they encounter it in future texts.

English Learners

Give ELs a chance to review the **Giant Otter video** before responding to the prompt.

Monitoring English Language Proficiency

Engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

- **WRITING DOMAIN:** Have students look at the photos on pages 27–31 and write a sentence describing what is happening in each one.
- **READING DOMAIN:** Have students read aloud the headings in the article. Then have them state 1–3 sentences to summarize what that section of text is about.
- **SPEAKING DOMAIN:** As students share their answers to the Listening Domain questions, record their use of academic vocabulary and connecting words.
- **LISTENING DOMAIN:** Read aloud the "Food Habits" section of the text on pages 30–31. ***Why does the author say the giant otter is a "piscivore"? What is the difference between a solitary and a social hunt? What are the benefits of each one? Why might the otters have to eat snakes and crustaceans?***

DQ1L7 TE p. 63

Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the photos on pages 22–23 and write a brief description of what is happening and why.

Reading Domain

Use the photos and illustrations in Chapter 1. Write:

- The Earth has many different biomes.
- Plants growing in the desert have to adapt because they get very little water.
- Trees don't grow in the permafrost of the Arctic tundra.
- The soil is very poor in rain forests, even though they get a lot of rain.

Have students read each sentence, then match it to the correct photo or part of photo.

Listening Domain

Describe the illustrations at the bottom of page 21. Add key details included in the illustrations, but not in the text (e.g., how the steps of the water cycle are connected).

- ***What is happening in the first picture? Why?***
- ***What is happening in the second picture?***
- ***In the third picture?***
- ***Why don't you need to water this plant?***

Speaking Domain

As students answer the four questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

Chapter 3 Second Read TE p. 299

Designed for the NGSS: Teacher Support	High Quality 5	Medium Quality 3	Low Quality 1
TS1. Phenomenon/Problem Driven Three-Dimensional Learning. Teacher materials provide: ● background information about the phenomena or problems included in the learning sequence and across sequences. ● an explanation of the role of phenomena or problems in driving student learning. ● rationale for why the unit phenomena or problems were selected for the targeted DCIs, SEPs, and CCCs. ● Refer to F1, F2, SW1, SW2, SP1	Materials provide clear guidance to teachers on how students develop, use, and integrate the three dimensions to make sense of phenomena or design solutions to problems.	Materials provide some guidance to teachers about how students develop, use, and integrate the three dimensions.	Materials provide little guidance on developing, using, or integrating them to make sense of phenomena or design solutions to problems.
TS2. Coherence. Teacher materials describe and provide a rationale for: ● the conceptual framework and sequence of ideas, practices, and learning experiences in the learning sequences and across sequences. ● strategies for linking student experiences across lessons to ensure student sense- making and/or problem-solving focused on phenomena or problems is linked to learning across all three dimensions. ● Connections to other science domains, nature of science, engineering, technology, and applications of science, math, and ELA. Refer to F2, F3, SW2, SP2	Materials provide strong support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide some support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.	Materials provide little support for understanding unit coherence and helping students link experiences to learning across all three dimensions and to phenomena or problems.
TS3. Effective Teaching. Teacher materials support the use of and provide a rationale and evidence of effectiveness for strategies that: ● support students in learning through authentic and meaningful phenomena or design problems. ● support student learning across the three dimensions. ● make student thinking visible; promote reasoning, sense-making, and problem-solving; challenge student thinking; and develop metacognitive abilities. Refer to SW1, SW2, SW3, SW4, SP3	Materials provide rationale and robust support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide some rationale and support for implementing strategies that enhance student performances, thinking, and metacognition.	Materials provide little rationale and support for teachers to implement strategies that enhance student performances, thinking, and metacognition.

TS4. Support for Students with Diverse Learning Needs. Teacher materials provide an array of strategies: ● to support student access to the targeted learning goals, experiences, and performances. ● that help teachers differentiate instruction. Refer to SW5, SP4	Materials include robust and comprehensive strategies for supporting learners with diverse needs.	Materials include some robust strategies for supporting learners with diverse needs.	Materials include few robust strategies for supporting learners with diverse needs.
TS5. Support to Monitor Student Progress. Materials provide support for teachers to: ● monitor student learning and progress over time. ● make decisions about instruction and provide feedback to students. Refer to SW3, SW4, SP1, SP2, SP3	Materials provide robust support for interpreting and using data generated from assessments.	Materials provide some support for interpreting and using data generated from assessments.	Materials provide little support for interpreting and using data generated from assessments.

Designed for NGSS: Teacher Support Rubric

Analyze Evidence

Directions:

1. Review the Designed for NGSS: Foundations Rubric.
2. Reflect on the evidence (or lack of evidence) that you and your team gathered and represented.
3. Record strengths and limitations for each criterion based on your evidence. Cite specific examples.

Strengths

TS1. Phenomenon/Problem Driven Three-Dimensional Learning.

The Module materials are High Quality 5 in regards to TS1.

They provide clear guidance to teachers on how students develop, use, and integrate the three dimensions to make sense of phenomena or design solutions to problems.

Evidence

- The flow of DCIs, SEPs, and CCCs follow a logical sequence supporting students to gain expertise of the practices and concepts they need to address the Module Phenomenon.
- **DQ1: How do animal behaviors and plant structures affect their survival and reproduction?** Students obtain information from texts and videos about animal courtship rituals (SEP-8, LS1.B, CCC-1, CCC-2). They consider the question "How do animals help their offspring survive?" (LS1.B, CCC-2) and develop an answer through video observations, analysis of scientific data, and discussions (SEP-4, SEP-7, SEP-8).
- **DQ2: How do species reproduce?** Students develop genetic models to demonstrate how traits are passed from both plant and animal parents to offspring (LS3.A, SEP-2, CCC-2), compare asexual and sexual reproduction (LS1.B, LS3.A, LS3.B, SEP-7, CCC-2), and research the reproductive strategies of their chosen endangered species (SEP-8, CCC-6).
- **DQ3: How do environmental and genetic factors influence the growth of an organism?** Students consider patterns (CCC-1), cause and effect (CCC-2), and scale, proportion, and quantity (CCC-3) as they analyze several scientific studies (SEP-4, SEP-5) to determine how environmental and genetic factors influence the growth of an organism (LS1.B).
- **DQ4: How do we protect endangered species?** Students research their chosen endangered species and devise conservation plans to improve the growth and reproduction of members in the species, considering how genetics might be affected (SEP-1, SEP-6, SEP-7, SEP-8, CCC-2, LS1.B, ETS1.A). Students close the module with a 'World Conservation Symposium,' working with teammates to evaluate their individual plans and create a collaborative conservation plan (ETS1.B, SEP-6, SEP-8).

TS2. Coherence.

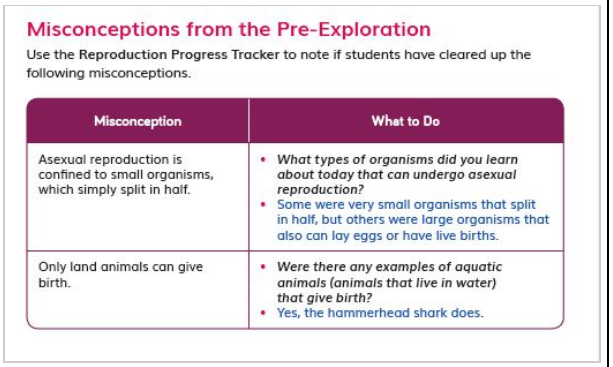
The Module materials are High Quality 5 in regards to TS2.

They provide teachers with a clear conceptual framework in a logical sequence, strategies for linking student experiences across lessons, and connections to other science domains, CNS (NoS), CETAS (ETS), math, and ELA.

Evidence

- The Module Phenomenon challenges students to be creative problem solvers, immersing them in engaging challenges that require mastery of the three dimensions of NGSS to solve. The instructional materials have been designed to support the teacher to guide students on a scaffolded learning journey to solve the Module Phenomenon: How do the environment and genetics affect animals and plants? They tackle the problem one Driving Question at a time, applying the three dimensions with increasing sophistication, building the skills and knowledge they need through a series of investigations.
- The Module Phenomenon targets the DCIs, SEPs, and CCCs explicitly stated in MS-LS1-4, MS-LS1-5, MS-LS3-2, MS-ETS1-1, and MS-EST1-2.
- Links are made to previous grades, such as Grade 5 Module 2 where students also explored the relationships between living things and the environment.
- A digital guide to SEPs and CCCs provides a clear explanation for each practice and concept with guidance on what these skills should look like in a third grade classroom, with specific reference for how students ask questions and develop investigations in Grade 6 Module 3.

- Additional module-specific support is frequently given at point of use in the instructional materials for all dimensions, often in the Connect. For example, the teacher is guided to connect to LS1.B (Growth and Development of Organisms) in **DQ2L9 TE p. 167**, and SEP-6 (Constructing Explanations and Designing Solutions) in **DQ3L5 TE p. 221**. The teacher is also guided to connect to the Nature of Science (Science Is Based on Empirical Evidence) in **DQ2L2 TE p. 110**.

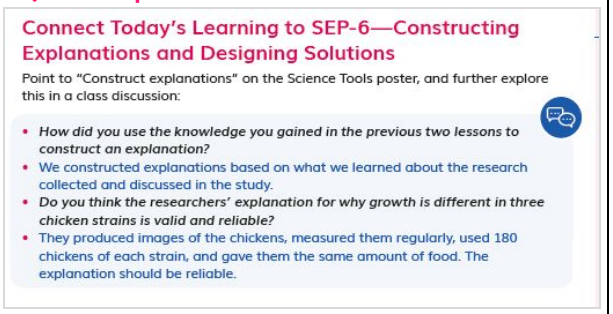


Misconceptions from the Pre-Exploration

Use the **Reproduction Progress Tracker** to note if students have cleared up the following misconceptions.

Misconception	What to Do
Asexual reproduction is confined to small organisms, which simply split in half.	• *What types of organisms did you learn about today that can undergo asexual reproduction?* • Some were very small organisms that split in half, but others were large organisms that also can lay eggs or have live births.
Only land animals can give birth.	• *Were there any examples of aquatic animals (animals that live in water) that give birth?* • Yes, the hammerhead shark does.

DQ2L9 TE p. 167

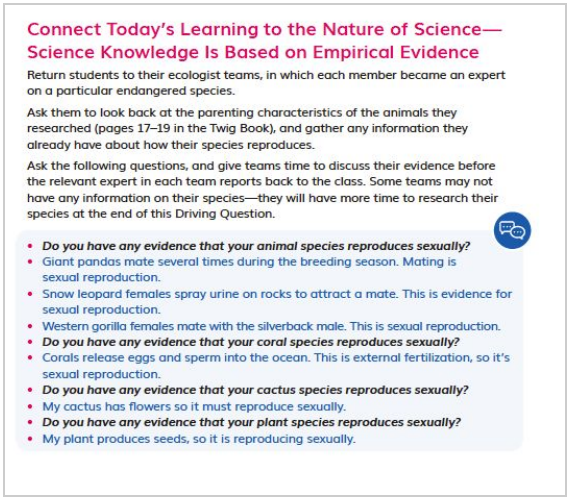


Connect Today's Learning to SEP-6—Constructing Explanations and Designing Solutions

Point to "Construct explanations" on the Science Tools poster, and further explore this in a class discussion:

- *How did you use the knowledge you gained in the previous two lessons to construct an explanation?*
- We constructed explanations based on what we learned about the research collected and discussed in the study.
- *Do you think the researchers' explanation for why growth is different in three chicken strains is valid and reliable?*
- They produced images of the chickens, measured them regularly, used 180 chickens of each strain, and gave them the same amount of food. The explanation should be reliable.

DQ3L5 TE p. 221



Connect Today's Learning to the Nature of Science—Science Knowledge Is Based on Empirical Evidence

Return students to their ecologist teams, in which each member became an expert on a particular endangered species.

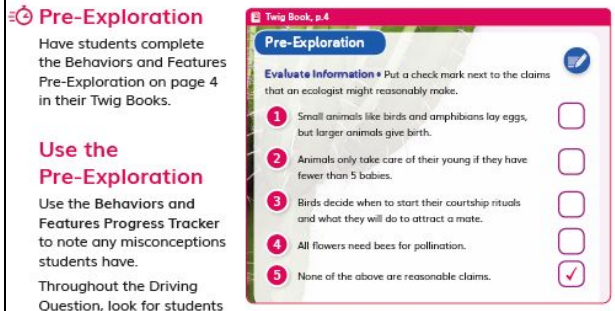
Ask them to look back at the parenting characteristics of the animals they researched (pages 17–19 in the Twig Book), and gather any information they already have about how their species reproduces.

Ask the following questions, and give teams time to discuss their evidence before the relevant expert in each team reports back to the class. Some teams may not have any information on their species—they will have more time to research their species at the end of this Driving Question.

- *Do you have any evidence that your animal species reproduces sexually?*
- Giant pandas mate several times during the breeding season. Mating is sexual reproduction.
- Snow leopard females spray urine on rocks to attract a mate. This is evidence for sexual reproduction.
- Western gorilla females mate with the silverback male. This is sexual reproduction.
- *Do you have any evidence that your coral species reproduces sexually?*
- Corals release eggs and sperm into the ocean. This is external fertilization, so it's sexual reproduction.
- *Do you have any evidence that your cactus species reproduces sexually?*
- My cactus has flowers so it must reproduce sexually.
- *Do you have any evidence that your plant species reproduces sexually?*
- My plant produces seeds, so it is reproducing sexually.

DQ2L2 TE p. 110

- Opportunities for students to articulate, question, and revise their conceptual framework are woven into the instructional resources supporting teachers to assess the progression of their scientifically accurate understandings. Strategies on how to tailor instruction for students requiring more support is provided for teachers. **(DQ1L1 TE p. 17)**



Pre-Exploration

Have students complete the Behaviors and Features Pre-Exploration on page 4 in their Twig Books.

Twig Book, p.4

Pre-Exploration

Evaluate Information • Put a check mark next to the claims that an ecologist might reasonably make.

1. Small animals like birds and amphibians lay eggs, but larger animals give birth. ☐
2. Animals only take care of their young if they have fewer than 5 babies. ☐
3. Birds decide when to start their courtship rituals and what they will do to attract a mate. ☐
4. All flowers need bees for pollination. ☐
5. None of the above are reasonable claims. ☑

Use the Pre-Exploration

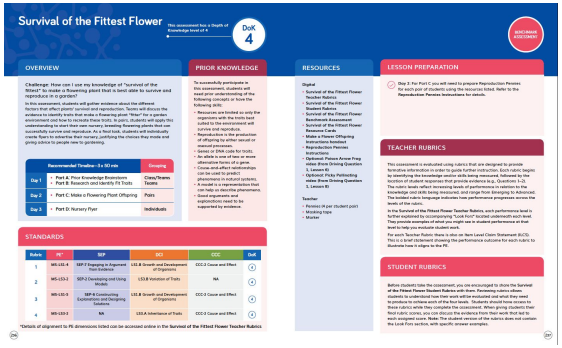
Use the Behaviors and Features Progress Tracker to note any misconceptions students have.

Throughout the Driving Question, look for students who clear up their misconceptions and note this on the tracker. The goal is for students to clear up all their misconceptions by the end of the Driving Question.

Misconception	What to Look For	Where Addressed
Small animals lay eggs, but large animals give birth.	Students who check Statement 1.	Lesson 5.
Animals only take care of their young if they have fewer than 5 babies.	Students who check Statement 2.	Lesson 5.
Animals plan their reproductive strategies.	Students who check Statement 3.	Lessons 3 and 4.
All flowers are pollinated by bees.	Students who check Statement 4.	Lesson 8.

DQ1L1 TE p. 17

- The assessment tasks are well connected to the phenomena and dimensions being assessed. For example, in the DQ3 **Benchmark Assessment Survival of the Fittest Flower**, students gather evidence about factors that affect plant survival, and identify advantageous traits and how to recreate them.



Survival of the Fittest Flower

DoK 4

OVERVIEW

PRIOR KNOWLEDGE

RESOURCES

LESSON PREPARATION

TEACHER RUBRICS

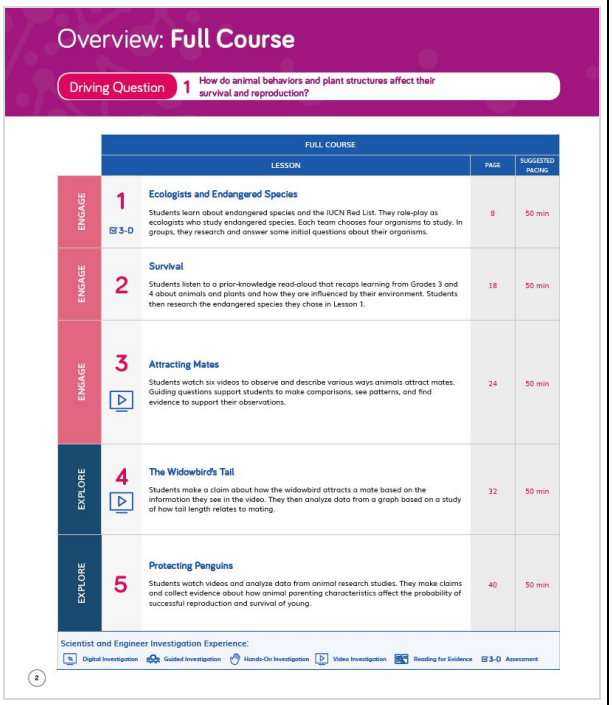
STUDENT RUBRICS

STANDARDS

Benchmark Assessment TE pp. 236–243

- **Driving Question Dividers** and **Driving Question Overviews** show the sequence of learning, the rationale behind it, and the three-dimensional aspect of the activities.

Driving Question Divider TE p. 245



Overview: **Full Course**

Driving Question 1 How do animal behaviors and plant structures affect their survival and reproduction?

		FULL COURSE LESSON	PAGE	SUGGESTED PACING
ENGAGE	1 3-D	**Ecologists and Endangered Species** Students learn about endangered species and the IUCN Red List. They role-play as ecologists who study endangered species. Each team chooses four organisms to study. In groups, they research and answer some initial questions about their organisms.	8	50 min
ENGAGE	2	**Survival** Students listen to a prior-knowledge read-aloud that recaps learning from Grades 3 and 4 about animals and plants and how they are influenced by their environment. Students then research the endangered species they chose in Lesson 1.	18	50 min
ENGAGE	3	**Attracting Mates** Students watch six videos to observe and describe various ways animals attract mates. Guiding questions support students to make comparisons, see patterns, and find evidence to support their observations.	24	50 min
EXPLORE	4	**The Widowbird's Tail** Students make a claim about how the widowbird attracts a mate based on the information they see in the video. They then analyze data from a graph based on a study of how tail length relates to mating.	32	50 min
EXPLORE	5	**Protecting Penguins** Students watch videos and analyze data from animal research studies. They make claims and collect evidence about how animal parenting characteristics affect the probability of successful reproduction and survival of young.	40	50 min

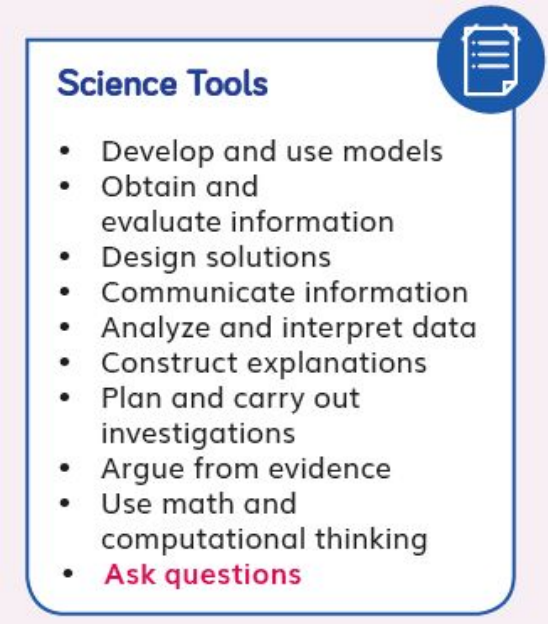
Scientist and Engineer Investigation Experience:

Digital Investigation · Guided Investigation · Hands-On Investigation · Video Investigation · Reading for Evidence · 3-D Assessment

2

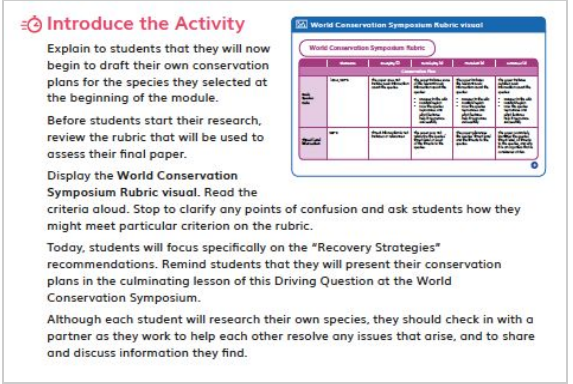
Driving Question Overview

- Throughout the module, students use their class **Science Tools poster** to track their growing use of the SEPs. The poster is blank at the start of the year, and the eight SEPs are added when each one is used for the first time. In this module, students add “Use math and computational thinking” (SEP-5) and “Ask questions” (SEP-1) to their poster, and revisit:
    - Obtain and evaluate information (SEP-8)
    - Analyze and interpret data (SEP-4)
    - Communicate information (SEP-8)
    - Develop and use models (SEP-2)
    - Construct explanations (SEP-6)
    - Design solutions (SEP-6).
- This metacognitive activity grows students' awareness of which skills they are using.



Science Tools poster

- Engineering practices are fully embedded in this module. Students engage with science and engineering practices at the very start of the module, defining and delimiting their problem by choosing an endangered species to focus on during the module. By DQ4, they have enough knowledge of key concepts to further define their problem and develop possible solutions. **(DQ4L3 Performance Task TE pp.266-280)**



Introduce the Activity

Explain to students that they will now begin to draft their own conservation plans for the species they selected at the beginning of the module.

Before students start their research, review the rubric that will be used to assess their final paper.

Display the **World Conservation Symposium Rubric visual**. Read the criteria aloud. Stop to clarify any points of confusion and ask students how they might meet particular criterion on the rubric.

Today, students will focus specifically on the "Recovery Strategies" recommendations. Remind students that they will present their conservation plans in the culminating lesson of this Driving Question at the World Conservation Symposium.

Although each student will research their own species, they should check in with a partner as they work to help each other resolve any issues that arise, and to share and discuss information they find.

DQ4L3 Performance Task TE pp.266-280

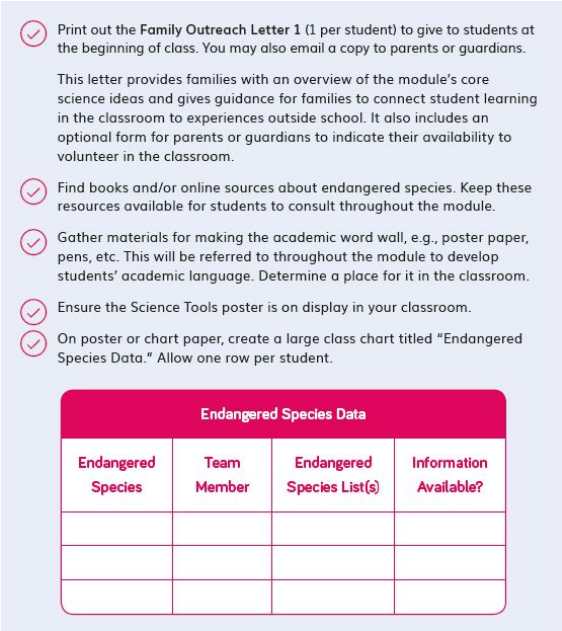
TS3. Effective Teaching.

The Module materials are High Quality 5 in regards to TS3.

They provide strong guidance to support students in learning through authentic and meaningful phenomena/problems, support student learning across the three dimensions, and develop students' metacognitive abilities.

Evidence

- Instructional materials support authentic and meaningful learning experiences. Teacher support includes scaffolded discussion questions in the Teacher Edition (with sample answers), notes, background, Professional Learning videos, and Progress Trackers.
- 3-D Learning Objectives in each lesson provide teachers with information of how students will learn across the three dimensions, while lesson preparation provides further information on how to support students' learning. **DQ1L1 TE p. 9, DQ2L5 3-D Learning Objectives TE p. 130**

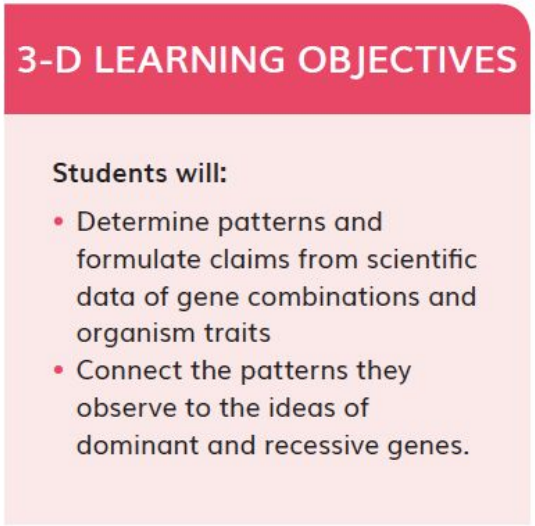


- Print out the **Family Outreach Letter 1** (1 per student) to give to students at the beginning of class. You may also email a copy to parents or guardians.

  This letter provides families with an overview of the module's core science ideas and gives guidance for families to connect student learning in the classroom to experiences outside school. It also includes an optional form for parents or guardians to indicate their availability to volunteer in the classroom.
- Find books and/or online sources about endangered species. Keep these resources available for students to consult throughout the module.
- Gather materials for making the academic word wall, e.g., poster paper, pens, etc. This will be referred to throughout the module to develop students' academic language. Determine a place for it in the classroom.
- Ensure the Science Tools poster is on display in your classroom.
- On poster or chart paper, create a large class chart titled "Endangered Species Data." Allow one row per student.

Endangered Species Data			
Endangered Species	Team Member	Endangered Species List(s)	Information Available?

DQ1L1 TE p. 9



3-D LEARNING OBJECTIVES

Students will:

- Determine patterns and formulate claims from scientific data of gene combinations and organism traits
- Connect the patterns they observe to the ideas of dominant and recessive genes.

DQ2L5 3-D Learning Objectives TE p. 130

• The teacher is supported in the instructional material to connect their learning experiences back to the Module Phenomenon at strategic points with discussions where students share their ideas and evidence for how to approach this problem. For example, DQ2L3 TE p. 119, DQ2L4 TE p. 128.	**Connect Today's Learning to the Module Phenomenon** Engage in a class discussion to strengthen class understanding of genetics: • *How does genetics affect animals and plants?* • Genes are responsible for transmitting information from parents to offspring. • Genes affect how animals and plants look, behave, and function. **DQ2L3 TE p. 119** **Connect Today's Learning to the Module Phenomenon** Genetics is the study of genes; today the class made a model of how genes are structured on chromosomes. • *How do genetics affect animals and plants?* • Genes determine what animals and plants will look like. • They affect the behaviors of animals. • Genes pass traits from parents to their offspring. • *What body shape do you think Teams 1 and 5's butterfly will have?* • It has two opaque yellow beads, which represent two thin body alleles, so it will have a thin body. • *Teams 2 and 3's chromosome pair has one thin allele and one thick allele (one opaque yellow and one translucent yellow bead). What body shape do you think this butterfly will have?* • Thick • Thin • Somewhere between thick and thin • A random body size **DQ2L4 TE p. 128**
• Teachers use a number of Language Routines, discussions, and metacognitive strategies to ensure that students are reflecting on what they are learning and how they are learning it. For example, the teacher uses a Meta-Think-Aloud to show how a reader might figure out the meaning of the word *gestation* (DQ1L7 TE p. 59).	This article has many challenging words—students should use context clues to figure out what they mean. The next section, "Reproduction," will likely have relevant information; therefore, you will read this whole section slowly and carefully to look for information. Read aloud the first paragraph before explaining that the information is important, but it doesn't really relate to behaviors that protect the young. One sentence in this paragraph is worth reading closely to practice handling new, unfamiliar words that readers often come across in scientific texts. • *"After fertilization, gestation lasts for about 65–70 days."* Use a Meta-Think-Aloud to show how a reader might figure out the meaning of the word *gestation*. • *How can you use the other words in this sentence to figure out the meaning of gestation?* **DQ1L7 TE p. 59**

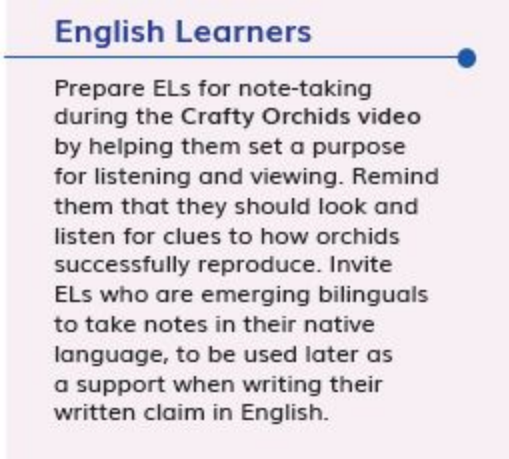
TS4. Support for Students with Diverse Learning Needs.

The Module materials are High Quality 5 in regards to TS4.

They provide a strong array of strategies to support student access to the targeted learning goals and help teachers differentiate instruction.

Evidence

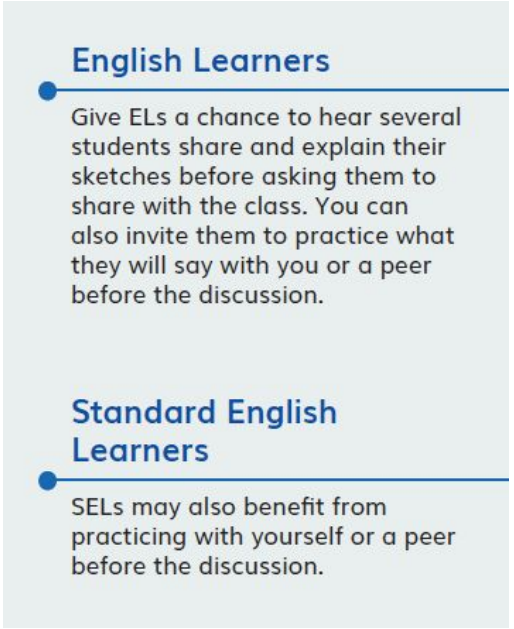
- Integrated English Learner sidebars offer teachers guidance to support students' engagement with the material (**DQ1L8 TE p. 67**, **DQ2L3 p. 118,** DQ2L11 TE p. 179, DQ3L5 TE p. 218, DQ4L2 TE p. 261).



English Learners

Prepare ELs for note-taking during the Crafty Orchids video by helping them set a purpose for listening and viewing. Remind them that they should look and listen for clues to how orchids successfully reproduce. Invite ELs who are emerging bilinguals to take notes in their native language, to be used later as a support when writing their written claim in English.

DQ1L8 TE p. 67



English Learners

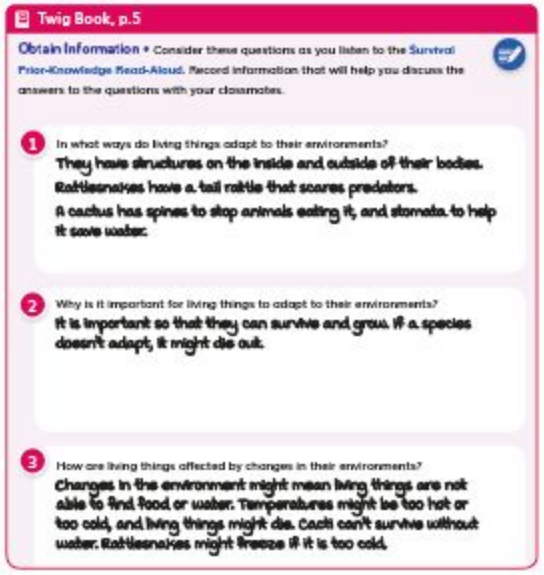
Give ELs a chance to hear several students share and explain their sketches before asking them to share with the class. You can also invite them to practice what they will say with you or a peer before the discussion.

Standard English Learners

SELs may also benefit from practicing with yourself or a peer before the discussion.

DQ2L3 p. 118

- Integrated Cultural Connection sidebars offer teachers guidance to engage students of all backgrounds and abilities (**DQ1L2 TE p. 20**, **DQ1L6 TE p. 50**, DQ1L9 TE p. 76, DQ2L7 TE p. 149, DQ4L1 TE p. 252).

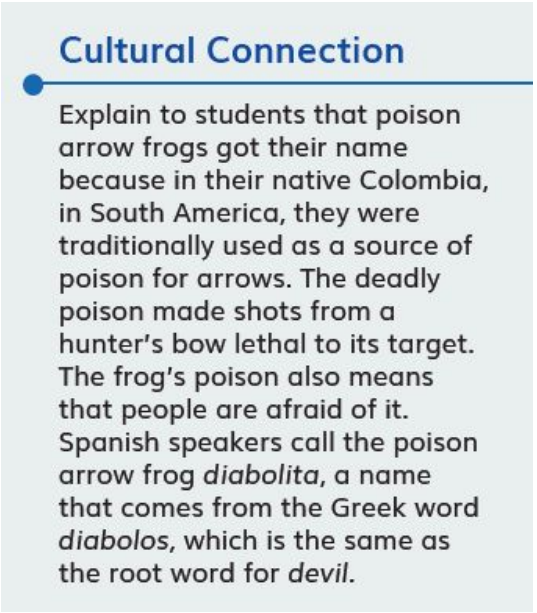


Twig Book, p.5

Obtain Information • Consider these questions as you listen to the Survival Prior-Knowledge Read-Aloud. Record information that will help you discuss the answers to the questions with your classmates.

1. In what ways do living things adapt to their environments?
   They have structures on the inside and outside of their bodies. Rattlesnakes have a tail rattle that scares predators. A cactus has spines to stop animals eating it, and stomata to help it save water.
2. Why is it important for living things to adapt to their environments?
   It is important so that they can survive and grow. If a species doesn't adapt, it might die out.
3. How are living things affected by changes in their environments?
   Changes in the environment might mean living things are not able to find food or water. Temperatures might be too hot or too cold, and living things might die. Cacti can't survive without water. Rattlesnakes might freeze if it is too cold.

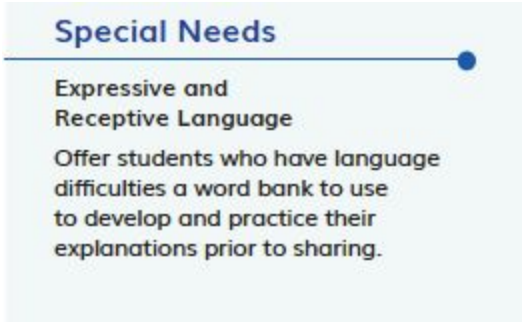
DQ1L2 TE p. 20



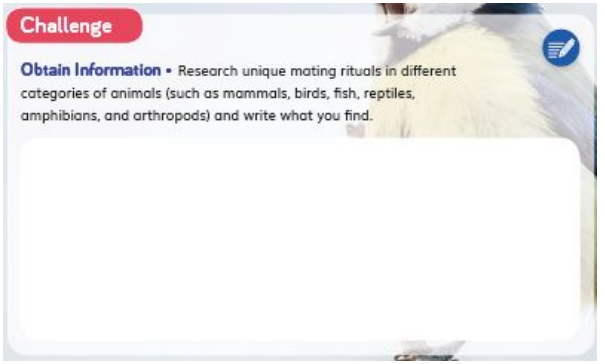
Cultural Connection

Explain to students that poison arrow frogs got their name because in their native Colombia, in South America, they were traditionally used as a source of poison for arrows. The deadly poison made shots from a hunter's bow lethal to its target. The frog's poison also means that people are afraid of it. Spanish speakers call the poison arrow frog *diabolita*, a name that comes from the Greek word *diabolos*, which is the same as the root word for *devil*.

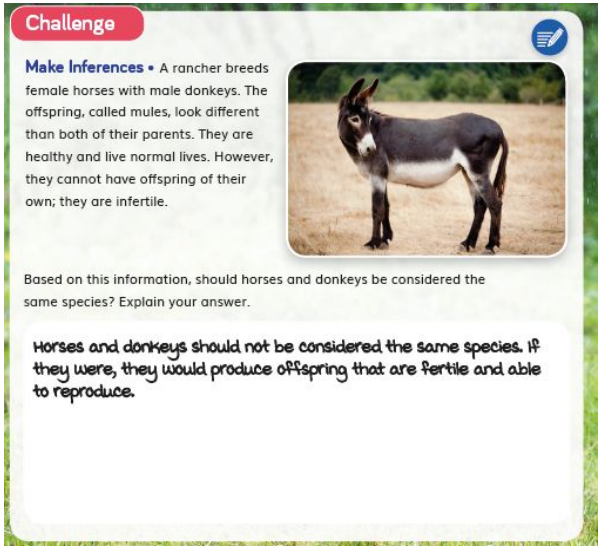
DQ1L6 TE p. 50

• Integrated Special Needs sidebars offer teachers guidance to support students of all abilities as they participation in class activities and grasp key concepts (DQ2L7 TE p. 151, DQ2L8 TE p. 157, DQ3L1 TE p. 193, DQ3L3 TE p. 207, DQ4L4 TE p. 275).	 DQ2L7 TE p. 151

- Integrated Challenges interspersed throughout the TB support GATE students who have met the learning goals (**DQ1L3 TB p. 11**, **DQ2L3 TB p. 59**, DQ2L5 TB p. 65, DQ2L7 TB p. 71, DQ3L3 TB p. 100).



DQ1L3 TB p. 11

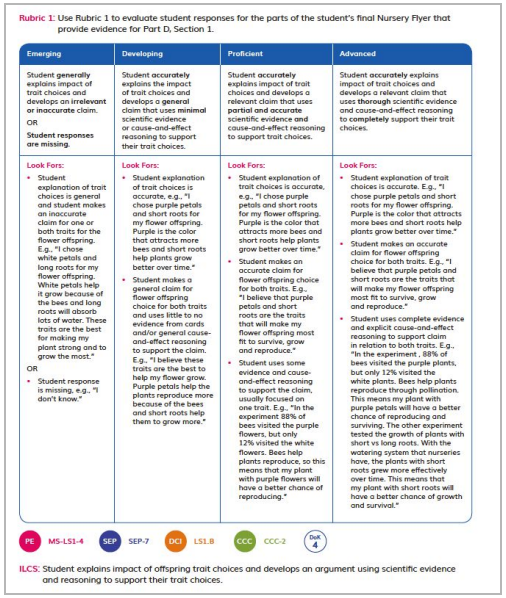


DQ2L3 TB p. 59

- Videos like **Courtship Rituals: Puffer Fish (DQ1L3)**, Whitebark Pine Tree (DQ1L9), Asexual Reproduction in Animals (DQ2L9), and Saving Sea Turtles (DQ4L3) bring phenomena and concepts to life for all students.

Courtship Rituals: Puffer Fish (DQ1L3)

- Assessments of the three dimensions are multimodal and include multiple choice, writing, drawing, physical models, and oral presentations, allowing all students to access a range of assessment types to suit their learning style and/or reading level.
- The digital Twig Book and digital assessment items (Benchmark, Multiple Choice, Rubrics) have a text to speech function allowing students of all reading levels to access the assessments.
- The rubrics for the Performance Tasks (**DQ1L10 TE pp. 80–86**, DQ2L10 TE pp. 170–175, DQ4L3–5 TE pp. 266–280) and Benchmark Assessment (**DQ3 TE pp. 236–243** and online) have four levels—emerging, developing, proficient, and advanced—allowing all students to demonstrate their current level of attainment.



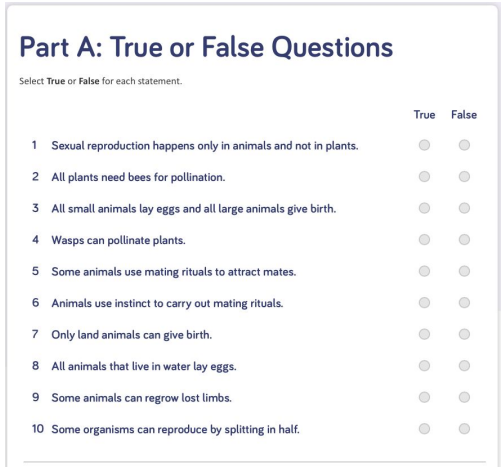
Rubric 1: Use Rubric 1 to evaluate student responses for the parts of the student's final Nursery Flyer that provide evidence for Part D, Section 1.

Emerging	Developing	Proficient	Advanced
Student generally explains impact of trait choices and develops an irrelevant or inaccurate claim. OR Student responses are missing.	Student accurately explains the impact of trait choices and develops a general claim that uses minimal scientific evidence or cause-and-effect reasoning to support their trait choices.	Student accurately explains impact of trait choices and develops a relevant claim that uses partial and accurate scientific evidence and cause-and-effect reasoning to support trait choices.	Student accurately explains impact of trait choices and develops a relevant claim that uses thorough scientific evidence and cause-and-effect reasoning to completely support their trait choices.
Look Fors: • Student explanation of trait choices is general and student makes an inaccurate claim for one or both traits for the flower offspring. E.g., "I chose white petals and long roots for my flower offspring. White petals help it grow because of the bees and long roots will absorb lots of water. These traits are the best for making my plant strong and to grow the most." OR • Student response is missing, e.g., "I don't know."	Look Fors: • Student explanation of trait choices is accurate, e.g., "I chose purple petals and short roots for my flower offspring. Purple is the color that attracts more bees and short roots help plants grow better over time." • Student makes a general claim for flower offspring choice for both traits and uses little to no evidence from cards and/or general cause-and-effect reasoning to support the claim. E.g., "I believe these traits are the best to help my flower grow. Purple petals help the plants reproduce more because of the bees and short roots help them to grow more."	Look Fors: • Student explanation of trait choices is accurate, e.g., "I chose purple petals and short roots for my flower offspring. Purple is the color that attracts more bees and short roots help plants grow better over time." • Student makes an accurate claim for flower offspring choice for both traits. E.g., "I believe that purple petals and short roots are the traits that will make my flower offspring most fit to survive, grow and reproduce." • Student uses some evidence and cause-and-effect reasoning to support the claim, usually focused on one trait. E.g., "In the experiment 88% of bees visited the purple flowers, but only 12% visited the white flowers. Bees help plants reproduce, so this means that my plant with purple flowers will have a better chance of reproducing."	Look Fors: • Student explanation of trait choices is accurate. E.g., "I chose purple petals and short roots for my flower offspring. Purple is the color that attracts more bees and short roots help plants grow better over time." • Student makes an accurate claim for flower offspring choice for both traits. E.g., "I believe that purple petals and short roots are the traits that will make my flower offspring most fit to survive, grow and reproduce." • Student uses complete evidence and explicit cause-and-effect reasoning to support claim in relation to both traits. E.g., "In the experiment , 88% of bees visited the purple plants, but only 12% visited the white plants. Bees help plants reproduce through pollination. This means my plant with purple petals will have a better chance of reproducing and surviving. The other experiment tested the growth of plants with short vs long roots. With the watering system that nurseries have, the plants with short roots grew more effectively over time. This means that my plant with short roots will have a better chance of growth and survival."

PE MS-LS1-4 SEP SEP-7 DCI LS1.B CCC CCC-2 DoK 4

ILCS: Student explains impact of offspring trait choices and develops an argument using scientific evidence and reasoning to support their trait choices.

- The **Multiple Choice Assessment (DQ4)** contains questions targeting different DOK levels, with an extended section available to further challenge GATE students.



Part A: True or False Questions

Select **True** or **False** for each statement.

		True	False
1	Sexual reproduction happens only in animals and not in plants.	○	○
2	All plants need bees for pollination.	○	○
3	All small animals lay eggs and all large animals give birth.	○	○
4	Wasps can pollinate plants.	○	○
5	Some animals use mating rituals to attract mates.	○	○
6	Animals use instinct to carry out mating rituals.	○	○
7	Only land animals can give birth.	○	○
8	All animals that live in water lay eggs.	○	○
9	Some animals can regrow lost limbs.	○	○
10	Some organisms can reproduce by splitting in half.	○	○

Multiple choice (DQ4 digital)

- Writing, Reading, Listening, and Speaking domain tasks dedicated to assessing science-relevant English language development are integrated into the core instructional resources (**DQ1L7 TE p. 63**, DQ3L3 TE p. 209) and the On-Level reader lessons (**Chapter 3 Second Read TE p. 299**).

Formative Assessment

Have students reflect on their learning by responding to the prompt on page 33 in their Twig Books. Invite some students to share their thoughts with the class.

Reflect

Construct Explanations • Explain how the otters' behavior improves the chances of their young surviving.

Otters live in family groups of 5–8, and build dens to keep cubs safe when they are young. By working as a group, they can scare off other animals, like jaguars, that might attack their cubs. If they need to move to a different location, the adults will carry the cubs in their mouths. These behaviors all increase the cubs' chances of survival.

Extention

Vocabulary Strategy and Focus on Text Features—Glossary

Revisit the "Giant Otter" article on page 28 in the Twig Book. Explain that when reading scientific articles, students will often encounter new and unfamiliar terms. There are many strategies readers can use to address unknown terms, but this particular article has an attached resource that is very helpful—a glossary.

Glossary

- Generally includes the page numbers where terms occur in longer texts
- Gives the content-specific definition of the term. This means that there may be more than one definition; the one given is the one that is appropriate for its use in the text.

Model how to read and connect the term *neotropical*. Locate the term in the third paragraph under "Other Comments" at the end of the article. First, read the term in context, thinking aloud the strategies you might use to determine its meaning:

- ***The word parts are neo (new) and tropical (tropical). You've probably heard the word tropical before, so this will help you figure out that the term has something to do with a tropical location.***

Read the glossary definition of the term, which explains that it describes organisms that live in southern parts of the New World (Central and South America). Note how the glossary describes exactly what the term means in the context of the article.

In future writing tasks, encourage students to include a glossary or list of key terms for their readers. Going through the process of creating a list of potentially confusing words and defining them will help students better understand how to use the text feature when they encounter it in future texts.

English Learners

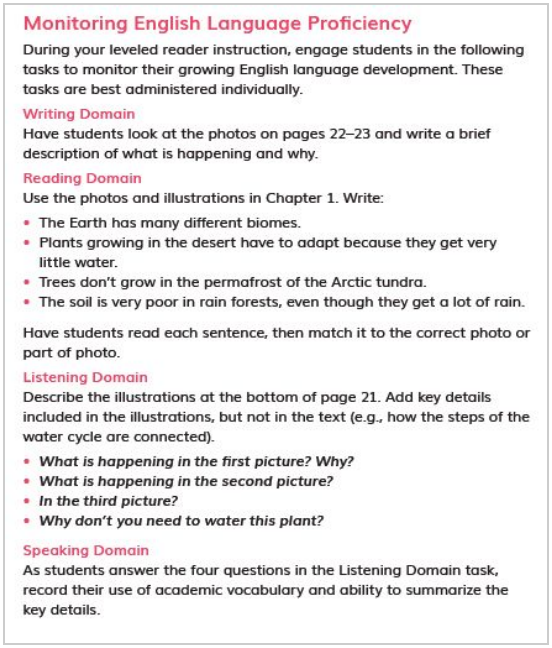
Give ELs a chance to review the Giant Otter video before responding to the prompt.

Monitoring English Language Proficiency

Engage students in the following tasks to monitor their growing English Language development. These tasks are best administered individually.

- **WRITING DOMAIN:** Have students look at the photos on pages 27–31 and write a sentence describing what is happening in each one.
- **READING DOMAIN:** Have students read aloud the headings in the article. Then have them state 1–3 sentences to summarize what that section of text is about.
- **SPEAKING DOMAIN:** As students share their answers to the Listening Domain questions, record their use of academic vocabulary and connecting words.
- **LISTENING DOMAIN:** Read aloud the "Food Habits" section of the text on pages 30–31. ***Why does the author say the giant otter is a "piscivore"? What is the difference between a solitary and a social hunt? What are the benefits of each one? Why might the otters have to eat snakes and crustaceans?***

DQ1L7 TE p. 63



Monitoring English Language Proficiency

During your leveled reader instruction, engage students in the following tasks to monitor their growing English language development. These tasks are best administered individually.

Writing Domain

Have students look at the photos on pages 22–23 and write a brief description of what is happening and why.

Reading Domain

Use the photos and illustrations in Chapter 1. Write:

- The Earth has many different biomes.
- Plants growing in the desert have to adapt because they get very little water.
- Trees don't grow in the permafrost of the Arctic tundra.
- The soil is very poor in rain forests, even though they get a lot of rain.

Have students read each sentence, then match it to the correct photo or part of photo.

Listening Domain

Describe the illustrations at the bottom of page 21. Add key details included in the illustrations, but not in the text (e.g., how the steps of the water cycle are connected).

- ***What is happening in the first picture? Why?***
- ***What is happening in the second picture?***
- ***In the third picture?***
- ***Why don't you need to water this plant?***

Speaking Domain

As students answer the four questions in the Listening Domain task, record their use of academic vocabulary and ability to summarize the key details.

Chapter 3 Second Read TE p. 299

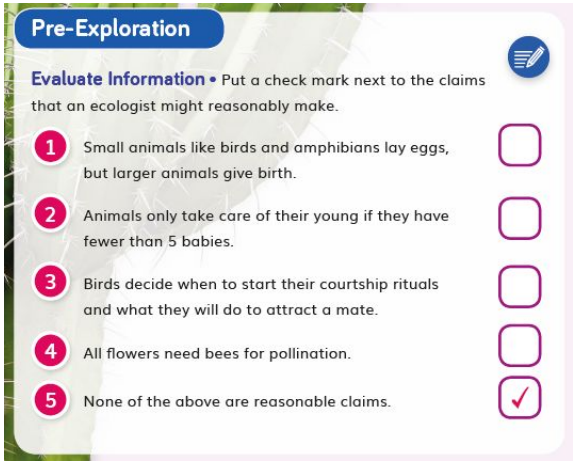
TS5. Support to Monitor Student Progress.

The Module materials are High Quality 5 in regards to TS5.

They provide strong support for teachers to monitor student learning and progress over time, and make decisions about instruction and provide feedback.

Evidence

- There are three diagnostic pre-assessments (Pre-Explorations) at strategic points in the module that assess prior knowledge and misconceptions (DQ1L1 TB p. 4, DQ2L1 TB p. 54, DQ3L1 TB p. 90). Notes in the Teacher Edition and the Progress Tracker support teachers to monitor students' mastery of their misconceptions and the three dimensions and give suggestions for how to tailor instruction accordingly (DQ1L5 TE p. 42, DQ2L3 TE p. 117, DQ2L9 TE p. 167, DQ3L7 TE p. 234).
- Progress Trackers, digital assessment trackers, and rubrics support teachers in monitoring students progress. Pre-Exploration and regular Formative Assessments inform teacher at the point of use as to which students require further support.

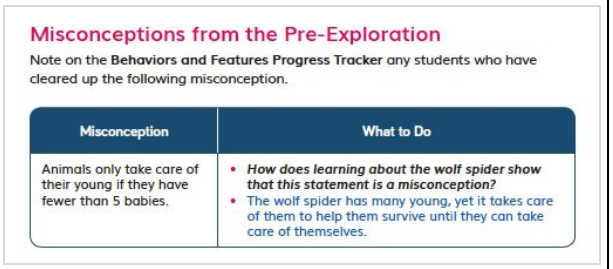


Pre-Exploration

Evaluate Information • Put a check mark next to the claims that an ecologist might reasonably make.

1. Small animals like birds and amphibians lay eggs, but larger animals give birth. ☐
2. Animals only take care of their young if they have fewer than 5 babies. ☐
3. Birds decide when to start their courtship rituals and what they will do to attract a mate. ☐
4. All flowers need bees for pollination. ☐
5. None of the above are reasonable claims. ☑

DQ1L1 TB p. 4



Misconceptions from the Pre-Exploration

Note on the **Behaviors and Features Progress Tracker** any students who have cleared up the following misconception.

Misconception	What to Do
Animals only take care of their young if they have fewer than 5 babies.	• ***How does learning about the wolf spider show that this statement is a misconception?*** • The wolf spider has many young, yet it takes care of them to help them survive until they can take care of themselves.

DQ1L5 TE p. 42