Lesson 2.2
Exploring Patterns
Lesson Overview

In this lesson, students use the Think-Pair-Share discourse routine to discuss how offspring can have traits that are like their parents’ traits. Students build on the patterns they observed in fruit flies by reading about parents and offspring of other organisms from *Handbook of Traits*. This helps students understand that organisms can have traits that are similar to their parents’ traits. Students return to the *Inheritance and Traits* Modeling Tool to apply their new understanding of patterns between parents and offspring by modeling their ideas about this concept. Students’ models will show that offspring can have traits that are similar to one or both parents or, sometimes, a mix of parents’ traits and that the traits of offspring are more similar to the traits of their own parents than to the traits of other parents. The purpose of this lesson is for students to understand that offspring have traits similar to their parents. In the next lesson, they will learn why this is the case.

**Anchor Phenomenon:** A wolf at Graystone National Park does not have the same fur color as the rest of its pack, but does have the same fur color as another pack.

**Investigative Phenomenon:** Fruit flies and deer offspring have traits that are like one or both parents.

**Students learn:**

- Organisms can have traits that are similar to their parents’ traits.
- The traits of offspring can be like one parent or both parents.
- The traits of offspring can sometimes be a mix of their parents’ traits.
Students look for patterns between parents and offspring as they read about different organisms in the reference book.

Instructional Guide

1. Hold up Handbook of Traits.

   We have observed that fruit flies can have traits that are like their parents’ traits. What about other organisms? Do you think that other organisms also have traits similar to their parents’ traits? Why do you think that?

   Accept all responses.

2. Remind students about evidence.

   Remember that evidence is information that supports an answer to a question. Many of you think that other organisms have traits similar to their parents, not just fruit flies.

   Let’s see if the information we read in the book is evidence to support the idea that organisms can have traits that are similar to their parents’ traits.

3. Distribute books. Distribute one copy of Handbook of Traits to each pair of students.

4. Introduce and project notebook pages. Have students turn to pages 32–33, Patterns in Parents and Offspring, in their notebooks.

   • Review the directions and explain that each student will read about the organisms and use photographs or illustrations of parents and offspring to select a trait that they observe.

   • Point out the question on page 33 that they should answer when they have finished reading and recording information.
5. Model recording traits.

- Turn to the contents page in *Handbook of Traits* (or the index) and find the page for the Harlequin Poison Frog. [Page 20.]
- Turn to pages 20 and 21 and read aloud the text as students follow along in their books.

The caption on page 21 states *This frog has traits that are similar to both its parents. Its body color and spots are similar to those of its parents.*

I will pick the trait of having spots.

- On the projected notebook page after Trait, write “spots.” Have students do the same in their notebooks.

The two photographs on the top of page 21 are the parent frogs. I observe that Parent 1 has spots. So does Parent 2.

- Write “spots” after Parent 1 and after Parent 2. Have students do the same in their notebooks.

Look at the offspring frog. Does it also have spots?

[Yes.]

- Write “spots” after Offspring. Have students do the same in their notebooks.

6. Discuss patterns.

- What pattern did you observe?
  [The offspring’s trait is similar to the traits of both of its parents.]

Is the pattern you described similar to what we observed with the fruit flies?

[Yes, the frog offspring has a trait that is like both of its parents’ traits. The fruit fly offspring had traits that were similar to one or both of its parents’ traits.]

7. Read aloud the names of the remaining four organisms on the notebook pages. Let students know that partners should read about these four organisms in the book. Encourage students to use the table of contents to locate the organisms in the book.

For each organism, you will need to read carefully to find out about their traits. You will also need to look for the photographs and illustrations that show parents and offspring and read the captions. Also be sure to look at the life cycle diagrams of each organism. Thinking about the text, the images, and the captions together will help you observe what traits the parents and offspring have.
8. **Students read and complete notebook pages.** Circulate to support students as they read about the four remaining organisms. Remind students to use the images and captions in the book to help them identify traits. When a few minutes remain, remind students to answer the question on page 33.

9. **Refer back to the Investigation Question.**
   
   What new ideas do you have about patterns of parents and offspring, based on what you read in *Handbook of Traits*?

   All the ideas you shared from the book are evidence that supports the idea that when organisms reproduce, the offspring have traits that are similar to their parents’ traits.

10. **Make a connection back to Patterns.** Pose the following question. Give students a moment to think on their own and then discuss briefly with a partner. Gather responses from the class.
   
   As you were reading about the different organisms, did you see any patterns in the life cycles of the different organisms?
   
   [In all of the life cycles, the adults undergo reproduction: The frog and fish life cycles involve eggs hatching; the cat, tetra, and dog have the same steps of young offspring to adult; and the frog and the plant life cycles have more steps than the others.]

   Different organisms have differences in their life cycles. Eventually, as the offspring grow, one pattern they all share is that they start to show traits that are similar to their parents’ traits.

11. **Introduce and post the key concept.** Read aloud the key concept.

   Organisms can have traits that are similar to their parents’ traits.

12. **Return to the entry for House Cats.** Have students turn to page 22 in the reference book. Discuss how organisms’ traits are more like their parents’ traits than the traits of other adults of their species.

   The evidence you gathered also supports the idea that offsprings’ traits are more similar to their own parents’ traits than they are to the traits of other adults.

   For example, the cats on this page are the same species. However, the kittens on the left look more like their own parents than the other adult cats on the right.

13. **Connect traits to the wolves.**

   Now that we know that organisms can have traits that are similar to their parents’ traits, what new ideas do you have about Wolf 44?
   
   [Wolf 44 should have traits that are more similar to its parents and less similar to other wolf parents.]

   Accept all responses at this point. (Note that students will revisit this question again later in the chapter.)
Teacher Support

Background

Science Note: Incomplete Dominance
Incomplete dominance is when the trait that is displayed in the offspring is a mix of the traits of either parent. For example, red and white snapdragon parents can produce pink snapdragon offspring; long-tail and short-tail dog parents can produce a medium-tail dog offspring. In this unit, students learn that sometimes organisms have traits that are a mix of their parents traits. This idea will be explored further in upcoming lessons.

Rationale

Literacy Note: Assigned Organisms in the Reference Book
Not all the organisms in Handbook of Traits contain sufficient information for students to observe the pattern between parents and offspring. The organisms students are asked to read about in this activity are examples that support the idea that the traits of offspring can be like one parent or both parents, or, sometimes, a mix of their parents' traits.

Background

Science Note: Parents and Offspring in Handbook of Traits
Some of the entries in Handbook of Traits—such as those for the domestic dog, house cat, and snapdragon plant—describe or label parent and offspring organisms. The photographs in the book are not of two parents and an offspring. However, the traits described and depicted in the images are real traits based on patterns of inheritance that do actually occur in organisms. The familial relationships were chosen to support students’ understanding of patterns of trait variation between parents and offspring.

Assessment

Assessment Opportunities: Student Understanding of Reproduction and Life Cycles
You can use this activity to assess students’ understanding of the ideas that reproduction is essential to the continued existence of all organisms and that different organisms have unique life cycles. Look for whether students are able to describe the purpose of reproduction, which is for parents to produce offspring in order to continue the species. Also listen for students to describe the different life cycles of the organisms they read about in Handbook of Traits. If many students do not seem to understand these ideas, you might take some time to have a more in-depth discussion about reproduction and life cycles, using two of the more well know organisms that students read about, such as the frog, cat, or dog. Help students construct the understanding that animals get similar traits as their parents through the process of reproduction and that this process is part of each organisms’ unique life cycle.

Possible Responses

Investigation Notebook
Patterns in Parents and Offspring (pages 32–33)
Snapdragon Plant
Trait: flower color
Parent 1: red
Parent 2: white
Offspring: pink

House Cat
Answers will vary. Example:
Trait: fur length
Parent 1: short fur
Parent 2: long fur
Offspring: long fur

Mexican Tetra
Trait: having no eyes
Parent 1: no eyes
Parent 2: no eyes
Offspring: no eyes

Domestic Dog
Trait: spots
Parent 1: lots of spots
Parent 2: no spots
Offspring: some spots

What new ideas do you have about offspring and parents after reading *Handbook of Traits*?
The traits of offspring can be similar to one parent or both parents, or, sometimes, a mix of their parents’ traits.
### Asking Questions When Reading: *The Code*

**Directions:**
1. As you read the book, record questions you have in Column 1.
2. If you find the answers to your questions as you read, record your answers in Column 2. Be sure to include the page number from the book where you found the information so you can discuss these ideas with the class.
3. In Column 3, record other ways you could investigate your questions.

<table>
<thead>
<tr>
<th>Question</th>
<th>Information from the book that helps answer my question</th>
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Students look for patterns between parents and offspring as they read about different organisms in the reference book.

Instructional Guide

1. Hold up Handbook of Traits.

Hemos observado que las moscas de la fruta pueden tener rasgos que son parecidos a los rasgos de sus padres. ¿Y otros organismos? ¿Piensan que otros organismos también tienen rasgos similares a los rasgos de sus padres? ¿Por qué piensan eso?

Accept all responses.

2. Remind students about evidence.

Recuerden que evidencia es información que respalda una respuesta a una pregunta. Muchos de ustedes piensan que otros organismos tienen rasgos similares a los rasgos de sus padres, no solo las moscas de la fruta.

Veamos si la información que leímos en el libro es evidencia para respaldar la idea de que los organismos pueden tener rasgos que son similares a los rasgos de sus padres.

3. Distribute books. Distribute one copy of Handbook of Traits to each pair of students.

4. Introduce and project notebook pages. Have students turn to pages 32–33, Patterns in Parents and Offspring, in their notebooks.

- Review the directions and explain that each student will read about the organisms and use photographs or illustrations of parents and offspring to select a trait that they observe.
- Point out the question on page 33 that they should answer when they have finished reading and recording information.
5. Model recording traits.

- Let students know that you will show them how to complete the first example for the Harlequin Poison Frog.

- Turn to the contents page in *Handbook of Traits* (or the index) and find the page for the Harlequin Poison Frog. [Page 20.]

- Turn to pages 20 and 21 and read aloud the text as students follow along in their books.

La leyenda en la página 21 indica *Esta rana tiene rasgos que son similares a los rasgos de sus padres. El color de su cuerpo y sus manchas son similares a los de sus padres.*

Elegiré el rasgo de tener manchas.

- On the projected notebook page after Trait, write “spots.” Have students do the same in their notebooks.

Las dos fotografías en la parte superior de la página 21 son los padres ranas. Observo que el Padre/la Madre 1 tiene manchas. También el Padre/la Madre 2.

- Write “spots” after Parent 1 and after Parent 2. Have students do the same in their notebooks.

Miren el descendiente. ¿También tiene manchas?
[Sí].

- Write “spots” after Offspring. Have students do the same in their notebooks.

6. Discuss patterns.

¿Qué patrón observaron?
[El rasgo del descendiente es similar a los rasgos de ambos padres].

¿El patrón que describieron es similar a lo que observamos con las moscas de la fruta?
[Sí, la descendencia de las ranas tiene un rasgo que es parecido a los rasgos de ambos padres. La descendencia de mosca de la fruta tenía rasgos que eran similares a los rasgos de uno o ambos padres].

7. Read aloud the names of the remaining four organisms on the notebook pages. Let students know that partners should read about these four organisms in the book. Encourage students to use the table of contents to locate the organisms in the book.

Por cada organismo, necesitarán leer detenidamente para averiguar acerca de sus rasgos. También necesitarán buscar las fotografías e ilustraciones que muestran a los padres y a la descendencia y leer las leyendas. También asegúrense de mirar el diagrama del ciclo de vida de cada organismo. Pensar en el texto, las imágenes y las leyendas juntos les ayudará a observar los rasgos que tienen los padres y la descendencia.
8. **Students read and complete notebook pages.** Circulate to support students as they read about the four remaining organisms. Remind students to use the images and captions in the book to help them identify traits. When a few minutes remain, remind students to answer the question on page 33.

9. **Refer back to the Investigation Question.**

   ¿Qué nuevas ideas tienen sobre los patrones de los padres y la descendencia, basándose en lo que leyeron en el *Manual de rasgos*?

   Todas las ideas que compartieron del libro son evidencia que respalda la idea de que cuando los organismos se reproducen, la descendencia tiene rasgos que son similares a los rasgos de sus padres.

10. **Make a connection back to Patterns.** Pose the following question. Give students a moment to think on their own and then discuss briefly with a partner. Gather responses from the class.

   Mientras leían sobre los diferentes organismos, ¿vieron algún patrón en los ciclos de vida de los diferentes organismos?  
   [En todos los ciclos de vida, los adultos experimentan la reproducción: Los ciclos de vida de la rana y del pez involucran salir del cascarón; el gato, la tetra y el perro tienen los mismos pasos de descendencia joven a adultos; y los ciclos de vida de la rana y la planta tienen más pasos que los otros].

   Diferentes organismos tienen diferencias en sus ciclos de vida. Con el tiempo, mientras los descendientes crecen, un patrón que comparten todos ellos es que comienzan a mostrar rasgos que son similares a los rasgos de sus padres.

11. **Introduce and post the key concept.** Read aloud the key concept.

   Los organismos pueden tener rasgos que son similares a los rasgos de sus padres.

12. **Return to the entry for House Cats.** Have students turn to page 22 in the reference book. Discuss how organisms’ traits are more like their parents’ traits than the traits of other adults of their species.

   La evidencia que reunieron también respalda la idea de que los rasgos de la descendencia son más similares a los rasgos de sus propios padres que a los rasgos de otros adultos.

   Por ejemplo, los gatos en esta página son de la misma especie. Sin embargo, los gatitos de la izquierda se parecen más a sus propios padres que a los otros gatos adultos de la derecha.

13. **Connect traits to the wolves.**

   Ahora que sabemos que los organismos pueden tener rasgos que son similares a los rasgos de sus padres, ¿qué nuevas ideas tienen acerca del Lobo 44?  
   [El Lobo 44 debería tener rasgos que son más similares a los de sus padres y menos similares a los de otros padres lobo].

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Teacher Support

Background

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Incomplete dominance is when the trait that is displayed in the offspring is a mix of the traits of either parent. For example, red and white snapdragon parents can produce pink snapdragon offspring; long-tail and short-tail dog parents can produce a medium-tail dog offspring. In this unit, students learn that sometimes organisms have traits that are a mix of their parents traits. This idea will be explored further in upcoming lessons.

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What new ideas do you have about offspring and parents after reading Handbook of Traits?
The traits of offspring can be similar to one parent or both parents, or, sometimes, a mix of their parents’ traits.
### Hacer preguntas al leer: *El código*

#### Instrucciones:

1. Mientras lees el libro, apunta preguntas que tengas en la columna 1.
2. Si encuentras las respuestas a tus preguntas mientras lees, apunta tus respuestas en la columna 2. No olvides incluir el número de la página donde encontraste la información, para que puedas discutir estas ideas con la clase.
3. En la columna 3, apunta otras maneras en las que podrías investigar tus preguntas.

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<th>Pregunta</th>
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