Successful Reproduction and Offspring

Investigation 7.4: Flower Design

Procedure

1. Review the results of Investigations 7.1, 7.2, and 7.3 with students, emphasizing the roles of pollinators and seed dispersal in flower reproduction.

2. Sample answers to questions are the following:

a. The different colors help attract different pollinators to help them reproduce, while the single color blossom may rely on a particular pollinator.

b. Rainforest flowers are very diverse. Some flowers in a rainforest are more colorful to stand out among the dense green foliage. The flowers also need to be tough enough to withstand a lot of water and must have a structure to prevent water from filling up the flower and destroying the reproductive structures within it. In the desert, many animals are nocturnal due to the intense heat. Desert flowers would be white to better attract pollinators who come out at night. The flower may also close during the day to prevent it from drying out.

c. The plant mostly likely will not reproduce because it relies on attracting a pollinator. The plant may have success through self-pollination, but that is highly unlikely.

3. Review Steps 3–5 with the class. Emphasize that groups are designing a flower, a pollinator that will visit the flower, the resulting seed, and germination conditions needed for the seed to successfully grow. Point out that students need to plan how they will present all four parts of the design on the poster board before they begin drawing.

Suggest that students first brainstorm their flower/pollinator shapes and make sketches in their notebooks. Group members can then analyze the various ideas and choose one to produce on their poster. Remind students to label all parts of their flower and pollinator as they produce their design.

4. As students move to Step 4, suggest they review the different methods of seed dispersal. The group should discuss the various methods and determine which type their seed will employ as the first step in their seed design. They should then add an illustration of their seed with explanatory labels to their poster.

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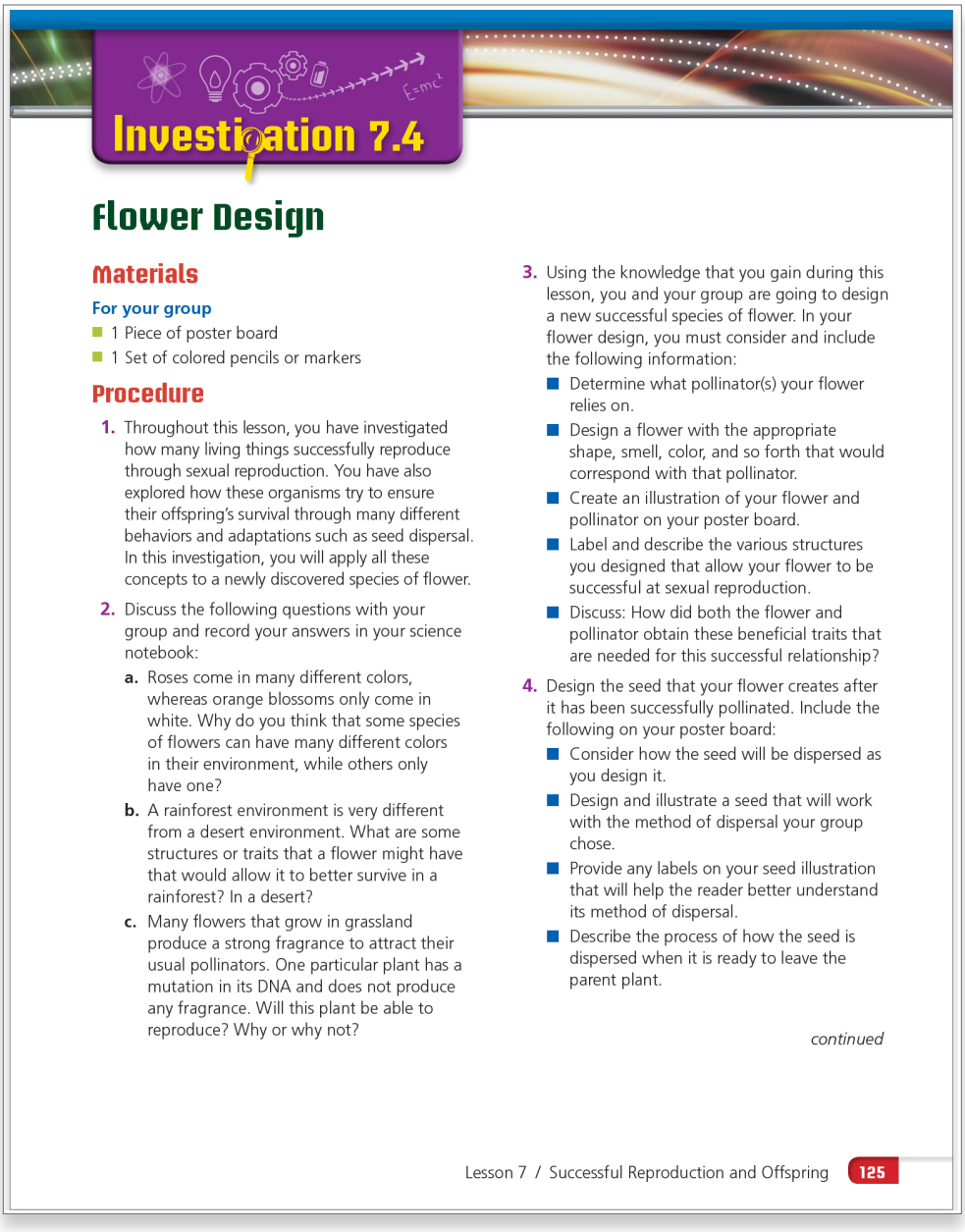

Investigation 7.4

Flower Design

Materials

For your group

- 1 Piece of poster board
- 1 Set of colored pencils or markers

Procedure

1. Throughout this lesson, you have investigated how many living things successfully reproduce through sexual reproduction. You have also explored how these organisms try to ensure their offspring's survival through many different behaviors and adaptations such as seed dispersal. In this investigation, you will apply all these concepts to a newly discovered species of flower.
2. Discuss the following questions with your group and record your answers in your science notebook:
   - **a.** Roses come in many different colors, whereas orange blossoms only come in white. Why do you think that some species of flowers can have many different colors in their environment, while others only have one?
   - **b.** A rainforest environment is very different from a desert environment. What are some structures or traits that a flower might have that would allow it to better survive in a rainforest? In a desert?
   - **c.** Many flowers that grow in grassland produce a strong fragrance to attract their usual pollinators. One particular plant has a mutation in its DNA and does not produce any fragrance. Will this plant be able to reproduce? Why or why not?
3. Using the knowledge that you gain during this lesson, you and your group are going to design a new successful species of flower. In your flower design, you must consider and include the following information:
   - Determine what pollinator(s) your flower relies on.
   - Design a flower with the appropriate shape, smell, color, and so forth that would correspond with that pollinator.
   - Create an illustration of your flower and pollinator on your poster board.
   - Label and describe the various structures you designed that allow your flower to be successful at sexual reproduction.
   - Discuss: How did both the flower and pollinator obtain these beneficial traits that are needed for this successful relationship?
4. Design the seed that your flower creates after it has been successfully pollinated. Include the following on your poster board:
   - Consider how the seed will be dispersed as you design it.
   - Design and illustrate a seed that will work with the method of dispersal your group chose.
   - Provide any labels on your seed illustration that will help the reader better understand its method of dispersal.
   - Describe the process of how the seed is dispersed when it is ready to leave the parent plant.

continued

Investigation 7.4: Flower Design *continued*

5. Suggest students review their notes and conclusions from Investigation 7.3 as they consider what seeds need for germination and successful growth before they make final decisions on the environment and germination requirements. Again, suggest they record all their ideas first before making a final decision on the best environment for their new species of plant.

6. Direct students to the location of the poster board and coloring utensils. Review the four requirements for the poster that groups are to design.

7. Have each group present their flower/pollinator/seed/germination design. Encourage students to provide detail as to how each part of the design functions in allowing the plant to successfully reproduce. Encourage constructive critiques of each design. If time permits, allow students to rework their designs based on input from their peers.

Investigation 7.4 *continued*

5. Illustrate and describe on your poster board both the materials and conditions the seed will need to successfully germinate in its new environment.
   - Discuss: What will the offspring look like when it is fully grown?
6. Collect a poster board and markers or colored pencils from the designated area in your class and bring them back to your group. This poster board will display four different concepts:
   - A newly designed flower
   - The flower's pollinator
   - The seed your flower produces after successful sexual reproduction
   - The materials and conditions needed for the seed to germinate successfully in its environment
7. Be prepared to present your group's designs to the rest of the class. All group members must share some part of the presentation. During the presentation, discuss the following key topics:
   - Explain the new species of flower and pollinator that your group created.
   - What structures do both organisms have that allow this successful relationship? How did both organisms obtain these beneficial traits?
   - What structures does the flower have that enable it to successfully reproduce?
   - How does the pollinator assist the flower in reproduction?
   - What seeds are produced after the plant has successfully reproduced? What method of dispersal does the plant use?
   - What environmental conditions will this seed need in order to germinate into a new plant?
   - Once the plant has fully germinated, what would you anticipate the offspring to look like and why?

Figure 7.6
Some species of bee orchids not only look like a female bee but also emit a fragrance that smells like one. The males mistake these flowers for females, attempt to reproduce with them, and end up pollinating the orchid in the process.
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