TO EACH ITS OWN

Students draw and describe one item from a set of similar objects (such as leaves or shells), then play a matching game in which they pair the objects to the notes their classmates made.

Time

Introduction: 5 minutes
Activity: 10–30 minutes
Discussion: 10–15 minutes

Materials

- ☐ Journals and pencils
- ☐ Tape

optional

- ☐ Hand lenses or magnifying glasses

Teaching Notes

This activity is an ideal introduction to journaling. The goal is for students to practice recording data accurately, and the scaffolding in the instructions is critical to their success. If you just say, "Go out and draw a leaf," students who do not like drawing will disengage, and even your "drawers" might just make a symbolic drawing without focusing on details.

This introductory activity gives students practice creating accurate, data-rich journal entries through the lens of a game. It is a great confidence builder for students who might be insecure about writing or drawing—they are (pleasantly) surprised when they see a classmate successfully use their notes to match their leaf or rock to their journal entry. This approach reframes drawing and journaling as tools used to communicate information rather than as means of producing something that "looks good." The discussion afterward helps students notice different approaches to recording observations and information. In the process, students learn new strategies for journaling and practice producing scientific text.

NATURAL PHENOMENA

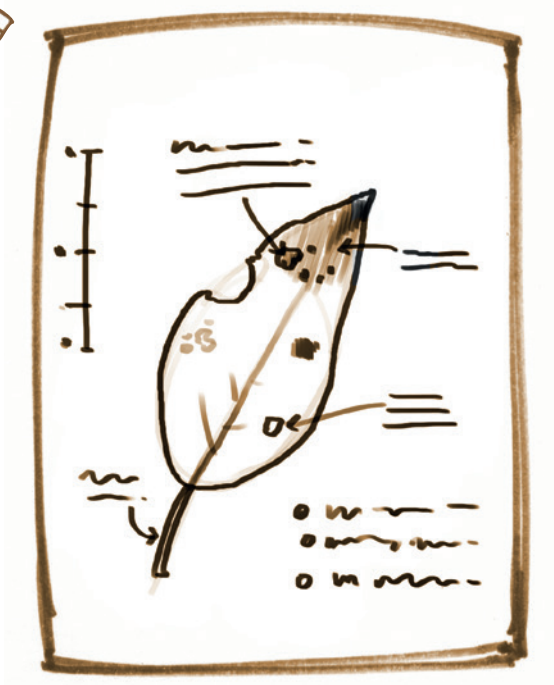
Assemble (or tell students to find) a set of small and similar objects, such as fallen leaves, shells, or acorns. Make sure that students have objects of the same species. In rain or extreme weather, bring a collection of objects inside. If your students are younger, or newer to journaling, pick an object that is relatively easy to draw. Simpler leaves are an often successful choice because they are more two-dimensional than a rock or shell.

PROCEDURE SUMMARY

1. Use writing, drawing, and numbers to describe your object.
2. Record unique features, such as growth forms, holes, shapes, and colors.
3. Others in your group will try to match your object to your entry, so make your page accurate and detailed.

DEMONSTRATION

When the whiteboard icon appears in the procedure description: Model tracing a leaf (or other natural object). Add details using written notes and numbers, including suggestions students bring up.



PROCEDURE STEP-BY-STEP

1. **Tell students to select a natural object of the same type as the objects in the set you have assembled, or from their surroundings.**

   a. "This is a maple leaf. [We will use the example of a leaf for this procedure description.] You have one minute to look around and find one that you like, one that is interesting to you. When you have picked a leaf, return to this spot."

2. **Explain that students will make a diagram of their natural object in their journal, then play a matching game.**

   a. "We're going to play a matching game. Here are the rules: When I say 'go,' you will only have twelve minutes to make a diagram of your leaf in your journal, in as much detail as possible."

   b. "When we are done, we will all try to match each leaf to the journal page describing it, so do not crumple or throw away your leaf."

3. **Explain that students' journal entries should include words, pictures, and numbers and that they can rely more on whichever mode is most comfortable for them.**

   a. "This is not about making a pretty picture. It's about recording accurate information."

   b. "You will need to use words, pictures, and numbers to record your observations."

   c. "If you're more comfortable writing, you may write more. If you're more comfortable drawing, you may draw more. If you like using numbers, you can do more of that. But you must use all approaches to show what you see."

4. **Offer drawing tricks that will help students start making a diagram of their object.**

   a. "I've got a trick to help you draw any leaf. Place your leaf on your journal page, lightly but firmly hold it in place with one finger, and lightly trace it without pressing in on the leaf. The key here is to draw lightly. The tracing gives a rough outline of the object that you can then refine and detail."

   b. (For a three-dimensional object [acorn, shell]) "I've got a trick to get you started. Lightly trace around the object to block in the basic shape. You can also slightly angle your pencil inward so that the rough tracing is not too large. The key here is to draw lightly. The tracing gives a rough outline of the object that you can then refine and detail."

5. **Ask students to list the kinds of details it will be helpful to include.**

   a. "Your notes need to be accurate and detailed so that others can match your diagram with the leaf. What kinds of clues or details can you include to help us tell one leaf from another?"

6. **Listen to students' responses, asking for clarification and emphasizing key ideas. Add examples of their suggestions to the whiteboard.**

7. **If students don't bring up any of the following strategies, share them yourself: measuring the leaf to exact size and writing "actual size" next to it; labeling colors or adding color; recording numbers of things, such as leaf points or holes; drawing from more than one perspective; including unique characteristics, such as bug bites or broken pieces.**

8. **Tell students to begin making their diagrams, then offer reminders, or support students who are struggling as the group works.**

   a. "Keep adding details, even if you think you're done. There's always more to observe. If you finish a first level of detail quickly, go back in at a higher level of resolution. You can enlarge interesting parts in an inset.

9. **When the time is two-thirds done, give reminders about using words, pictures, and numbers and adding metadata.**

   a. "Be sure you are using words, pictures, and numbers in your diagram. If you've only used one mode of recording information, be sure to incorporate other modes into your note taking."

   b. "If you have not already done so, add the date and location [metadata] to your work."

   c. "Keep your leaf; you will need it intact for the next part of the activity."

10. **Call students back together, then facilitate the matching game: Groups of about fifteen students clear leaves from a small patch of ground or rock, place their journals in a circle around the bare area, and put the leaves they drew in the center. Next, students move to a position in front of someone else's journal. Then each student studies the journal entries before them, picks up a leaf when they think they know the entry it matches, then puts it down on that journal.**

    a. "Please move any fallen leaves from the center of the circle, then put the leaves you drew down there."

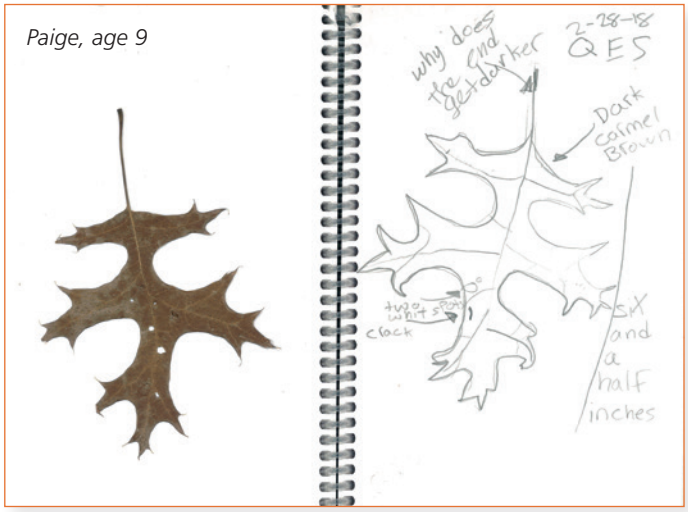
    b. "Put your journals in a ring around the leaves, opened to the page you were just working on, then move to stand at a different part of the circle so that you're not in front of your own journal."

    c. "Study the journal in front of you, then move around the circle to study some other journals. Notice details that the observer recorded. Then look at the details of some of the leaves in the center."

d. "When you think you know which leaf matches one of the journal entries, take it from the center and place it on the journal."

11. If necessary for your group, facilitate this process with students. For example:

a. "Does everyone agree that the leaves are in the right place? If you don't agree with the placement of a leaf, pick it up and move it to another journal, and say why you think it belongs there instead."



Lightly tracing the leaf or making a series of small dots along the edge helps quickly and accurately match the shape of the leaf. It is not cheating. It is a practical shortcut.

12. (Optional) Tape the leaves inside students' notebooks.

DISCUSSION

Lead a discussion using the general discussion questions and questions from one of the Science and Engineering Practices or Crosscutting Concept categories. Intersperse pair talk with group discussion.

General Discussion

Once all the leaves have been matched, ask students to turn and talk about the following questions with a partner, then share with the group. Highlight any important ideas that connect the group's journaling abilities as a whole.

a. "What details were most helpful for identifying a leaf? Why?"

b. "What kinds of details were easier to show through writing? What details were easier to show through drawing? How did you use numbers to show your observations?"

c. "Can you notice any patterns in how we recorded information? Are there any strategies in others' journal entries that you could incorporate in your future journaling?"

Obtaining, Evaluating, and Communicating Information

Put out students' journals, then tell students to circulate, noticing patterns or interesting approaches their group used to record information.

a. "Let's take a look at our journal entries. Everyone has a different way of recording information, and that's OK, but we can learn new ideas from looking at one another's work."

"Open your journal to the page for this activity and put it on the ground in front of you. If you don't want anyone to know it is your page, you can put it down and walk quickly to the other side of the circle. In a moment, when everyone's journal is on the ground, no one will remember which one is yours."

b. "Move around and look for patterns, similarities, and differences in the journal entries. How did different people lay out the page?"

c. "How did different people use words, pictures, and numbers together to show observations? Discuss what you notice with the people around you."

Patterns

a. "What similarities in growth and rot patterns do you see when you look at these leaf observations together?"

b. "How could we group these leaves based on shared characteristics?"

c. "Do you think you could find two leaves that are exactly the same? Why or why not? What kinds of things cause variations in leaves? What are some of the differences you'd expect to see between different leaves?"

Cause and Effect

a. "What might have caused the patterns we observed? For example, why might all the leaves have circle-shaped holes?"

b. "Look at the unique features of your leaf, such as holes, tears, or discolorations. What are some possible explanations for the causes of these features?"

Structure and Function

a. "Compare these leaves to the leaves of another kind of tree. How are their structures different? How are they similar? How might they function differently? Connect your explanation to what you can observe in the surrounding environment."