

ZOOM IN, ZOOM OUT

Students investigate and draw an object in three scales (magnified, life size, and distant) and reflect on the kinds of observations made at each level.

Getting close to a subject reveals different details than those you see from a distance. Close up, micro textures and fine details stand out. Standing back from a subject in nature, you begin to notice where it is in the environment, its relationship to other things around it, and its overall shape. This activity gives students a framework to intentionally record observations at close, medium, and long range. In the process, they will make varied observations about the subject and pick up the valuable tool of changing perspective, which they can apply in future journaling entries.

NATURAL PHENOMENA

Any natural object can be used for this activity, including trees or other plants, rocks, fungi, or any animal that does not move too much. *Zoom In, Zoom Out* is best completed in the field, where students' "zoomed-out" view can include the environment and context around their subject. Pick subject matter that supports other lessons you are doing with your class. If your goal in doing this activity is to support a lesson about a certain topic (e.g., plant structures or a fungus's relationship to its environment), make sure the whole class does the activity focused on that part of nature. Although it is ideal to do this activity with an object in its natural environment, if students are working with an object that has been removed from its surroundings (e.g., a seashell in a classroom), they can skip the zoomed-out view and focus more on their life-size diagrams and enlargements.

PROCEDURE SUMMARY

1. Record observations at three scales: close up, life size, and far away.
2. Use circles to show magnified views for the "zoom in." In the zoomed-out view, you can include details such as growth forms, where the subject is, or a small map.
3. Use writing, drawing, and numbers to record your observations.

DEMONSTRATION

When the whiteboard icon appears in the procedure description: Make a quick example sketch of a plant (or other subject) at life size; circle a feature you want to enlarge, and draw the enlargement within a larger circle. Then add a more distant view of the plant (perhaps showing the entire plant if it is large, e.g., a tree) or where the plant is in the environment, in a side-view diagram, map, or landscape sketch. Add sets of lines to suggest written notes.



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published by Heyday books.

Time

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



Materials

- Journals and pencils
- optional
 Loupes, hand lenses, or magnifying glasses
- Paper cups (to trace circles)



Teaching Notes

Zoom In, Zoom Out is a stand-alone activity. It is also an approach students can use in any journal entry to spark observations and questions. The discussion questions will help students recognize opportunities to use changing scale in the future. Taking the time to reflect in this way transforms a one-time activity into a transferable skill.

(Optional) Bring some paper cups or other round objects to help students trace crisp, round circles for the magnified "zoomed-in" view on their journal page.



PROCEDURE STEP-BY-STEP

1. Tell students that they are to observe a subject from three points of view: close up, life size, and more distant.

- a. "We will be looking at [leaves, cottonwood trees, these fungi, river stones, etc.] from three levels of focus: life size, a magnified close-up view, and a more distant view."
- b. "You will record your observations at these different scales all on the same page. There's a lot you can observe by changing your level of focus."

2. Give suggestions for the types of details students could show and focus on at each perspective.



- a. (Life size) "In the middle of your page, draw a view of your subject that is exactly life size. If the object is larger than your page, only draw part of it. Add written notes about what you notice at this distance."
- b. (Zoom in) "Then choose some part of the subject that you find interesting, and 'zoom in' to observe it in detail. To show this view, draw a circle around that part of your drawing. At the side of the paper, draw a larger circle and draw a magnified view of that same area showing details that are too small to be shown in the life-size picture. Include written notes and questions."

- c. (Zoom out) "Step back and make a final sketch, this time zoomed out to take in the whole subject and some of its environment. You could show a side view of the subject, or a small map of its overall shape and where it is in the environment. Again, add written notes about what you see at this scale."

3. Remind students to use words, pictures, and numbers to record their observations at every scale.

- a. "At every point of view, be sure to use a combination of words, pictures, and numbers to show what you observe, but you can use more of whichever approach is most comfortable for you."
- b. "Some observations might be easier to show in drawing, others in writing. Think about which mode is best for the observations you're recording."

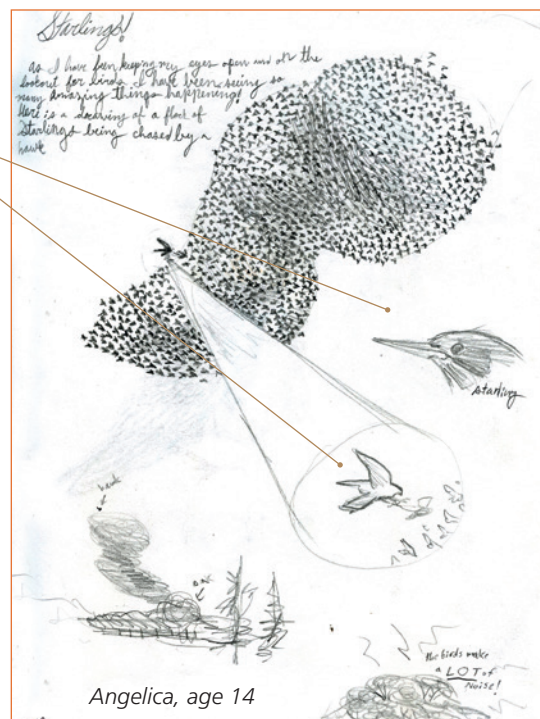
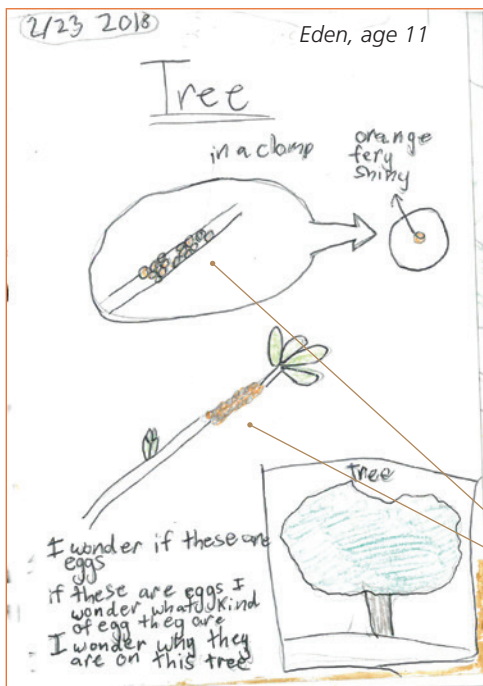
4. Set a time limit and the boundaries of the study area, then send students out to journal.

- a. (About halfway through) "We've got about half our time left. If you've only worked on one perspective so far, shift to another one."

DISCUSSION

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

Zoomed-in details and zoomed-out big-picture diagrams can be used in any study, from botanical drawings to animal behavior investigations.



Students can include drawings of the same subject at different scales as a strategy for capturing a range of details and observations.



General Discussion

- a. "What kinds of details do you notice when up close? Far away?"
- b. "How does shifting your perspective on something change the way you think about it?"
- c. "What structures might we be able to see if we had better magnification?"
- d. "How could you use this 'zoom-in and zoom-out' approach in other journal entries?"

Structure and Function

- a. "What are some of the structures (or parts) you observed at the zoomed-in scale? At the life-size scale? At the zoomed-out scale?"
- b. "When scientists are learning about a part of nature, they think about how a structure might work, or function, to help the plant, animal, or other living thing survive. Pick a structure, such as a leaf or the husk of a seed, and make some possible explanations of how it might function. Connect this explanation to the surroundings, thinking about how they influence your journal subject."

Scale, Proportion, and Quantity

- a. "Are there structures or patterns of shapes you're seeing in the magnified view that are similar to structures you see in the distant view? How are they alike and different?"
- b. "How might the size of a structure affect how it functions? For example, if one of the micro structures you observed were much larger, how might its function change?"

Cause and Effect

- a. "Look at some of the unique features of the subject you focused on in your journal. What did you notice?"

- b. "What might have caused some of these features to occur?"
- c. "What things in the surrounding environment might impact or influence the subject of your journal entry? Can you see any evidence of this?"
- d. "Is there any evidence you see of organisms that might have interacted with the subject of your journal entry?"
- e. "Can you come up with any explanations based on evidence about how the environment influences and interacts with your subject?"

FOLLOW-UP ACTIVITIES

Showing Scale in Magnified Views

Teach students how to show the scale of magnified views (three methods). The first two are useful if you plan to scan and resize the notes. The third does not require any measuring device.

1. Measure the actual size of the enlarged object or area and write the length next to the enlargement.
2. Measure the actual size of the enlarged object or area and add a scale bar next to the enlargement.
3. Compare the size of the real object with the enlarged drawing. Use the real object as a measurement unit and count how many could be placed end to end to match the length of the enlargement. This number is the magnification. If you could line up three-and-a-half seeds across your enlargement, you have magnified three-and-a-half times (or 3.5x).



Shrinking Adventure

Build a shrinking machine that can shrink the student down to the size of an ant, then have them complete the activity as written. Be careful not to step on any of them.

Reflecting on Perspective

Prompt students to look for places in previous journal entries where they'd already unintentionally included zoomed-in and zoomed-out views, or places where they would have liked to use this strategy.