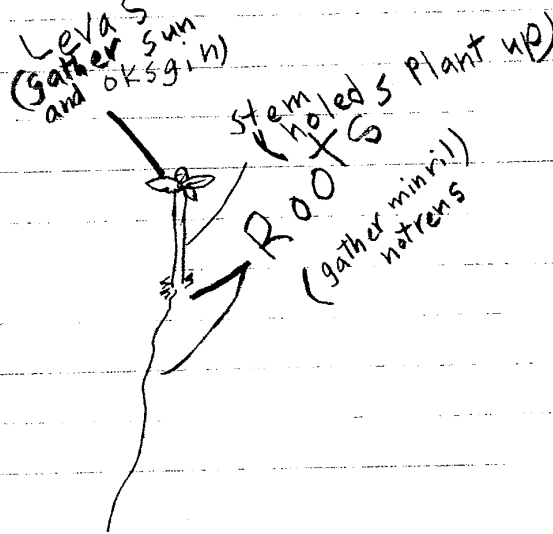


9/25

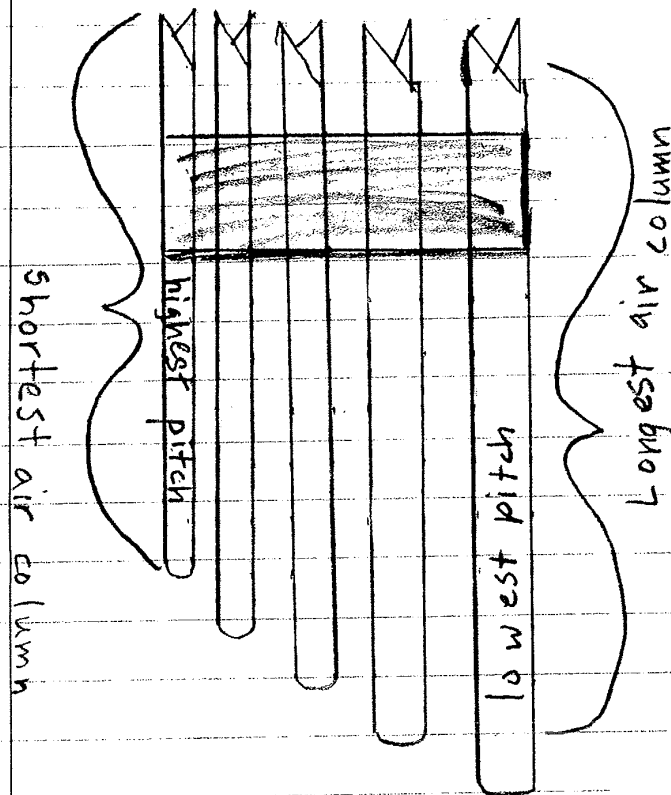
Focus Question: what differences
can we see in our seedlings?

Seedling



5.5.10

My reed instrument

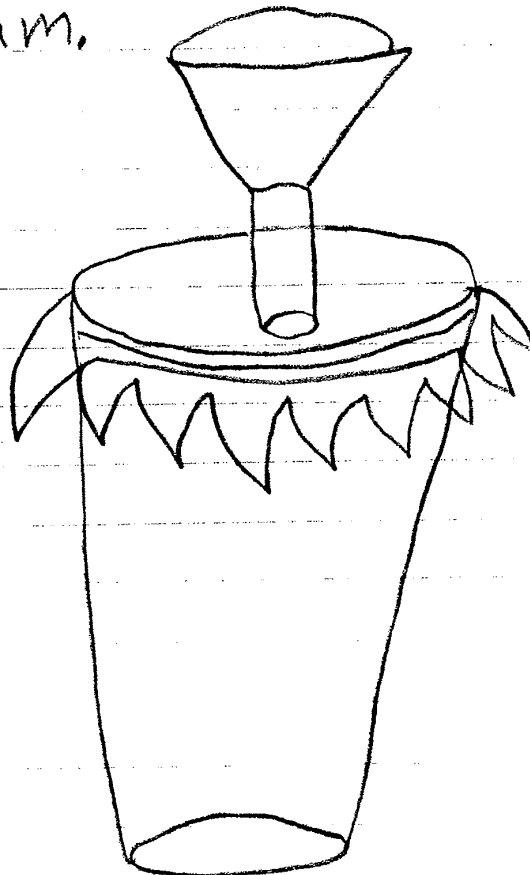


My instrument has reeds which vibrate the air columns. My instrument also has multiple pipes which make multiple pitches. The shortest air column produces the highest pitch, while the longest air column produces the lowest pitch.

My evidence that the model ear drum vibrates is I saw the tea leaves bouncing up and down. When the noise maker got closer to the tea leaves the tea leaves started to vibrate a little more.

The model ear drum is like the real human ear drum because they both vibrate. This model helps me to understand how we hear because it shows how sound vibrates.

To make my model eardrum into a model ear I could make a funnel and then attach it to the model ear drum.



5th Grade 2-8-08 Budget

What can we do to show that sound causes vibrations?

I think that the middle eardrum vibrates because when I cranked the sound maker it caused the air to vibrate which made the latex vibrate which made the tea leaves bounce.

When the noise maker got closer to the middle eardrum it caused the air to vibrate quicker and caused the latex to vibrate quicker which caused the tea leaves to bounce quicker. When the noise maker got farther away it caused the air to vibrate slower and the latex to vibrate slower and the tea leaves to move slow or not at all.

I conducted field tests of mineral H. The most distinctive property of mineral H is how it left a peach streak when I scraped it on the black streak plate. In the light test, the light for mineral H was translucent because I could see a little bit of light shine through it. Also, the hardness of mineral H was soft, because both a penny or a nail could scratch it. In addition, there was no magnetism because when I flipped the mineral the magnet didn't stick. Furthermore, mineral H has no special shape. Finally, the luster looked waxy when I shined the light on it.

I conducted observations of mineral H. the observable color of mineral H is: Pink, light-brown, and tan. also, there is no odor. in addition, the texture feels: smooth, dented, and lumpy.

4-29-10 water properties
→ I noticed that when I dropped the water on the white paper it didn't go the way I thought it would. When the drop of water hit the white paper it looked like a dome of a castle. The water dome felt smooth and when you hit it ^{with your finger} it breaks up.

→ Next I did the tin foil when I dropped water from the eyedropper you couldn't even see it. The water dome was invisible you could barely see it. I thought it was the funnest.

→ I observed that when I dropped water on the paper towel it

just soaked up into the paper towel. When the water dropped it made very cool shapes like a gear and weird shapes. When I was done the paper towel was soaking wet and there was a lot of water in it.

→ Last of all the wax paper the water domes were easy to see. I like to drag the domes around. The water domes didn't soak in the wax paper because it was covered and wax. I liked dragging the water domes around the wax paper.

Third Grade, Sample A—*Plant Growth and Development Unit: Ginny*

- In this scientific illustration, Ginny has added the function of each part next to its label: “Levas [leaves] (gather sun [light energy from the sun] and oksgin [oxygen])”; “Stem (holeds [holds] plant up)”; “Roots (gather minril notrens [mineral nutrients]).” Having students make a detailed drawing makes them observe the organism more closely than if they just observe it. Then having students add the functions to the labels while the class is discussing the seedling helps them construct their understanding of the seedling as a system, each part of which has a function.
- In drawing scientific illustrations, you want students to make them large enough to see details but not so large that it takes students too much time to draw them. This illustration could be a little larger so that Ginny can draw more details of what she observes.

Third Grade, Sample B—*Sound Unit: Lucy*

- In this physical science unit, making diagrams can help students remember what they are learning about the relationship between the length of an object and the pitch it makes (or other concepts about sound). Over time, students will not need this visual reminder, but while they are working with concrete objects and learning the concept, the diagram acts as a bridge between concrete experiences (the short column makes a high pitch, the long column makes a low pitch) and the abstract or generalized concept (short objects make high pitches and long objects make low pitches).
- In this case, the diagram is used to represent an instrument that Lucy has made based on her understanding of sound at the end of a unit of study. Lucy’s diagram is accurate and easy to read. Her paragraph about her instrument clearly describes the parts of her instrument and their functions and then explains the pitches the columns make.

Third Grade, Sample C—*Sound Unit: Afsara*

- To understand how our eardrums work, students make a model eardrum by stretching latex across the top of a cup and fastening it tightly. Then they put tea leaves on top of the latex and use a special noisemaker, moving it closer and closer to the cup. They observe that as the noisemaker gets closer, the tea leaves move faster on top of the latex. Students infer from this that the latex is vibrating because of the sound waves from the noisemaker.
- The first part of this entry supports students in providing evidence for their inferences about sound. Using the sentence starter “My evidence that the model ear drum vibrates,” Afsara writes about what she saw. Then she uses a cause-and-effect structure (“When the noise maker got closer to the tea leaves”) to add evidence to support her statement or claim.
- The second part of the entry makes students think about the similarities between their model eardrum and the real human eardrum. Students often do not make connections between their models and what they represent in the real world, so entries

like this are important for students to write. Afsara makes some good connections between the real and model eardrums.

- The last part of the entry helps students apply their understanding of models and real human ears as they consider how to revise their model. Again, writing about this kind of thinking is important in developing students' conceptual understanding and also gives you an idea of their level of understanding. Afsara's idea of adding a funnel to her model makes sense. You might ask her, "A scientist might wonder why you would add a funnel. What function would it serve?"
- Afsara is a first-generation English speaker who less than a year before this required tutoring in reading and writing. At the beginning of third grade, she relied heavily on writing frames. When she wrote this entry, during the second quarter of third grade, she no longer needed to use writing frames very much. Her third-grade teacher says that Afsara made huge gains in third grade, especially because of her experiences with science and science writing.

Third Grade, Sample D—Sound Unit: Gidget

- This is a more complex version of the first part of Sample C. Here, the entry is focusing on cause-and-effect and inferential thinking. The frame is "I think the model eardrum vibrates because ____." Note how Gidget includes each step of the chain of events: cranking the noisemaker causes the air to vibrate which causes the latex to vibrate which makes the tea leaves bounce. This is an extremely important structure for students to learn in science. Making a flow map as you discuss concepts like this can help students learn how to talk and write about cause and effect. Over the arrows between each part of a flow map, you can write the appropriate words (underlined in the example above).
- The second paragraph starts with this frame: "When the noise maker got closer to the model eardrum, _____. When the noise maker got farther away, _____." Gidget appropriately uses the frame to explain her observations and thinking.
- Note that if this were written at the very beginning of students' investigations with the noisemaker and tea leaves, you would focus first on what students can *observe*. For example, a student might write, "When I turned the noisemaker, I observed that the tea leaves moved. I think this happened because the sound waves made the latex vibrate, which made the tea leaves move. When I moved the noisemaker closer to the latex, I observed that the tea leaves moved even more." (In the first part of Sample C, Afsara writes a simpler version of this.)

Third Grade, Sample E—Rocks and Minerals Unit: Emma

- In this unit, students make observations of different minerals and conduct tests that show them additional properties of the minerals. When students write an observation of a mineral (they do this for only two or three of the twelve minerals, so that the writing experience is meaningful), students write one paragraph about their test results and one paragraph about their observations. In writing about their test results,

they include what they observed that makes them think the test had a particular result. They also organize their writing by checking off each observation and test result as they include it in their entry.

- Emma has written a detailed, organized, and accurate description of the mineral. Note how she uses the words *Also*, *In addition*, and *Finally*, to add information to her entry (as shown in the Useful Words and Phrases in Scientific Writing chart in the Reproducibles section of this website).
- Although some writing programs instruct students not to include data or observations in topic sentences (just as Emma was instructed), students will learn to write in more complex ways using higher-level thinking if you teach them how to combine information in their introductory statements. For example, in this case, a more complex and meaningful introductory sentence would be, “In my field tests of Mineral H, its most distinctive property is how it left a peach streak when I . . .” The second paragraph could begin in this way: “In my observations of Mineral H, pink, light brown, and tan are its observable colors . . .”

Third Grade, Sample F—*Water Unit: Ethan*

- After students explore what happens to drops of water when they are dropped onto white paper, tin foil, paper towel, and waxed paper, students write their observations. When you read this entry, think about which statements are scientific observations and which are examples of creative writing.
- In the paragraph about the white paper, Ethan reports four strong scientific observations: the water did not go through the paper, the drop looked like a dome, the dome felt smooth, and it broke up when he hit it with his finger. The words “like the dome of a castle” is a creative simile that is inappropriate in a scientific observation. When describing the shape of water drops, students can learn to write about dome shapes, hemispheres, or spheres.
- In the second paragraph, the first two sentences are redundant but report an important observation. You might ask Ethan, “A scientist might wonder what else you noticed about the drop when you touched it or hit it.” The last sentence does not belong in a scientific entry.
- The third paragraph includes several key observations. “Weird” and “cool” are not scientific. You might say, “A scientist would want to know what you actually observed about the shapes.” Similarly, in the last paragraph, you would ask, “Could you describe for a scientist what you *observed* about the water drops as you dragged them across the waxed paper? Telling a scientist that you liked doing something does not communicate any important details about your observations. But in moving the drops, you have made some interesting scientific discoveries, haven’t you?”
- Ethan clearly has developed good observational skills and, on the whole, has written a strong scientific observation. With more feedback and practice, he will learn how to write observations that are purely scientific without any creative-writing elements.