

Conclusion

At the beginning the plants in the dark where taller than the plants in the light.

but the plants in the light where dark grass green and the other plant where yellow lime. and the plants in light had 15 buds and the others had no buds and they had no true leaves but the plants in the light had true leaves.

12/3/08

CONCLUSION

Light effects how the seeds and plants grow. I predicted the plants in the dark would be shorter than the plants in the light. At first I was wrong the plants in the light were 1 1/2 cm tall and the plants in the dark were 2 cm tall. However, later on the plants in the light grew and the plants in the dark stayed the same. The plants in the light got true leaves, and the plants in the dark there seed leaves turned yellow, and there stem turned white, and they drooped a lot more so the light effects the color and the health of the plant.

How does length affect
pitch

the graph shows me
that when the slide
is at 3 cm it's the
highest and when it is
at 12 cm it is the lowest
when it is 9 cm high but not highest
when it is 11 cm low but not lowest

3-1-10

How does the length of rulers affect pitch?

→ I observed that the longer ruler (28cm) has a low pitch and the short ruler (6cm) has a high pitch. I reminds me of the tuning forks because the longer one was lower and the shorter one was higher. When I put the ruler at 6 cm made a high sound. At first I thought that the smaller one would be easier to strum. But now I know that it is harder to strum because you don't have as much room. I am curious about why the smaller one has a higher pitch.

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

- The teacher of the students who wrote these next two samples did not provide a frame for writing a conclusion. During the class discussions, they have compared characteristics of the plants grown in the light with those of plants grown in the dark, using a T-chart structure for contrasting the characteristics and determining the effect of light on the health of plants.
- Note how Garrett begins by comparing the height of the plants, with the plants grown in the dark being taller, at first, than those grown in the light. This is a surprising outcome to many students. Then he uses the word *but* to imply a strong point that the plants in the dark might have been taller, *but* their color was yellow lime, which is not a characteristic of a healthy plant. Then he provides two more characteristics that implicitly indicate that the plants that grew in the light were healthier than the plants grown in the dark. On the whole, this is a strong conclusion that shows that Garrett has strong scientific thinking and writing skills. To take his scientific writing to the next level, he can work on being more explicit about the overall point he is trying to make (in this case, that the plants grown in the light are healthier than the plants grown in the dark as indicated by specific characteristics).

Third Grade, Sample B—*Plant Growth and Development Unit: Ivan*

- Ivan writes his conclusion differently than Garrett does. He begins with a general answer to the investigative question, then addresses the plants' relative heights, juxtaposing evidence about plants grown in the light with plants grown in the dark. This is a strong way of providing evidence.
- He continues by providing evidence about the plants' leaves, although he does not contrast leaves of the same type, and then provides evidence about the stem of the plants grown in the light. So a scientist might ask, "What did you observe about the seed leaves and the stem of the plants grown in the light? When you report data about the color of the plants and their parts, what does the color say about the health of the plants?" Like Garrett, Ivan already has strong scientific thinking and writing skills. This is the first time he has written a scientific conclusion in this grade. His next step is to learn to provide evidence from *both* sides of the rows of a T-chart, which would be a good tool for him to use to organize his evidence. He also needs to write more explicitly. Although we can infer that Ivan understands the concepts in the investigation, neither the first nor the last sentence of his conclusion explicitly states what effect light has on the color, and therefore the health, of the plants. This is a thinking and writing skill that Ivan will develop as he writes more scientific conclusions.

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

- Conclusions about investigations in physical science units in the elementary grades tend to be easier to write than conclusions in life and earth science investigations because there are fewer things to report. In this conclusion, students have tested the effect of the length of the column of air in a slide whistle on the pitch that the whistle makes. Max reports the evidence from the shortest column (highest pitch) and the longest column (lowest pitch) as well as the lengths and pitches in between. He understands how to read the graph and write about what the data tell him.
- This class includes first, second, and third graders, which makes differentiation challenging. The next step with the older students will be to make the conclusion more complex, adding connections to previous investigations they have made or applications of the information to engineering challenges such as how to make a different kind of instrument.

Third Grade, Sample D—*Sound Unit: Ben H.*

- In this conclusion, students are to report what they observed about the rulers, connect this evidence with earlier investigations (prompted by “It reminds me of”), then think about how their thinking has changed (“At first I thought . . . But now I know . . .”) and broaden their thinking (“I am curious about . . .”).
- Ben accurately reports the results of his investigations with the rulers, adding the actual length to be more specific about what he has been testing. He makes an appropriate connection with his earlier investigations with the tuning forks. His change in thinking has less to do with the physics of sound than it does with a design issue, but later in the unit, he will be designing an instrument and this thinking could be useful. He ends with a question that cannot be answered through observation, but now that he has had conducted many investigations, he is ready to do some research beyond the unit’s investigations.