

## Conclusions

### The Three Key Elements

In this science-writing approach, the first two components of a *basic* conclusion are the answer to the question and the evidence or data that support the answer. The third component is a general statement about what the data indicate (for example, “As the wheel size increases, the distance the go-cart travels increases.”). The fourth component, if it is needed in a basic conclusion, addresses whether or not the student’s prediction is accurate based on the test results.

A *complex* conclusion has all four of these components. It also includes components that help students think and write about the development of their scientific thinking and understanding, inconsistent or confusing data and what might have caused those outcomes, and what other questions they want to investigate.

When planning your lesson for teaching students how to think and write about the conclusion to their investigation, then later assessing their notebook entry in terms of the Three Key Elements, consider the following questions. What does the written conclusion reveal about the student’s:

1. Understanding of one or more *science concepts* (for example, uses appropriate evidence and reasoning that indicates she understands the concept or concepts)?
2. Ability to *think scientifically* (for example, chooses and provides appropriate data and/or reasoning to support the answer or a claim; reaches a conclusion that makes sense based on the data; recognizes when data do not support a prediction and when reasoning, the student’s hypothesis, does not make sense)?
3. Ability to use *scientific skills* (for example, has accurately collected and recorded observations and/or quantitative data on which the conclusion is based)?

## Characteristics of an Exemplary Basic (#1–4) or a Complex (#1–7) Conclusion

1. **Accurately answers the question the student has been investigating.**
2. **Provides evidence to support answer:**
  - Observations (qualitative data)—i.e., what student has observed, such as the color of a plant's leaves (rather than what he has measured, such as the height of a plant).*

*and/or*

  - Comparison of test results (e.g., "The largest wheels made the go-carts go farther than the smallest wheels.").*
  - Summary of measured (quantitative) data (i.e., reports specific measured data from the lowest and highest ends of the range, not all data: e.g., "7.5 cm wheels . . . went only 140 cm, but 11.5 cm wheels . . . went 283 cm.").*
  - Comparative data (e.g., "In fact, the 11.5 cm wheels made the go-cart travel 143 cm farther [and/or "about twice as far"] as the 7.5 cm wheels.") if needed.*
  - Other data, if inconclusive test results make it impossible to reach a conclusion.*
3. **Makes concluding statement that answers the question in a more generalized way (e.g., "Therefore, as the wheel size increases, the distance the go-cart travels increases." Or "So, the larger the wheels, the farther the distance the go-cart travels.").**
4. **Discusses whether results of investigation support student's prediction (i.e., *what he thought would happen*).**
5. **Addresses initial reasoning (inference or hypothesis) that was the basis for the prediction. Explains how thinking has or has not changed since making the prediction.**
6. **Points out inconsistent or confusing data, if applicable, and what might have caused those results.**
7. **May include question(s) student wants to investigate because of the results.**