

CER-RR Writing Guidelines

Your Claim Should

- ❖ Rephrase the investigative question as a statement summarizing your finding. (i.e. As the temperature of the balloon increased, the volume increased.)
- ❖ Identify the independent and dependent variables (i.e. Temperature is the independent variable and volume is the dependent variable.)
- ❖ Describe the relationship between these variables. (i.e. as temperature increased, volume increased.)

Your Evidence Should

- ❖ *Describe* many data points. One data point is not sufficient. (i.e. ...and at 25°C the volume of the balloon was 2.20 L)
- ❖ Include accurate number values (with the correct number of decimal places) taken from the data or graphs. Include units. (i.e. at temperature 22.0°C the volume of the balloon was 1.75 L)
- ❖ Include clear descriptions of all labels of graph axes or data table columns (i.e. graph 2 shows temperature on the x-axis and volume on the y-axis) [Assume that the reader cannot see the graph and you have to describe it in detail]
- ❖ Describe graph trends (i.e. as the temperature increased, the volume of the balloon also increased.)

Your Reasoning Should

- ❖ Explain and generalize what your evidence shows (i.e. my data show that as temperature increases, the volume also increases)
- ❖ Reference your claim (i.e. these data support my original claim)
- ❖ Include the scientific concepts we've learned that help explain what is happening with these data (i.e. our results support Charles' Law which states that as temperature of a balloon increases, the volume will increase proportionately.)
- ❖ Explain the scientific concepts related to these data (i.e. in class we learned that volume increase as temperature increases because the molecules move faster and with more energy, striking the walls of the balloon more frequently)

Your Reflection/Rebuttal Should

- ❖ Include an alternate explanation (i.e. While I am confident about my explanation, another possible explanation for our data is...)
- ❖ Include an "I wonder..." statement for further questions (i.e. I wonder if reaction rates might be affected by other factors such as pressure)
- ❖ Include possible limitations in your experimental design or measurements and their specific impact on your findings (i.e. We couldn't control for moisture in the room and that might have made the mass increase as the product absorbed water from the air. We recognized that heat was transferred to the environment, making it difficult to maintain a perfectly precise temperature. If temperatures were lower than recorded values, the volume increase would appear to be greater than it actually was.)

Writing in general:

- ❖ Do not use pronouns (it, they) as they are not usually specific.
- ❖ Do not claim that you have “proved” anything. You haven’t. Your evidence may support your claim, but science does not “prove.”
- ❖ State specific sources of error as limitations and describe them clearly. “Human error” is not a valid source of experimental error. Describe mistakes as mistakes.
- ❖ “We may have measured wrong” or “Our calculations may have been off” are not valid limitations. Do the experiment again.
- ❖ “Our results were off.....”

Include page of practice re-writing of CER, using academic language, and page for students to use when writing their own.