

**Hi there!**

I'm glad you're using this resource. Continue to check our website ([realsciencechallenge.com](https://realsciencechallenge.com)) to find more resources. And, sign up for our newsletter to receive updates on materials that will be available soon.

I spend countless hours writing, researching, editing and generating graphics/charts for each question. I want to continue creating useful content for you to use - however, I also want to ensure my work is fairly compensated.

Therefore, below are the terms and conditions for use of our materials.

What is allowed:

- photocopying our content for your students to use.
- posting a copy of our content (ie. questions, rubrics) on a password protected site for your students to access and/or complete.
- copying our questions into your tests or assignments. Please give credit in this case.

What is not allowed:

- Selling our content.
- Repackaging our content in your own materials and then selling it. NOTE: giving credit to us still does not make this okay.
- Distributing and/or posting our content online (for example, on social media or a blog).

Thank you for supporting us. And, we look forward to helping you with your teaching practice. Please feel free to reach out to us if you have any questions or suggestions.

Sincerely,

Kent  
REAL Science Challenge Founder  
Science Department Head (Burnaby South Secondary)

# Is This a Sandwich, Soup, or Salad?

Imagine all foods are classified under 3 categories: sandwich, soup, or salad. How would you classify popular food items (like cheeseburgers, lasagna, or chips and salsa)? Practice using CER (Claim, Evidence, Reasoning) to come up with your response.

Sample: Is Chips and Salsa a sandwich, soup, or salad?

## **Claim 1: It's a Salad**

Evidence: Salsa contains fresh, diced vegetables tossed together and seasoned.

Reasoning: Traditionally, salads have fresh vegetables that are cut, tossed together and seasoned.

## **Claim 2: It's a Soup**

Evidence: Some salsas contain a watery base with many vegetables that are mushy, mashed, and mixed into the liquid.

Reasoning: Vegetable soup is made up mostly of a liquid broth with fully cooked vegetables within it.

## **Claim 3: It's a Sandwich**

Evidence: chips are sturdy and starchy food items that are used to scoop up salsa, which is a topping or filling.

Reasoning: Sandwiches use starchy foods (ie. Bread) to hold, scoop, and/or carry fillings or toppings too. For example, open-faced sandwiches feature a single piece of bread with toppings on top.

# Case Studies on Bias in Science Ed.

Bias is defined as any tendency which prevents unprejudiced consideration of a question. In research, bias occurs when “systematic error [is] introduced into sampling or testing by selecting or encouraging one outcome or answer over others”. Bias can occur at any phase of research, including study design or data collection, as well as in the process of data analysis and publication. Readers of scientific research must consider the degree to which bias was prevented by proper study design and implementation. As some degree of bias is nearly always present in a published study, readers must also consider how bias might influence a study's conclusions.

## Case 1

Researchers are planning to conduct an experiment that studies the link between air pollution and asthma. The researchers ask for volunteers from a local university to participate. Two thousand volunteers - mostly first and second year students - sign up to participate. Volunteers are given a series of tests that measure the presence of asthma at the beginning of the study and every 3 months during the study as the participants live, work, and study in the university and the surrounding neighborhood. After 1 year, researchers found that - of the two thousand volunteers who participated - only 10 individuals developed asthma after a year. Therefore, researchers conclude that there is no link between air pollution and asthma. How might bias influence the study's conclusion (ie. lead to a conclusion that is not necessarily correct or representative) ? Explain.

## Case 2

Researchers are planning to conduct an experiment that studies the link between social media use and sleep quality in teenagers. You are an expert that has been hired to reduce bias in the study. Describe some of the things you would do to reduce bias. Consider:

- Who would you study (age range, gender, location, etc.) and how would you find them to participate in your study?
- How would you measure sleep quality?
- How would you analyze your results to determine whether or not there is a link between social media use and sleep quality?