

Read Ch. 1.3, pp. 10-13

1. Read the following sentence starters and descriptions. Identify and label each as “C” for claim, “E” for evidence or “R” for Reasoning.

- | | |
|---|---|
| a) <u>R</u> Based on this evidence, ... | b) <u>R</u> Includes one or more scientific principle. |
| c) <u>R</u> According to the text/video... | d) <u>R</u> This is important because... |
| e) <u>E,R</u> The data show... | f) <u>R</u> This shows that... |
| g) <u>E</u> Information gathered from hands-on investigations, reading, videos, interviews... | h) <u>E</u> The author wrote... |
| i) <u>C</u> If..., then... | j) <u>E</u> From the reading I know that... |
| k) <u>C</u> Answers the key question. | l) <u>E</u> The graphic showed... |
| m) <u>R</u> Therefore,... | n) <u>R</u> Because... |
| o) <u>R</u> Ties together claim and evidence. | p) <u>R</u> Shows how or why data supports claim. |
| q) <u>C</u> Consists of one sentence. | r) <u>R</u> All this proves that (restate your claim) because... |
| s) <u>E</u> Information from a reliable source. | t) <u>R</u> Use key words and ideas provided in the question as you write this. |

2. What is a scientific method?

A systematic approach used in scientific study to answer questions that are scientific in nature..

3. Define and explain the following terms:

a) Hypothesis

Tentative explanation based on observations; must be falsifiable

b) Experiment

Set of controlled observations designed to test a hypothesis; must be reproducible

c) Data (define, then describe types) **Observations or results**

Qualitative: descriptive, subjective

Quantitative: numerical, measured

d) Variables (define, then describe types) **Observed data that change**

Independent—you control (x-axis);

Dependent—you measure, changes in response (y-axis)

e) Control **An experiment where the independent variable is held constant**

f) Conclusion. Explain CER.

– **Claim:** What the evidence supports; may restate the hypothesis/beginning question.

– **Evidence:** Data & Calculations in support of hypothesis. Must be relevant and complete.

– **Reasoning:** How/why does the evidence support it? What scientific principles apply? Is data accurate/precise? Must be correct and complete. Shows understanding.

g) Theory

Explanation *strongly supported* (not proven) by many experiments. *Why* a system works the way it does.

h) Law

Concise description of how, not why, something works. Often mathematical equations or models.

4. You are asked to study the effect of temperature on the volume of a balloon. The balloon's size increases as it is warmed.

a) What is the independent variable? **The temperature**

b) What is the dependent variable? **the size of the balloon**

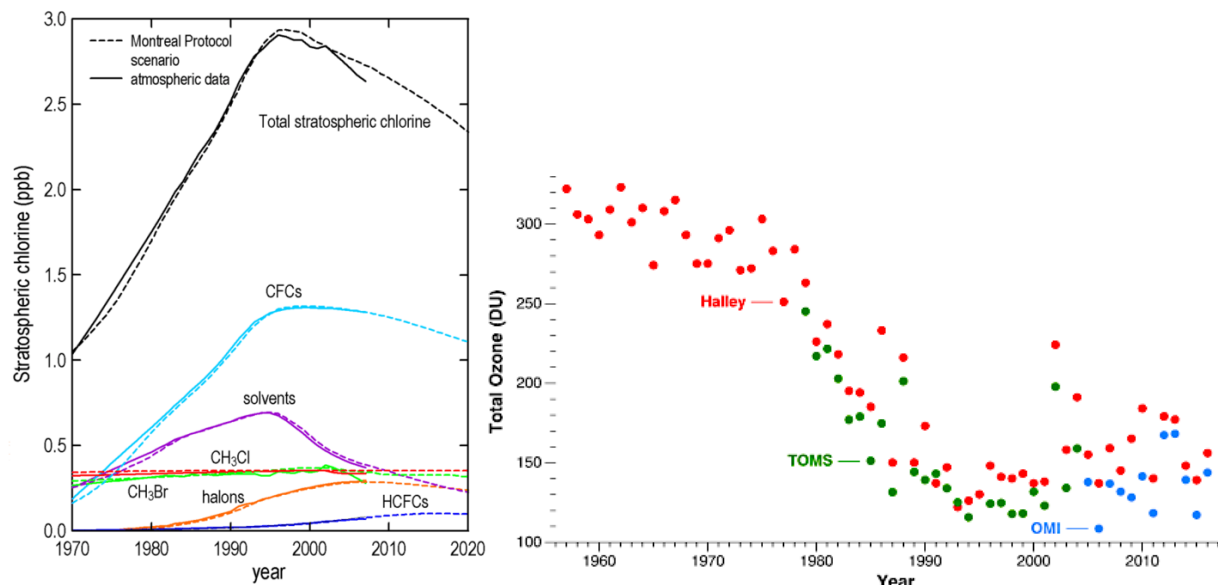
c) What factor is held constant? **the amount and type of gas in the balloon**

d) How would you construct a control? **use an identical balloon kept at room temperature**

5. A report in the media states that a specific diet will protect individuals from cancer. However, no data are reported to support this statement. What is missing from the CER model?

There is no supporting evidence (E) or scientific principles (R).

6. In class we discussed how CFCs released in the atmosphere were causing the destruction of the protective ozone layer. In 1987 the Montreal Protocol mandated decreases in production of ozone depleting chemicals. Below are two graphs showing the concentrations of CFCs (left) and ozone (right) in the years before and after Montreal. Use the CER model to discuss whether the reduction of CFCs was successful.



Claim: The Montreal Protocol led to an improvement in the ozone layer.

Evidence: Around 1993, after implementation of the Protocol, CFC concentrations in the stratosphere decreased. In 1993, the concentration of ozone started increasing.

Reasoning: Since the increase in ozone coincided with the decrease in CFCs, and prior experiments have connected the presence of CFCs to destruction of ozone, decrease in the level of CFCs has been responsible for increasing the level of ozone.