

IN:

1. What are the **constraints** in a design problem?
 - **Constraints** are **materials and resources** available; limitations that must be satisfied by a design
2. What are the criteria?
 - **Criteria** are the **design features**; rules or directions that must be followed; the requirements that must be met

**I. Claims**

= **the statements that answer your original question.**

- a. Must be accurate, specific, and **answer the question.**
- b. Usually **one** sentence long

II. Evidence

= **scientific data that supports your claim**



- a. Comes from: textbook, articles, videos, experimental data, class notes
- b. **Need numerous pieces of evidence to prove claim !**

- c. Should include both **qualitative** and **quantitative** data

1. **Quantitative** data = **can be expressed as a number or measured.** Examples: test scores, time, or weight
2. **Qualitative** data = **information about the quality of something;** NOT expressed as a number. Examples: skin softness, eye color, favorite foods

(Only quantitative data can be analyzed statistically)

III. Reasoning

= **is the explanation that connects your claim to the evidence**

- a. Supports claim
- b. Why you think your answer to the question (claim) is correct .
- c. Shows **why the data counts as evidence.**
- d. **Includes an explanation of the scientific principle(s) involved (conclusion.)**
- e. Several sentences long

Example: What type of animal is this?

Claim: It is a mammal.

Evidence: The animal has hair.



Reasoning: A characteristic of mammals is having hair or fur, therefore this animal is a mammal because it has hair.

Scientific Principle

Evidence

Example: How does temperature affect plant growth?

Claim: The rate of plant growth increases as the temperature increases.

Evidence:



Data Table: Weight, Height, & Leaf Number Changes of Plants Grown for One Week at Room Temperature and in a Greenhouse

Plants	Weight Change (g)	Height Change (cm)	Number of Leaves
Control Group Inside at 70 °F	5	2	2
Experimental Group in Greenhouse at 85°F	10	4	5

Reasoning:

The rate of plant growth increased as the temperature increased (claim) because the experimental plant had a larger mass, had more leaves, and grew taller than the control plant. The data table shows that the mass of the experimental plants increased by 10 g, while the control plants increased by only 5 g. The experimental plants grew 4 cm while the control plants grew only 2 cm. The experimental plants got five new leaves while the control plants only got two new leaves. Plants do photosynthesis faster at warmer temperatures. So, they grow more. Other factors influence plant growth like water, sunlight, and soil. But, this experiment showed that temperature can also affect growth.

Restate claim.
Link claim to evidence.

Evidence from Data Table

Explanation of Scientific Principle

Conduct the Alka-seltzer Lab



Let's do the reasoning together!

Part 1: The Alka-seltzer dissolved the fastest in hot water because the tablet was completely gone in the shortest amount of time when compared to the time it took to dissolve in the control and the cold water.

Part 2: The data table shows that at 60°C the tablet dissolved in 21 seconds while the tablet dissolved in 31 seconds at 15°C and in 1 minute and 35 seconds at 2°C.

Part 3: The higher the temperature, the more energy there is to cause molecules to collide. The more energy and collisions, the faster the chemical reaction will occur.

Restate claim.
Link claim to evidence.

Evidence from Data Table

Explanation of Scientific Principle

OUT:

What are the requirements for a data table to be in correct scientific format?

HINT: See P8 How to make a data table?

