

Claim, Evidence, Reasoning (CER)

Building evidence based thinking across every subject, with science and engineering examples.



The three parts

What counts as strong depends on the subject and the question.

C

CLAIM

Answers the question or states a conclusion.

What is your answer?

E

EVIDENCE

Relevant data or observations that support the claim.

How do you know?

R

REASONING

Uses science ideas to link the evidence to the claim.

Why does that evidence support it?

Easy ways to introduce it

Start with low pressure examples, before any formal task. Paths below are on virtuallscienceteachers.org.

Commercials and videos

My Dad Is a Space Alien, She Shed, Doritos

[Search these titles online](#)

Mystery images and demos

Footprints, a rusty car, a potato candle

[/cer-mystery-images](#)

[/candle-demo](#)

Classification games

Soup, Salad, or Sandwich?

[/cer-sandwich-salad-or-soup](#)

Funny correlation graphs

Ice cream and shark attacks, shoe size and reading level

[/correlation-vs-causation-graphs](#)

Six ways CER shows up in science and engineering

Common prompt types, not a rigid list.

Classification

Use evidence and criteria to decide which category best fits.

EXAMPLE *Based on the evidence, is this change physical or chemical?*

Comparison

Compare results gathered under the same conditions or criteria.

EXAMPLE *Under the same conditions, which material reduced heat transfer the most?*

Pattern or relationship

Use data to describe how quantities, conditions, or results are related.

EXAMPLE *What relationship is shown between altitude and temperature?*

Effect of a variable

Use a controlled test or strong evidence to examine how one factor affects another.

EXAMPLE *Under the tested conditions, how does nitrate concentration affect algae growth?*

Prediction

Use evidence, patterns, models, or prior cases to support what is likely next.

EXAMPLE *Based on the data, what will likely happen if the food supply decreases?*

Evaluate a solution

Use criteria, constraints, and test results to justify a design choice.

EXAMPLE *Which bridge design best meets the criteria and constraints?*

EVIDENCE MAY INCLUDE

observations

measurements

investigations

graphs and data

credible sources

calculations

models

design tests

REASONING MAY DRAW ON

accepted science concepts

definitions and criteria

cause and effect

models and mechanisms

math relationships

prior investigations

CORRELATION CHECK Two things changing together does not prove cause and effect. Ask: could another variable explain the pattern?

TRY CER WITH STUDENTS: [Graph Skill Builders](#) | [Virtual Labs & Simulations](#)

Evaluate the evidence and reasoning

Four questions to ask of any student response.

1 Relevant

Does it directly support the claim and answer the question asked?

2 Sufficient and strong

Is there enough of it? Could another explanation fit just as well?

3 Trustworthy

Did it come from a fair method, accurate data, or a credible source?

4 Well reasoned

Does it link evidence to claim using science, without overclaiming?