# CASE STUDIES OUTLINE

## INTRODUCTION

Want to make multiple choice test questions that use case studies to engage critical and scientific thinking? We suggest writing case studies that focus on one of three themes: (1) experimental design analysis, (2) experimental results analysis, and (3) multiple hypotheses analysis. We outline the three case study themes below.

### 1. Experimental Design Analysis

In these case studies, students are responsible for analyzing how an experiment is setup and how changes to the experimental setup can change the results. Students are typically given:

- Some background information regarding what the experiment is about.
- The experimental procedure, which includes the independent and dependent variables as well as some important controlled variables.
- Two or three different variations to the same experiment.
- Results in the form of tables or graphs for all variations to the experiment.

Questions for experimental design analysis case studies include:

- Identifying independent, dependent, and controlled variables.
- Predicting what can potentially occur if there are changes to any variables.
- Identifying or developing testable hypotheses
- Predicting hypothetical conditions that may provide similar experimental results
- Predicting future results under certain conditions.

Sample Case Study: Passage 1 in REAL Science Challenge Vol 2 Contest 4

## 2. Experimental Results Analysis

In these case studies, students are responsible for analyzing experimental results and applying such results in other scenarios. Students are typically given:

- Some background information regarding what the experiment is about.
- The experimental procedure, which includes the independent and dependent variables as well as some important controlled variables.
- Two or three different variations to the same experiment.
- Results in the form of tables or graphs for all variations to the experiment.

Questions for experimental design analysis case studies include:

- Identifying independent, dependent, and controlled variables.
- Predicting what can potentially occur if there are changes to any variables.
- Identifying or developing testable hypotheses
- Predicting hypothetical conditions that may provide similar experimental results
- Predicting future results under certain conditions.

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## 3. Multiple Hypotheses Analysis

In these case studies, students are responsible for comparing and contrasting the many hypotheses that may exist that explain the same scientific phenomenon. Students are typically given:

- A scientific phenomenon where there may be multiple hypotheses that explain the phenomenon.
- Details regarding two or three of the most popular hypotheses.

Questions for experimental design analysis case studies include:

- Determining which hypothesis is supported or refuted if given new evidence. Predicting future experimental results if one of the hypotheses was deemed correct.
- Identifying independent, dependent, and controlled variables.

Sample Case Study: Passages 3 in REAL Science Challenge Vol 2 Contest 4