Scoring BCRs

**Your task**: Read the BCR prompts and the sample student answers. Using the rubric provided, assign a score to each BCR. Write a brief paragraph defending your score for each response.

**BCR Prompt #1**:

Bean growers want to increase crop yields to meet the growing demand for food. The Acme Fertilizer Company has asked you to test the effect of their latest product, *Growmore*, on bean production.

Design an experiment to test the effect of this fertilizer on bean production in bean plants. Your answer should include:

* A description of the control and experimental groups
* Dependent and independent variable(s)
* Conditions such as temperature, water amount, soil type, and plant type
* Data you would expect to collect

**BCR Scoring Rubric**:

4 points—The student’s response demonstrates a full and complete understanding of experimental design, variables and controls, and data collection/analysis.

3 points—The student’s response demonstrates a good understanding of experimental design, variables and controls, and data collection/analysis. Each part of the response is mostly correct or some part may be missing.

2 points—The student’s response demonstrates only a basic understanding. Key parts are missing.

1 point—The student’s response demonstrates little understanding of experimental design. The student could maybe draw a conclusion.

🡪The student’s response is on the back of this sheet. Read, score, and explain your scoring.

Student Response:

The variable is fertilizer, so I would add fertilizer to one group of the plants for the experimental group. For controls I would water all of the plants the same and put them in the same kind of soil. I would also have to make sure that I started with the same kind of seeds for each of the plants. Another condition is temperature; I would keep all of the plants the same temperature.

When you do an experiment you need data and observations. The plants’ growth is a variable so I would measure the plants every day and the measurements would be my data. From this I could tell if the fertilizer was working or not.

**What score would you give this student and why?**

**What are two specific things the student should have done to get a better score?**

**BCR Prompt #2:**

The table below lists enzymes that function in different locations in the human body, and the normal pH and temperature ranges of these locations.

|  |  |  |  |
| --- | --- | --- | --- |
| **Location of Enzyme** | **Enzyme** | **pH ranges of location** | **Temperature ranges (°C) of location** |
| Mouth | Amylase | 6.0-7.0 | 36.7-37.0 |
| Stomach | Pepsin | 2.0-3.0 | 37.3-37.6 |
| Small Intestine | Trypsin, lipase | 7.5-9.0 | 37.3-37.6 |

Use your understanding of the structure and function of enzymes to

* predict how the activity of pepsin will change after it moves from the stomach to the small intestine
* explain your prediction using data from the table
* describe how changes in pH and temperature affect enzyme activity
* predict how a fever of 40°C would affect enzyme activity

BCR Scoring Rubric:

4 points—The student’s response demonstrates a full and complete understanding of enzymatic structure and function. The student correctly identified an enzyme as a protein with active sites that are specific to substrates. The student should have recognized that changes in pH and temperature disrupt enzyme activity.

3 points—The student’s response demonstrates a good understanding of enzymatic structure and function. The student correctly describes enzymes as proteins that speed up chemical reactions. The student has recognized that changes in pH and temperature affects enzyme activity but does not cite any specific data from the table.

2 points—The student’s response demonstrates a basic understanding of enzymatic structure and function. The student can identify the fact that enzymes speed up chemical reactions. The student can state that pH affects enzymes but does make predictions using data from the table.

1 point—The student’s response demonstrates some understanding and is minimally correct; the student knows something about enzymes.

🡪Sample student response is on the back. Read, score, and defend your score.

Student Response:

If pepsin moves from the stomach to the small intestine it will stop working because enzymes are specific proteins. They have to work in the same conditions or else the substrates won’t fit because the active site will unfold. If you change the temperature or the pH the enzyme will not work as well and it will not be able to speed up the chemical reactions in the cell. A fever is a temperature change so it would change the enzyme shape and the enzyme would not work. If the shape is changed then the substrate will not bind the right way and there won’t be a reaction.

**What score would you give this student and why?**

**What are two specific things this student could do to get a better score?**