PEEBEDU Enzyme Environment Explorer

Name: _____ **Period:** _____ **Date:** _____

> Open **peebedu.com** and navigate to **Enzyme Environment Explorer**. Use the **enzyme selector** to choose an enzyme, then adjust the **temperature** and **pH sliders** to observe how environmental conditions affect enzyme shape and catalytic activity. Try multiple enzymes to compare their optimal conditions.

Free Response Questions

Question 1 — Conceptual Analysis

> **Simulation Task:** *In the Enzyme Environment Explorer, select Amylase. Set the temperature slider to 37 degrees C and adjust the pH slider to find the optimal pH. Note the enzyme's shape and activity level. Then slowly increase the temperature to 80 degrees C and observe what happens to the enzyme's shape and activity.*

(A) (1 pt) **Describe** the relationship between environmental temperature and an enzyme's three-dimensional structure.

(B) (1 pt) **Explain** why reaction rate increases as temperature rises from 0 degrees C toward 37 degrees C but then sharply decreases as temperature continues to rise beyond the optimum.

(C) (1 pt) **Predict** what would happen to the rate of protein digestion in the stomach of an ectothermic predator if its body temperature dropped significantly due to a sudden decrease in environmental temperature.

(D) (1 pt) **Justify** your prediction.

3.2.A.1, EK 3.2.B.1, EK 3.2.B.2

Question 2 — Analyze Model / Visual Representation

> **Simulation Task:** *In the Enzyme Environment Explorer, select Catalase. Find the optimal temperature and pH. Then move the temperature slider to an extreme value (above 70 degrees C) to observe denaturation. Return the slider to the optimal temperature and observe whether the enzyme recovers its shape and activity.*

(A) (1 pt) **Describe** what happens to an enzyme's catalytic function when its three-dimensional shape is disrupted by an environmental change.

(B) (1 pt) **Explain** why Pepsin has maximum activity near pH 2 while Amylase has maximum activity near pH 7.

(C) (1 pt) **Represent** the relationship between temperature and reaction rate for a typical human enzyme by drawing a labeled graph with temperature on the x-axis and reaction rate on the y-axis.

Draw your diagram here.

(D) (1 pt) **Explain** how rising environmental temperatures could act as a selective pressure on enzyme variants within a population of ectothermic organisms.

3.2.A.1, EK 3.2.A.2, EK 3.2.B.1, EK 3.2.B.2