

PEEBEDU Blood Sugar Regulation App

Unit 4: Cell Communication and Cell Cycle

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Blood Sugar Regulation App**. Click the **Start Regulating** button to begin. Read the introduction popup, which describes the four stages of blood sugar regulation: Glucose Rise, Insulin Response, Glucose Drop, and Glucagon Response.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Set the simulation to **Normal Regulation** mode. Click **Eat Food** twice and observe the glucose meter and trend chart as blood sugar rises. Watch for the pancreas to release insulin and for glucose to return toward the set point. Then click **Exercise** and observe how the system responds when glucose drops below the set point.

(A) (1 pt) **Describe** the role of insulin in the regulation of blood glucose concentration.

(B) (1 pt) **Explain** why blood glucose concentration rises sharply after eating but then returns to approximately the same baseline level, rather than continuing to rise or falling to zero.

(C) (1 pt) **Predict** how blood glucose concentration after a meal would differ in an individual whose pancreatic beta cells no longer produce insulin compared with a healthy individual.

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

Question 2 — Analyze Model / Visual Representation

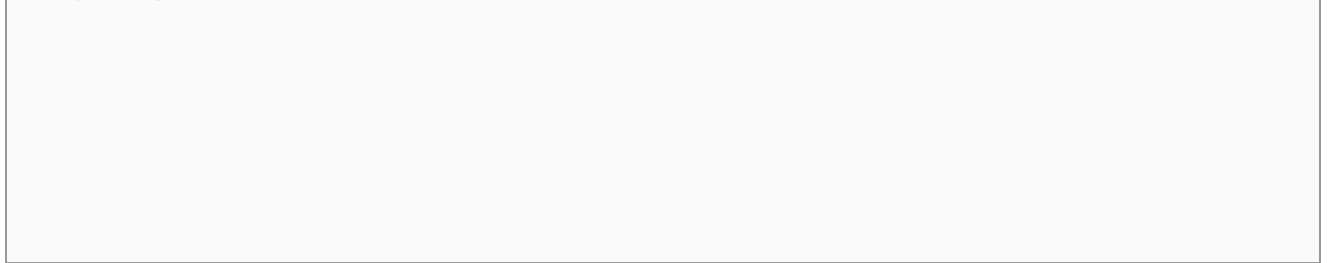
Simulation Task: First run the **Normal Regulation** scenario: click **Eat Food** and observe the full cycle of glucose rise, insulin release, and return to the set point. Then move the **Insulin Sensitivity** slider to a low value and click **Eat Food** again. Compare the glucose trend lines and meter readings between the two runs.

(A) (1 pt) **Describe** the path taken by insulin from the pancreas to the body cells that respond to it.

(B) (1 pt) **Explain** why an individual with reduced cellular sensitivity to insulin maintains a higher average blood glucose concentration after meals than a healthy individual, even though both individuals produce insulin from the pancreas.

(C) (1 pt) **Represent** the pathway by which insulin released from the pancreas causes body cells to take up glucose by drawing a labeled diagram that includes the pancreas, insulin, the bloodstream, a body cell, and glucose entering that cell.

Draw your diagram here.



(D) (1 pt) **Explain** why glucose requires a membrane transport protein in order to move from the bloodstream into a body cell.

4.1.B.2, 4.3.B.1, 2.6.A.2