Name: _____ **Date:** _____

Section: _____

Glycogen Hydrolysis Activity

Understanding Glycogen Metabolism Through Interactive Modeling

Phase 1: ENGAGE (5 minutes)

Getting Started: Open peebedu.com and navigate to Glycogen Hydrolysis Lab

Click '`Start Experimenting!`' after reading the tutorial.

Initial Observations: What molecular structure do you see? _____ Count the glucose units in the main chain: _____ How many branch points are visible? _____ What bonds connect the glucose units? _____

Predict: If you hydrolyze all bonds, how many free glucose molecules will result? _____

Phase 2: EXPLORE (20 minutes)

Part A: Glycosidic Bond Analysis

Using the Hydrolyze tool, break 3 different bonds.

Data Collection:

- ———— _____ _____ Endergonic/Exergonic

Clinical Application: Design an experiment to test glycogen storage disease:

- Variable tested: _____

- Molecular explanation: _____

Real-World Connection:

Athletes '`carb-load`' before events. Using the simulation:

- Model glycogen supercompensation: _____

- Trade-offs involved: _____

Phase 5: EVALUATE (3 minutes)

Synthesis Questions

Thermodynamics: Rank these processes by energy requirement: ___ Breaking one glycosidic bond ___ Forming one glycosidic bond ___ Complete glycogen hydrolysis ___ Building branched polymer

Evolutionary Advantage: Why did organisms evolve to store glucose as glycogen rather than free glucose?

Consider:

- Osmotic effects: _____
- Energy density: _____

Experimental Design:

You discover a mutant organism with linear glycogen. Predict:

- Glucose mobilization rate: _____
- Molecular explanation: _____

AP Exam Connection: This simulation best demonstrates which big idea? _____

Justify: _____

Model Limitations: Identify two aspects of glycogen metabolism NOT shown: _____

Design a simulation experiment to demonstrate:

- Glycogen phosphorylase regulation
- Effects of epinephrine on breakdown

- Glycogen synthase activity

Your experimental design: _____