Name: **Date:** **Section:**

Glycogen Hydrolysis Activity: Energy Storage and Release

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:

1. What molecular structure do you see? _____
2. How many branch points are visible? _____

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

1. **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

1. **Thermodynamics:**

Rank these processes by energy requirement:

___ Breaking one glycosidic bond

___ Forming one glycosidic bond

___ Complete glycogen hydrolysis

___ Building branched polymer

1. **Evolutionary Advantage:**

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

Consider:

- Osmotic effects: _____
- Energy density: _____

1. **Experimental Design:**

You discover a mutant organism with linear glycogen. Predict:

- Glucose mobilization rate: _____
- Molecular explanation: _____

1. **AP Exam Connection:**

Justify: _____

Model Limitations:

Identify two aspects of glycogen metabolism NOT shown:

1. _____

Design a simulation experiment to demonstrate:

- Glycogen phosphorylase regulation
- Effects of epinephrine on breakdown
- Glycogen synthase activity

Your experimental design: _____