Name: _____ **Date:** _____

Section: _____

Powerhouse Activity

The Cell's Power Plant: Making ATP

Phase 1: ENGAGE (8 minutes)

Getting Started: Open peebedu.com and navigate to Powerhouse - Cellular Respiration

Game Overview: You're managing a cell's energy production! Your goal: See how cells make ATP Tools available:

- '`Eat`' button = Add glucose (food)
- '`Breathe`' button = Add oxygen
- Drag molecules to reaction zones

First Impressions: What do you see in the game? List the main areas: _____

- _____

- _____

Click '`Eat`' - what appears? _____ Click '`Breathe`' - what appears? _____

Big Question: How do cells turn a sugar molecule into usable energy (ATP)? _____

Phase 2: EXPLORE (20 minutes)

Mission 1: Breaking Down Glucose

Click '`Eat`' to spawn glucose Drag glucose to different zones - which one accepts it? _____ Zone name: _____

Glycolysis Observations:

- What happens to the glucose molecule? _____

- Where does this happen in the cell? _____

Mission 2: Into the Mitochondria

Take the products from glycolysis to the mitochondria: _____ What happens to them? _____

Notice any gas being released? What is it? _____

Mission 3: The Cycle Continues

Watch what happens in the circular zone:

- What shape does the process make? _____

- What carriers are produced? _____

Mission 4: The Final Stage

Follow the electron carriers to the last zone:

- Where do they go? _____

Final observations:

- What happens to oxygen? _____

- When is ATP produced? _____

Phase 3: EXPLAIN (12 minutes)

Understanding the Process

The Journey of Glucose:

Fill in the pathway: _____ Glucose → _____ (glycolysis) → _____ (enters mitochondria) → _____ (Krebs cycle) → Electron carriers go to _____

Why We Need Oxygen:

Oxygen's job in the last stage:

- Accepts _____ at the end

- Without oxygen, the process _____

Process Summary:

——- Cytoplasm CO_2 released Stores it _____
Yes ——— Glucose + O_2 Energy

Problem Solving:

A cell has glucose but no oxygen:

- Can it still make some ATP? _____

- What builds up? _____

Critical Thinking:

Why is cyanide deadly? (Hint: It blocks electron transport) _____

Game as a Model:

What did the game show well? _____

What was simplified? _____

Reflection: How does this game help explain why you need food AND air? _____

Speed Run Challenge:

- Try to produce 30 ATP as fast as possible
- Record your best time

- Strategize for efficiency
- How do plants do cellular respiration? _____

- How do athletes '`hit the wall`'? _____

Create Your Own:

- Design a board game version
- Make a comic strip of glucose's journey
- Write a song about making ATP

Vocabulary Review:

- **ATP:** Adenosine triphosphate, cell's energy currency
- **Glucose:** Sugar molecule, CH_2O
- **Glycolysis:** Breaking glucose in half
- **Krebs Cycle:** Circular reactions in mitochondria
- **Electron Transport Chain:** Final ATP-making stage