Name: _____ **Date:** _____

Section: _____

Powerhouse Activity

The Amazing Cellular Energy Factory!

Phase 1: ENGAGE (5 minutes)

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

Your Mission: You're the manager of a cell's energy factory! Your job is to turn food into energy (ATP) that the cell can use.

First Look: Find these buttons:

Click '`Eat`' - what appears? Draw it: [Box for drawing] _____

Think About It: When you eat a sandwich, where does the energy go?

Phase 2: EXPLORE (18 minutes)

Level 1: Breaking Down Sugar

Click '`Eat`' to get glucose (sugar) Drag it to different areas - where does it go? _____ Area name: _____

What Happens:

- Glucose turns into: _____ (smaller molecules)

- Location: This happens in the _____ (cell's jelly)

Level 2: Enter the Powerhouse

Take the new molecules to the mitochondria (the big oval) First stop: _____

Record Your Observations:

- What goes in: _____

- Any gas released? _____

Level 3: The Energy Cycle

Move molecules to the circular area: _____ This is called: _____

Cycle Results:

- More ATP? Yes / No How many? _____
- More CO_2? Yes / No

Level 4: The Big Finish

Take electron carriers to the final zone Click '`Breathe`' to add oxygen

Final Stage Magic:

- Oxygen combines with electrons to make: _____

- Total ATP from one glucose: _____

Score Board:

- Your time: _____ seconds

- Efficiency rating: _____

Phase 3: EXPLAIN (12 minutes)

How Your Cells Make Energy

The Journey of a Sugar Molecule:

Fill in the energy story: _____ “‘ Glucose (food) → Broken into _____ pieces →

Enters _____ (powerhouse) → Goes through _____ cycle →

Electrons go to make lots of _____! “‘

Why We Need Oxygen:

Oxygen is like a magnet that:

- Pulls _____ through the energy machine
- Without it, we only get _____ ATP instead of ˜30!

The Energy Equation:

Draw what goes in and what comes out:

IN: [Boxes for glucose + oxygen] ↓ CELL RESPIRATION ↓ OUT: [Boxes for CO_2 + water + ATP]

Where Everything Happens:

Label this cell diagram: _____ “‘ [Simple cell outline with]

- Cytoplasm (jelly part)
- Mitochondria (powerhouse)
- Nucleus (control center)

“‘

Phase 4: ELABORATE (8 minutes)

Energy in Real Life

Why You Breathe:

Every breath brings in _____ for your cells Every breath releases _____ waste

Hold your breath for 10 seconds. Why does it get uncomfortable?

Food as Fuel:

Match the food to its main molecule: _____ “‘ Bread/Pasta → _____ (glucose/sugar) Butter → _____ (fats) Chicken → _____ (proteins) “‘

Which gives quickest energy? _____

Exercise Connection:

During exercise:

- Your cells need more _____
- Your heart pumps _____ to deliver oxygen

What happens if you can’t get enough oxygen? _____

Energy Disorders:

If someone’s mitochondria don’t work well:

- They feel _____ all the time
- They need to rest _____

Phase 5: EVALUATE (7 minutes)

Show What You Know!

Order the Steps: (Number 1-5) ___ Oxygen arrives to help ___ Glucose enters the cell ___ Lots of ATP is made ___ Pyruvate enters mitochondria ___ CO_2 is breathed out

1.

Fill in the Blanks:

Cellular respiration turns _____ and _____ into _____, _____, and _____ that cells can use.

Math Connection:

If one glucose = 30 ATP:

- 2 glucose = _____ ATP

- To make 300 ATP, you need _____ glucose

Drawing Challenge:

Draw a comic strip (3 panels) showing glucose's journey: _____ Panel 1: Glucose enters cell Panel 2: [Your choice] Panel 3: ATP celebration!

[Three boxes for drawing]

Exit Ticket:

Complete this analogy: _____ Cellular respiration is like _____ because _____

One question I still have: _____

- –

Fun Facts!

- Your body makes its weight in ATP every day!
- Brain cells use 20% of your body's oxygen
- Hummingbirds have the most mitochondria per cell
- You breathe out about 2.3 pounds of CO_2 daily

- Mitochondria have their own DNA!

Try at Home:

Energy Test:

- Run in place for 30 seconds
- Notice your breathing
- Feel your heart rate
- Explain what's happening in your cells

Yeast Experiment:

- Mix yeast + sugar + warm water
- Watch for bubbles (CO_2!)
- This is fermentation (no oxygen)

Food Energy:

- Read food labels for Calories
- Calories = energy for cells

Key Vocabulary

See activity for vocabulary specific to this topic.