Cell Builder

Name: _____ **Period:** _____ **Date:** _____

> Open **peebedu.com** and navigate to **Cell Builder**. Click the **Launch Interactive** button to begin. Read the introduction slideshow, which covers cell theory, organelle functions, and cell types. Use the **Next** button to advance through all slides before building your first cell.

Free Response Questions

Question 1 — Conceptual Analysis

> **Simulation Task:** *Click "Choose Membrane" and select the circle shape. Then click "Add Organelles" and place a nucleus, two mitochondria, rough ER, smooth ER, Golgi body, and lysosomes into the cell. Next, click "Investigate" and click on each organelle you placed to read its description. Record the function of the mitochondria and the Golgi body.*

(A) (1 pt) **Describe** the structural feature of mitochondria that increases the area available for the reactions of aerobic cellular respiration.

(B) (1 pt) **Explain** why a eukaryotic cell produces more ATP per glucose molecule than a prokaryotic cell of comparable size that carries out the same metabolic pathway on its plasma membrane.

(C) (1 pt) **Predict** how the rate of ATP synthesis in a muscle cell would change if the inner membranes of its mitochondria were experimentally smoothed so they no longer formed folds.

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

Question 2 — Analyze Model / Visual Representation

> **Simulation Task:** *Complete Mission 1 (Animal Cell) by adding all required organelles. Note the SA:V ratio displayed. Then complete Mission 4 (Prokaryotic Cell) and note which organelles are available and which are absent. Compare the two completed cells.*

(A) (1 pt) **Describe** the organizational feature of eukaryotic cells that allows different enzymatic reactions to occur simultaneously without interfering with one another.

(B) (1 pt) **Explain** why a eukaryotic cell can carry out both the synthesis and the breakdown of specific macromolecules at the same time, whereas these competing reactions would interfere with each other if they occurred in the same cellular space.

(C) (1 pt) **Represent** the structural difference between a eukaryotic cell and a prokaryotic cell by drawing a labeled diagram of each, including the plasma membrane, at least three membrane-bound organelles in the eukaryotic cell, the absence of membrane-bound organelles in the prokaryotic cell, and ribosomes in both.

Draw your diagram here.

(D) (1 pt) **Explain** why the presence of a nearly identical molecular structure in organisms as different as bacteria and humans is considered evidence of shared ancestry.