Name: _____ **Date:** _____

Answer Key: Cells Among Us: 8th Grade Organelle Imposter Mission

Synthesize complex cellular interactions and identify structural anomalies to prevent biological system failure in this advanced organelle function challenge.

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1. A researcher discovers a specialized cell in an deep-sea organism that lacks a nucleolus. Which cellular process would be most immediately and severely impaired by this structural deficiency?

Answer: B) Assembly of ribosomal subunits for protein synthesis

The nucleolus is the specific site within the nucleus where ribosomal RNA (rRNA) is synthesized and combined with proteins to form ribosomal subunits; without it, translation cannot occur.

2. The _____ theory proposes that mitochondria and chloroplasts originated as independent prokaryotic organisms before being engulfed by a larger host cell in a symbiotic relationship.

Answer: B) Endosymbiotic

The endosymbiotic theory explains the origin of eukaryotic cells, specifically noting that mitochondria and chloroplasts have their own circular DNA and double membranes.

3. True or False: In highly active secretory cells, such as those found in the human pancreas, the volume of the Golgi apparatus is generally larger compared to that of a dormant storage cell.

Answer: A) True

The Golgi apparatus is responsible for modifying and packaging proteins for secretion; therefore, cells specializing in high protein output require more extensive Golgi networks.

4. If a plant cell is placed in a hypertonic solution, the central vacuole loses water, causing the plasma membrane to pull away from the cell wall. This specific biological phenomenon is known as:

Answer: C) Plasmolysis

Plasmolysis occurs when the cell membrane detaches from the wall due to water loss, a key concept in understanding plant turgor pressure and osmosis.

5. The _____, a network of protein fibers including microfilaments and microtubules, provides mechanical support and facilitates the movement of motor proteins carrying vesicles.

Answer: C) Cytoskeleton

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The cytoskeleton is a dynamic structure that maintains cell shape and acts as a highway for intracellular transport.

6. True or False: Prokaryotic cells, such as those found in extremophile bacteria, contain mitochondria but lack a membrane-bound nucleus.

Answer: B) False

Prokaryotic cells lack all membrane-bound organelles, including mitochondria; they generate energy across their plasma membrane.

7. Comparing the Smooth Endoplasmic Reticulum (SER) to the Rough Endoplasmic Reticulum (RER), which of the following is an exclusive function of the SER in mammalian liver cells?

Answer: B) Detoxification of metabolic byproducts and toxins

The Smooth ER lacks ribosomes and is primarily involved in lipid synthesis, calcium storage, and the detoxification of chemicals and drugs.

8. In the Fluid Mosaic Model of the cell membrane, _____ molecules act as 'temperature buffers' to maintain membrane fluidity in varying environmental conditions.

Answer: C) Cholesterol

Cholesterol is interspersed within the phospholipid bilayer to prevent it from becoming too rigid in the cold or too fluid in the heat.

9. True or False: Peroxisomes are specialized organelles that utilize enzymes to break down fatty acids and neutralize hydrogen peroxide into water and oxygen.

Answer: A) True

Peroxisomes contain catalase, an enzyme specifically designed to convert the toxic byproduct hydrogen peroxide into harmless water and oxygen.

10. When a macrophage (immune cell) engulfs a pathogen, which organelle must fuse with the phagocytic vesicle to digest the intruder using hydrolytic enzymes?

Answer: C) Lysosome

Lysosomes are the 'digestive bags' of the cell, containing the enzymes necessary to break down biological polymers and foreign invaders.