Name: _____ **Date:** _____

Answer Key: Sizzling Systems: Sixth Grade Cell Structure Synthesis Quiz

Examine complex cellular systems through scenario analysis, moving beyond identification to evaluate organelle interactions and metabolic failures.

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1. A scientist observes a specialized cell in a deep-sea organism that must survive in extreme darkness. The cell has an unusually high concentration of mitochondria. Which biological function is this adaptation likely supporting?

Answer: B) Increased respiration to fuel active transport in low-nutrient zones

Mitochondria are the site of aerobic respiration; an abundance of them suggests the cell requires significant ATP (energy) to power active processes like metabolic absorption or transport against gradients.

2. In a hypothetical 'Cell City' scenario, the Post Office (Golgi Apparatus) stops functioning. What immediate impact would this have on the rest of the 'city'?

Answer: C) Proteins would be created but fail to reach their final destination or be secreted

The Golgi Apparatus is responsible for modifying, sorting, and packaging proteins for secretion or delivery to other organelles; without it, transport systems fail.

3. If a cell is engaging in 'Conductivity' to send a signal, it relies on the _____ to regulate the passage of ions like sodium and potassium.

Answer: A) Cell Membrane

The cell membrane's selective permeability is crucial for conductivity, as it controls the ion concentration gradients necessary for transmitting electrical impulses.

4. True or False: Smooth Endoplasmic Reticulum is primarily responsible for the synthesis of digestive enzymes used by lysosomes for excretion.

Answer: B) False

False. Enzymes are proteins, which are synthesized by ribosomes on the Rough ER. The Smooth ER focuses on lipid synthesis and detoxification.

5. An immune system cell, specifically a macrophage, must engulf and break down invading bacteria. Which organelle works in tandem with the cell membrane to complete this act of excretion and protection?

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Answer: C) Lysosomes

Lysosomes contain digestive enzymes that break down foreign pathogens and waste, making them essential for the protective and excretory functions of immune cells.

6. A scientist treats a cell with a chemical that prevents DNA from being transcribed. This chemical is targeting the _____, effectively halting the plan for cell reproduction.

Answer: B) Nucleus

The nucleus houses the genetic material (DNA). If transcription is blocked here, the cell cannot follow the 'blueprint' needed for protein synthesis or reproduction.

7. True or False: Metabolic absorption is a function that occurs exclusively at the cell membrane level without requiring any energy input from the mitochondria.

Answer: B) False

False. Many forms of metabolic absorption require active transport, which is powered by ATP generated by the mitochondria.

8. Consider a plant cell that needs to secrete a sticky sap to trap insects. Trace the path of the sap's protein components from creation to exit.

Answer: B) Ribosome -> Rough ER -> Golgi Apparatus -> Cell Membrane

Proteins are built at ribosomes (often on the Rough ER), refined in the ER, packaged by the Golgi Apparatus, and finally released through the cell membrane.

9. During the process of cellular movement, such as the contraction of a muscle cell, the organelle providing the necessary chemical energy is the _____.

Answer: A) Mitochondrion

Mitochondria produce ATP through respiration, which is the specific energy currency used for mechanical work like muscle contraction.

10. True or False: If the ribosomes in a cell were destroyed, the cell would still be able to perform secretion because the Golgi apparatus is the organelle that actually releases the substances.

Answer: B) False

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False. Without ribosomes, the cell cannot synthesize the proteins that need to be packaged and secreted by the Golgi apparatus.