

Life Science: Cell Structure & Organelle Functions



Use the matching sheet ID when checking answers.

Part A: Cellular Biology. Analyze cellular functions and choose the best scientific answer.

1. Which cellular organelle is responsible for performing cellular respiration to convert biochemical glucose into usable energy in the form of ATP?

Answer: B. Mitochondria

Mitochondria are often called the powerhouses of eukaryotic cells because they perform aerobic respiration, generating ATP energy for cellular metabolic activities.

2. A student views a mystery cell specimen under a microscope and observes green disc-shaped chloroplasts, a rigid cellulose cell wall, and a large central vacuole. What kind of cell is this?

Answer: B. Plant leaf cell

Chloroplasts (for photosynthesis), a rigid outer cellulose wall, and a massive water-filled central vacuole are unique defining characteristics of plant cells.

3. What is the critical regulatory role of the selectively permeable plasma (cell) membrane?

Answer: B. Controlling the passage of nutrients, water, and waste molecules into and out of the cell

The lipid bilayer cell membrane acts as a selective barrier, maintaining homeostasis by regulating what enters and exits the intracellular cytoplasm.

Part B: Organelle Specialization Matrix. Classify whether each organelle feature belongs to Plant Cells Only, Animal Cells Only, or Both.

Sort these items: Chloroplasts containing green chlorophyll pigments for photosynthesis; Nucleus enclosing DNA chromosomes and coordinating cell growth; Centrioles utilized during mitotic spindle fiber separation in animal cell division; Rigid outer cell wall made of structural cellulose fibrils; Mitochondria generating ATP power via cellular respiration; Small, scattered temporary vacuoles rather than a single dominant central vacuole

Plant Cells Only	Found in Both Cells	Animal Cells Only
Chloroplasts containing green chlorophyll pigments for photosynthesis; Rigid outer cell wall made of structural cellulose fibrils	Nucleus enclosing DNA chromosomes and coordinating cell growth; Mitochondria generating ATP power via cellular respiration	Centrioles utilized during mitotic spindle fiber separation in animal cell division; Small, scattered temporary vacuoles rather than a single dominant central vacuole