Week 3 Lab Instructions
Cell Structure, Membrane Transport & Mitosis

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Part A
Step 1: Read the Entire Lab Packet

1.0– Read through the laboratory packet – SEE ATTACHED SHEETS

Part A
Step 2: Come to the Lab with Proper PPE

BACKGROUND:

Cells

Cells are the basic units of all living organisms. They are surrounded by a plasma membrane, supported by a cytoskeleton, and contain organelles, cytosol, and a nucleus.

- **Plasma Membrane:** This is the outer boundary of the cell. It controls what enters and leaves the cell. It is made of a double layer of lipids (fats) with proteins embedded in it.
- **Cytoskeleton:** This is a network of protein filaments and microtubules that support the cell's shape and help with movement.
- **Organelles:** These are specialized structures within the cell that perform specific functions. Examples include mitochondria (energy production), ribosomes (protein synthesis), and lysosomes (digestion).
- **Cytosol:** This is the clear gel-like fluid inside the cell where the organelles are suspended.
- **Nucleus:** This is the control center of the cell. It contains DNA, which holds the genetic information. The nucleus also has a nucleolus, where ribosomes are made.

Membrane Transport

The plasma membrane is selectively permeable, meaning it allows certain substances to pass through while blocking others. There are two main types of membrane transport:

- **Passive Transport:** This does not require energy. It includes:
  - **Simple Diffusion:** Movement of molecules from an area of high concentration to a low concentration.
  - **Facilitated Diffusion:** Movement of molecules through a protein channel.
  - **Osmosis:** Movement of water molecules through a semipermeable membrane.
  - **Filtration:** Movement of water and solutes through a membrane due to pressure.

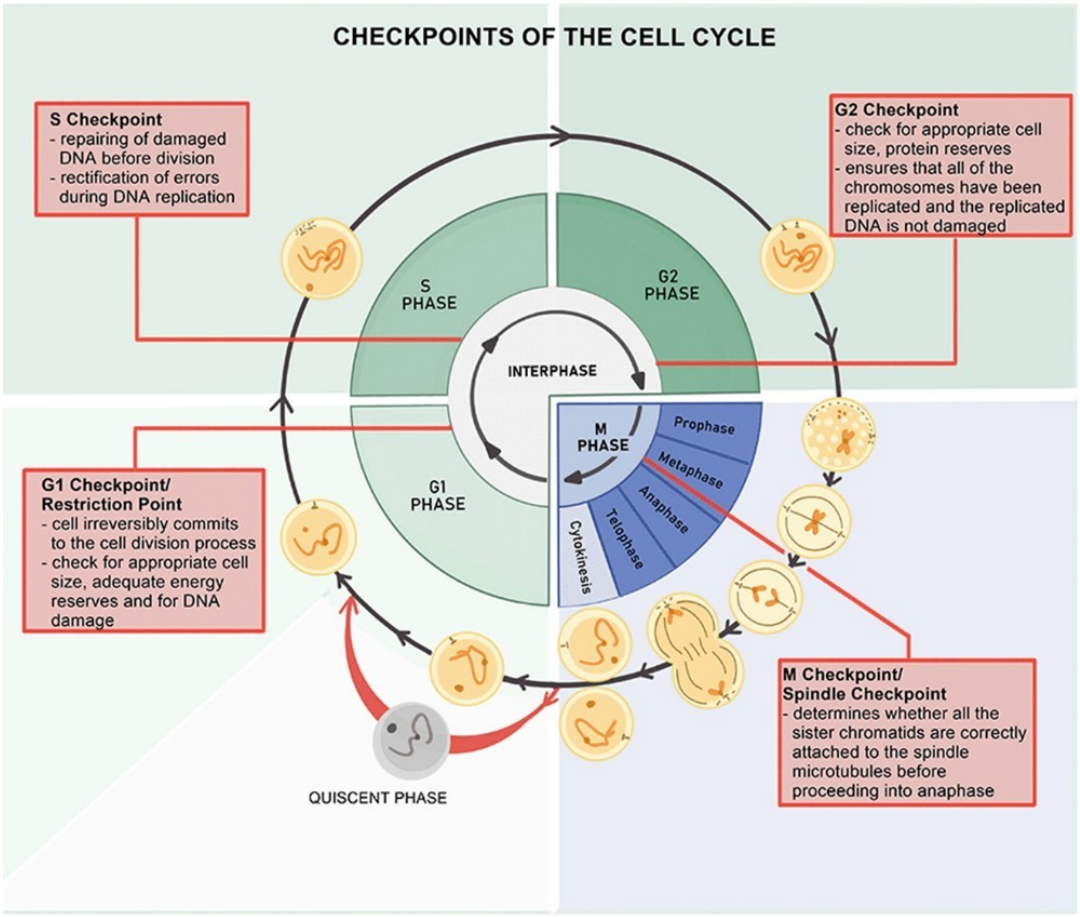
- **Active Transport:** This requires energy (ATP). It includes:
    - **Primary Active Transport:** Direct use of ATP to transport molecules.
    - **Secondary Active Transport:** Uses the energy from the movement of one molecule to move another.
    - **Endocytosis:** Taking in large molecules by engulfing them.
    - **Exocytosis:** Expelling large molecules by merging a vesicle with the plasma membrane.

Cell Cycle and Mitosis

Cells go through a cycle of growth and division called the cell cycle. It includes four main stages:

- **G1 (Gap 1):** Cell grows and performs normal functions.
- **S (Synthesis):** DNA is replicated.
- **G2 (Gap 2):** Cell prepares for division.
- **M (Mitosis):** The Cell divides into two identical daughter cells. Mitosis has four subphases:
    - **Prophase:** Chromosomes condense and become visible.
    - **Metaphase:** Chromosomes line up in the middle of the cell.
    - **Anaphase:** Chromosomes are pulled apart to opposite ends of the cell.
    - **Telophase:** New nuclear membranes form around each set of chromosomes.
- **Cytokinesis:** Division of the cytoplasm, resulting in two separate cells.

Figure 1: The Cell Cycle.



PURPOSE: