GRADE 10

LIFE SCIENCES

CELLS: THE BASIC UNITS OF LIFE

MEMORANDUM

QUESTION 1

1. Cell Theory:
    - All living organisms are made of cells.
    - Cells are the basic units of structure and function.
    - All cells come from pre-existing cells.
      Significance unifies all biology; basis for cell research and medicine.
2. Prokaryotic vs Eukaryotic:
    - No nucleus vs nucleus
    - No membrane-bound organelles vs organelles present
    - Smaller vs larger
    - Bacteria vs animal/plant cells
3. Unicellular = one-celled (e.g., amoeba); Multicellular = many cells (e.g., human).
4. Advantages: Division of labour, specialization, increased size, survival efficiency.
5. Life processes: respiration, growth, excretion, reproduction, sensitivity.
6. Animal: nucleus, membrane, mitochondria, cytoplasm, ribosomes.
   Plant: cell wall, chloroplasts, vacuole, nucleus, mitochondria.
7. Plant cells: have a cell wall, chloroplasts, large vacuole; animal cells don't.
8. Plant cell – green, has chloroplasts, thick wall, rigid shape.
9.
    - Nucleus: controls cell, contains DNA
    - Membrane: controls entry/exit
    - Mitochondrion: respiration/energy
    - Ribosome: protein synthesis
    - Chloroplast: photosynthesis
10. Organelle = specialized cell structure with a specific function. Allows efficiency and specialization (e.g. chloroplast for photosynthesis).

QUESTION 2

1. Light: uses light; pros: live cells; cons: lower resolution.
   Electron uses electrons; pros: high detail; cons: expensive, dead cells only.
2.
   - Magnification: enlargement factor
   - Resolution: clarity/detail
   - Field of view: visible area under lens
3. Stains improve contrast to reveal structures.
4. Drawing: eyepiece on top, objective lens under, stage center, diaphragm below stage, fine adjustment on side.
5. Magnification = eyepiece × objective
   E.g. 10× eyepiece × 40× lens = 400×
6. Electron microscopes have shorter wavelengths → better resolution.
7. TEM = internal ultrastructure; SEM = 3D surface image.
8. Mount sample → stain with iodine → cover slip → view under low power → increase magnification.
9. Thin sections allow light/electrons to pass through → clear images.
10. Micrograph = photo from microscope; helps record/analyse fine detail.