

Objectives, Concepts & Skills, and Vocabulary

| UNIT | LAB | OBJECTIVES |
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| 1: Cell Types and Organization | 1: Exploring the Cellular World | <ul style="list-style-type: none"> • Observe cells and classify them as prokaryotic or eukaryotic • Observe cells in tissues • Measure the size of cells and cell organelles • Understand that cells in tissues are specialized |
| 2: Cell Structure and Function | 2: Learning About Cell Structure and Function | <ul style="list-style-type: none"> • Compare and contrast the structural differences between plant and animal cells • Observe the genetic material in a rapidly dividing plant tissue (root tips) • Identify mitochondria in plant cells • Observe the effect of exposing cells to hypertonic, hypotonic, and isotonic solutions |
| 3: Cell Processes | 3: Examining Cell Processes | <ul style="list-style-type: none"> • Construct models of cells using dialysis tubing to simulate the semi-permeable nature of the cell membrane • Observe the effects of osmosis and diffusion on a model cell • Study the effect of exposing model cells to hypertonic, hypotonic, and isotonic solutions |
| 4: Cells and Energy | 4: How Cells Cycle Energy | <ul style="list-style-type: none"> • Observe how the biochemical reactions of cellular respiration and photosynthesis cycle the compound carbon dioxide (CO_2) • Understand how the cellular enzyme catalase breaks down a chemical that is poisonous to living things—hydrogen peroxide (H_2O_2) • Create a chromatogram to compare the pigments found in green leaves and autumn leaves • Calculate the R_f values of various plant pigments |
| 5: Cell Reproduction and the Cell Cycle | 5: Exploring the Cell Cycle | <ul style="list-style-type: none"> • Perform staining and mounting of onion root cells for microscopic examination • Compare and contrast the process of mitosis between plant and animal cells • Model the phases of mitosis • Model the phases of Meiosis I & II and the phenomenon of crossing over • Understand the role chromosomes play in the process of reproduction • Demonstrate how sexual reproduction produces genetic diversity |
| 6: Cell Growth | 6: Exploring Cell Growth | <ul style="list-style-type: none"> • Create model cells of various sizes • Observe the process of diffusion in model cells • Infer how cell size influences the rate of diffusion • Grow a culture of yeast cells • Measure yeast cell population growth over several days • Graph the growth pattern of the yeast cell population |
| 7: Comprehensive Inquiry Investigation | 7: Culminating Lab | <ul style="list-style-type: none"> • Develop a biochemical test for the cell enzyme catalase • Use this test to determine the presence of the enzyme in cells from members of five kingdoms |

| CONCEPTS & SKILLS | VOCABULARY |
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| Analytical thinking, microscopic techniques in observing cells and tissues, measurement skills, collecting and tabulating data, drawing conclusions, prokaryotic and eukaryotic cells | Cell, cell membrane, cytoplasm, organelles, ribosomes, DNA, mitochondria, chloroplasts, vacuoles, prokaryotic/prokaryote, eukaryotic/eukaryote, bacteria, unicellular, multicellular, tissues, xylem, phloem, hepatocytes, stomates |
| Plant and animal cell structure, cell organelles, genetic material, plasmolysis, osmosis, diffusion | Phospholipids, cytosol, cell membrane, nucleus, selectively permeable, endoplasmic reticulum, Golgi bodies, lysosomes, eukaryotic/eukaryote, DNA, RNA, nucleic acid, chromatin, cell division, chromosome, nucleolus, protein synthesis, ATP, mitochondria, aerobic, cellular respiration, chloroplasts, photosynthesis, central vacuole, hypertonic, plasmolysis, turgor pressure |
| Analytical thinking, cell membrane, diffusion, drawing conclusions, making observations, osmoregulation, osmosis, plasmolysis, solute, solvent | Cell membrane, cytoplasm, cytosol, phospholipid, semipermeable membrane, protein gate, solvent, solute, concentration gradient, hypertonic, hypotonic, isotonic, diffusion, osmosis, crenation, plasmolysis |
| Analytical thinking, cellular enzyme, catalase, cellular respiration, chemical reactions and equations, collecting, tabulating, and graphing data, drawing conclusions, evidence of chemical reactions, photosynthesis, products, reactants, retention factor (R_f), making observations, measurement skills | Photosynthesis, cellular respiration, catalase, enzyme, protein, pigment, chlorophyll, chromatography, retention factor |
| Cell cycle, cell division, cell reproduction, cell theory, chromosomes, cytokinesis, DNA replication, genetic recombination, making predictions and observations, mitosis, microscope slide preparation, meiosis, scientific method | Cell cycle, interphase, DNA replication, chromosomes, centrioles, mitosis, prophase, metaphase, anaphase, telophase, cytokinesis, spindle fibers, centromere, sister chromatids, cell plate, meristem, meiosis, homologous chromosomes, sex cell, daughter cell, chromatid, crossing over |
| Analytical thinking, cell function, cell processes, collecting and graphing data, diffusion, experimental design, growth curves, making observations and inferences | Diffusion, population, lag phase, exponential phase, stationary phase, death phase |
| Experimental design, cellular enzymes, chemical reactions, cell types, peroxisomes, collecting and tabulating data | Catalase, peroxisomes, prokaryotic/prokaryote, eukaryotic/eukaryote, organelles, kingdoms of life, aerobic, anaerobic, metabolism |