Choose One of Our Signature Biology LabPaqs Below or Configure Your Own!

<table>
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<tr>
<th>EXPERIMENT</th>
<th>Non-Majors</th>
<th>Science Majors</th>
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<tr>
<td>Biological Macromolecules</td>
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<td>Carbon Footprint and Sustainable Living</td>
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<td>Cells: Prokaryotic and Eukaryotic</td>
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<td>Cellular Respiration</td>
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<td>Chemoreceptors</td>
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<td>Classification of Species</td>
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<td>Climate Change and The Scientific Method</td>
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<td>Comparative Cell Membranes and Transport</td>
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<td>Comparative Vertebrate Structure and Function</td>
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<td>Molecular Biology and Gel Electrophoresis</td>
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<td>Genetics and Genomics</td>
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<td>Genetics: Plant Breeding and Selection</td>
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<td>Homeostasis</td>
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<td>Human Genetics: Phenotype and Genotype</td>
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<td>Kingdom Animalia: Class Mammalia</td>
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<td>Kingdom Animalia: The Deuterostomes</td>
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<td>Kingdom Plantae: Angiosperms</td>
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<td>Kingdom Plantae: Simple Plants and Gymnosperms</td>
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<td>Laboratory Techniques &amp; Measurements</td>
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<td>Microbes Everywhere</td>
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<td>Microscopy: Use and Function</td>
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<td>Plant Photosynthesis</td>
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<td>Respiratory Physiology</td>
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<td>Taxonomy of Living Things</td>
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<td>The Macobiome</td>
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<td>Using the Scientific Method to Identify Unknowns</td>
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<td>Water, pH, and Buffers</td>
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<td><strong>NUMBER OF EXPERIMENTS</strong></td>
<td><strong>23</strong></td>
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<td>Experiment</td>
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<td>Acid Rain</td>
<td>• Create a microenvironment producing sulfur dioxide and nitrogen oxide.</td>
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<td>• Examine the buffering effects of calcium carbonate.</td>
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<td>• Model the effects of acid deposition on different types of rocks and iron.</td>
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<td>Biological Macromolecules</td>
<td>• Build the structures of 14 macromolecules using a modeling kit.</td>
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<td>• Perform qualitative tests to determine the presence of lipids, sugars, proteins, and starch in a variety of samples.</td>
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<td>• Identify an unknown through its composition of macromolecules.</td>
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<td>Biomes, Ecosystems, and Habitats</td>
<td>• Prepare 1 m² quadrats in two distinct areas.</td>
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<td>• Collect abiotic and biotic data on weather, soil type, and species composition in two quadrats.</td>
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<td>• Interpret the relationship between habitats and observed species.</td>
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<td>Carbon Footprint and Sustainable Living</td>
<td>• Record energy, trash, transportation, food, and water consumption for 48 hours.</td>
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<td>• Calculate an individual’s carbon footprint.</td>
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<td>• Apply lifestyle changes to minimize environmental impacts.</td>
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<td>Cells-Prokaryotic and Eukaryotic</td>
<td>• Identify and label the cellular structures of bacteria, animal, and plant cells.</td>
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<td>• Examine microscope slides of plant, animal, bacteria, and protist cells.</td>
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<td>• Categorize organisms as prokaryotic or eukaryotic based on cellular structures.</td>
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<td>Cellular Respiration</td>
<td>• Germinate millet seeds under experimental conditions.</td>
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<td>• Measure respiration rates as a function of water displacement by germinated and dormant millet seeds.</td>
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<td>• Graphically analyze experimental data.</td>
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<td>Classification of Species</td>
<td>• Explain how dichotomous keys are used to identify organisms.</td>
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<td>• Use a dichotomous key to identify adult dragonflies to the family taxonomic level.</td>
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<td>• Create a dichotomous key for leaf types based on morphological observations.</td>
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<td>Comparative Cell Membranes and Transport</td>
<td>• Measure osmosis in potato sections placed in distilled water and five concentrations of sucrose solution.</td>
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<td>• Analyze experimental data to classify solutions as hypotonic, hypertonic, or isotonic.</td>
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<td>• Examine how large and small molecules diffuse across a semipermeable membrane using dialysis tubing, sucrose and starch.</td>
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<td>Comparative Vertebrate Structure and Function</td>
<td>• Summarize the characteristics of five vertebrate classes.</td>
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<td>• Examine the skeletal structure of bony fish, amphibians, reptiles, birds, and mammals.</td>
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<td>• Relate vertebrate structure to survival adaptations.</td>
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<td>Comparing Arthropods</td>
<td>• List shared characteristics of animals that belong to phylum Arthropoda.</td>
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<td>• Compare and contrast external anatomical features of a garden spider (Argiope sp.), crayfish (Cambarus sp.), and the plains lubber grasshopper (Brachyostola magna).</td>
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<td>• Dissect a crayfish and grasshopper and identify and label internal organs.</td>
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<td>DNA, RNA, and Protein Synthesis</td>
<td>• Model the processes of transcription and translation.</td>
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<td>• Construct a DNA molecule, mRNA strand, and a series of tRNA molecules.</td>
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<td>• Write the anti-codons and amino acids carried by tRNA for the synthesis of a protein.</td>
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<td>Enzymes-Temperature, pH, and Specificity</td>
<td>• Compare the specificity of the enzyme lactase on the catabolism of lactose and sucrose.</td>
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<td>• React lactase with lactose at three temperatures and three pH levels.</td>
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<td>• Relate experimental results to conditions within the human body.</td>
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<td>Extraction of DNA</td>
<td>• Summarize the structure of a double-stranded DNA molecule.</td>
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<td>• Isolate DNA from split peas by physically breaking down plant tissues, lysing cell membranes with detergent, and precipitating isolated DNA in alcohol.</td>
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<td>• Record observations of the appearance and volume of DNA extracted from peas.</td>
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<td>Food Web</td>
<td>• Dissect a barn owl pellet.</td>
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<td>• Use a dichotomous key to identify the rodent species present in an owl pellet.</td>
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<td>• Relate owl diet to habitat characteristics.</td>
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<td><strong>Homeostasis</strong></td>
<td>• Identify positive and negative feedback and determine the stimulus, receptor, control center, effector, and response for various stimuli.</td>
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<td>• Test the body’s sensitivity to temperature through exposure to a series of water baths and various temperatures.</td>
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<td>• Collect and analyze data on heart rate during a series of exercises.</td>
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<td><strong>Human Genetics: Phenotype and Genotype</strong></td>
<td>• Create Punnett squares for 10 traits.</td>
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<td>• Identify homozygous dominant, homozygous recessive, and heterozygous alleles for common human traits.</td>
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<td>• Perform karyotyping on two sets of chromosomes to identify potential chromosomal disorders.</td>
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<td><strong>Kingdom Animalia-Class Mammalia</strong></td>
<td>• Create a Venn diagram to classify the characteristics of mammals.</td>
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<td>• Identify the major internal organs of a human and describe their functions.</td>
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<td>• Dissect a fetal pig and label key internal structures.</td>
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<td><strong>Kingdom Animalia-Invertebrates</strong></td>
<td>• Summarize the habitat, feeding, reproduction, and unique features of phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Rotifera, and Annelida.</td>
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<td>• Examine prepared slides of a budding Hydra, planarian, and rotifer and a preserved hydra specimen.</td>
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<td>• Dissect a common earthworm (<em>Lumbricus terrestris</em>) from phylum Annelida and identify internal and external structures.</td>
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<td><strong>Kingdom Animalia-The Deuterostomes</strong></td>
<td>• Dissect the sea star (<em>Pisaster spp</em>), frog (<em>Rana forreri</em>), and perch (<em>Pomadasys macracanthis</em>) and identify the major organs of each animal.</td>
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<td>• Explain the function of organs identified through dissection.</td>
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<td>• Compare and contrast echinoderm and chordate structures.</td>
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<td><strong>Kingdom Animalia-The Protostomes</strong></td>
<td>• Dissect a clam (<em>Anodota spp.</em>) from phylum Mollusca and a grasshopper (<em>Brachyostoma spp.</em>) from phylum Arthropoda.</td>
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<td>• You will identify external and internal features of the clam and grasshopper body and submit labeled photographs.</td>
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<td>• Relate internal and external structures of protostomes to their functions.</td>
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<td><strong>Kingdom Plantae-Angiosperms</strong></td>
<td>• Observe and compare the roots, stems, leaves, and flowers of a monocot and dicot plant.</td>
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<td>• Examine prepared slides of root, stem, and leaf tissue of a monocot and dicot.</td>
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<td>• Relate internal and external structures of angiosperms to their functions.</td>
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<td><strong>Kingdom Plantae-Simple Plants and Gymnosperms</strong></td>
<td>• Create a generalized phylogenetic tree of plants and summarize the features of mosses, ferns, and conifers.</td>
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<td>• Examine the macroscopic and microscopic structures of a moss (<em>Bryophyta</em>).</td>
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<td>• Relate the morphology of confer reproductive structures to their functions.</td>
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<td><strong>Microbes Everywhere</strong></td>
<td>• Collect and culture microbes from six household surfaces on agar slants.</td>
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<td>• Create and Gram stain four bacteria smears.</td>
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<td>• Relate experimental result to microbial diversity contained on fomites.</td>
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<td><strong>Microscopy – Use and Function</strong></td>
<td>• Calculate the total magnification and field of view for the lenses on an optical microscope.</td>
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<td>• Examine prepared slides under scanning, low, and high power lenses.</td>
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<td>• Prepare wet-mount slides and practice staining technique.</td>
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<td><strong>Mitosis</strong></td>
<td>• Summarize each step of mitosis.</td>
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<td>• Examine images of plant and animal cells undergoing mitosis.</td>
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<td>• Identify the different stages of mitosis in cells of an onion root tip and whitefish blastula.</td>
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<td><strong>Mitosis and Meiosis</strong></td>
<td>• Create models to simulate the stages of mitosis and meiosis in an animal cell.</td>
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<td>• View microscope slides of plant and animal cells undergoing mitosis.</td>
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<td>• Identify the different stages of mitosis in cells of an onion root tip and a whitefish blastula.</td>
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<td><strong>Molecular Biology and Gel Electrophoresis</strong></td>
<td>• Create codons for a specific protein sequence and identify codon mutations.</td>
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<td>• Perform gel electrophoresis using food coloring as DNA.</td>
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<td>• Analyze electrophoresis results to determine molecule size.</td>
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<td><strong>Natural Selection: Hardy Weinberg</strong></td>
<td>• Calculate the number and frequency of alleles and genotypes in a population.</td>
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<td>• Predict genotypic numbers and frequencies and compare these values to observed data from a population model.</td>
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<td>• Analyze and compare a population subjected to no agents of evolution and a population subjected to natural selection.</td>
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<td>Plant Genetics</td>
<td>• Create monohybrid crosses for millet seed samples.</td>
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<td>• Examine corn for color and texture and design dihybrid crosses for the sample.</td>
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<td>• Analyze the distributions of genotypes from plant crosses with chi-square tests.</td>
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<td>Plant Photosynthesis</td>
<td>• Perform a controlled experiment to investigate the role of carbon and light availability in photosynthesis.</td>
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<td>• Graphically analyze experimental data.</td>
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<td>• Design a novel study to investigate other variables influencing photosynthetic rates.</td>
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<td>Plant Reproduction</td>
<td>• Identify and label the reproductive structures of a fresh flower.</td>
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<td>• Examine samples of pollen and ovules under the microscope.</td>
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<td>• Dissect an immature fruit and observe the structures of a developing seed.</td>
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<td>Plant Structures</td>
<td>• Examine cross sections of living root and stem tissue with a hand lens and microscope.</td>
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<td>• Analyze the annual ring pattern of a woody plant stem.</td>
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<td>• Model transpiration with a celery stalk and colored water.</td>
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<td>Population Ecology</td>
<td>• Model population growth and graphically illustrate the data.</td>
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<td>• Relate population trends to resource constraints.</td>
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<td>• Calculate the probability of death within a cohort from cemetery data and graphically illustrate the results.</td>
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<td>Properties of Soils</td>
<td>• Analyze four soil samples for pH, nitrogen, phosphorus, and potassium levels.</td>
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<td>• Examine the physical properties of soil samples, including weight and porosity.</td>
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<td>• Calculate the percentage of sand, silt, and clay in soil samples to determine the texture.</td>
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<td>Renewable Solar Energy</td>
<td>• Construct a solar thermal collector.</td>
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<td>• Analyze the efficiency of a thermal collector at heating water.</td>
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<td>• Calculate the power density of a silicon solar cell.</td>
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<td>Salinization of Soils</td>
<td>• Conduct a controlled experiment germinating seeds in five salt concentrations.</td>
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<td>• Measure seedling growth for five days.</td>
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<td>• Relate experimental results to the effects of soil salinization in nature.</td>
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<td>Spread of Contagion</td>
<td>• Summarize the agents, incidence, symptoms, prevention, and treatment of six contagious diseases.</td>
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<td>• Model the transmission of a contagion using chemical substances.</td>
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<td>• Relate the transmission of infectious disease to common social practices.</td>
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<td>Taxonomy of Living Things</td>
<td>• Summarize the characteristics of the 12 animal phyla.</td>
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<td>• Create a dichotomous key for identifying common household items.</td>
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<td>• Examine and identify five microbes using a dichotomous key.</td>
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<td>The Greenhouse Effect</td>
<td>• Conduct a controlled experiment on the effect of a greenhouse gas on temperature in a closed system.</td>
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<td>• Graphically analyze experimental data.</td>
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<td>• Relate the experimental results to Earth's atmosphere.</td>
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<td>The Macobiome</td>
<td>• Compare the biotic and abiotic components of two ecosystems.</td>
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<td>• Examine an owl pellet and identify its contents.</td>
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<td>• Relate owl diet to habitat characteristics.</td>
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<td>The Microbiome</td>
<td>• Summarize the habitat, feeding, mobility, and reproduction of bacteria, Daphnia, and Hydra.</td>
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<td>• Create two experimental microcosms and compare their inhabitants.</td>
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<td>• Examine living microbes under the microscope.</td>
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<td>Water Quality</td>
<td>• Measure the pH, phosphate, nitrates and fecal coliform levels of three water samples.</td>
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<td>• Rank environmental water, tap water, and bottled water for quality.</td>
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<td>• Relate water quality to environmental sources of contamination.</td>
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</tbody>
</table>

*Additional supplemental labs available for a nominal fee.