

## Introduction

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### Lab Options

AP Biology requires the completion of hands-on lab activities, and has been approved by the College Board as meeting all requirements for a laboratory science course.

To conduct the hands-on laboratory activities in this course, you will need to obtain the materials listed in this document. Apex Learning has partnered with a third-party vendor to create a custom laboratory kit that contains all the materials needed for this course. The kit may be purchased via Apex Learning or directly from the vendor's website at <http://www.qualitysciencelabs.com/apex-learning-science-kits/>. Once there, select "[Advanced Biology Kit for Apex Learning](#)."

### Lab Manual

There is no lab manual for this course. It is strongly recommended that students keep a detailed notebook of their work as some colleges require proof of experiments.

See the [Course Materials List](#) for required textbooks.

### Disclaimer

Apex Learning® has no liability whatsoever regarding any hands-on laboratory activities. The personnel at the school at which the student conducts the hands-on lab activities, or the student's parent or guardian if the lab activities are completed at home, are responsible for all such hands-on lab activities, including ensuring that qualified personnel are available to supervise the activities.

### Questions

Contact Apex Learning Support by phone at 1-800-453-1454 or by email at [support@apexlearning.com](mailto:support@apexlearning.com).

## Hands-On Lab Materials

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### Osmosis, Diffusion, and the Effects on Transpiration

Semester 1: 1.2.8

- Forceps
- Iodine solution (30 ml)
- 30 mL plastic beaker
- Stopwatch
- Magnifying glass
- Ruler (cm)
- Gloves, disposable
- Glucose (C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>), 2.8 g
- Ovalbumin (egg white protein), 0.5 g
- Dialysis tubing, 20-cm long (5)
- Cups, clear plastic, 9-oz. (14)
- Digital scale
- Graduated cylinder, 10-mL

- Test tubes, plastic with caps
- Test tube rack
- Pipet, graduated for stirring
- Glucose test strips (2)
- Protein test strip (1)
- Conductivity tester
- Microscope slide, concave
- Microscope cover slip
- Elodea water plant single leaf blade\*
- Mini Pipet
- Potato, peeled\*
- Kitchen knife (straight edge)\*
- Cored or cut potato pieces (peeled)\*
- Distilled water (H<sub>2</sub>O)\*
- Sucrose (table sugar), 3.4 g\*
- Table salt, 5.8 g\*
- Microscope\*
- The leftover solutions from Lab investigation 3.2 Part 1 (1 M glucose, 1 M sucrose, 1 M NaCl, 5% ovalbumin)
- Solutions of a chosen solute (like NaCl or sucrose) in distilled water (1.0 M, 0.2 M, 0.4 M, 0.6 M, 0.8 M)

## Hardy Weinberg Equilibrium

Semester 1: 2.2.8

- PTC (Phenylthiocarbamide) test strips
- 40 black beads and 25 white beads per group
- Paper bag
- (3) 2 oz. Sample Cups - Label BB, Bb, and bb

## Comparing DNA Sequences to Understand Evolutionary Relationships with BLAST

Semester 1: 3.2.8

- A computer with internet access\*

## Meiosis and Mitosis

Semester 1: 4.1.8

- Toothpicks (8)
- Metric rulers (2)
- Digital scale
- Razor blade, straight edge
- Forceps

- Microscope slides (4)
- Microscope coverslips (4)
- 0.5% Toluidine Blue stain
- 0.1M hydrochloric acid
- Stopwatch
- Onion bulbs (2)\*
- Glass canning jars (2)\*
- Concentration of caffeine (coffee): 0.5% (0.5 g/100ml)\*
- Paper towels\*
- Distilled water\*
- Microscope\*
- Light bulb heat source\*

## Understanding Enzymes

### Semester 2: 1.1.8

- Digital scale
- Lactase tablet
- 24-well reaction plate
- Pipets (13)
- Glucose (dextrose), 2 grams
- Glucose test strips (21)
- Beaker plastic, 150 ml, 30 ml
- Graduated cylinders, 10 ml
- Prepared Solutions from Lab Investigation 5.1
  - 20% glucose
  - 5% sucrose
  - Lactase Enzyme Solution
- Test tubes, plastic with caps (9) Test tuberack
- Stopwatch
- pH buffer powder in capped test tubes: pH 4, 7, 10
- Lactase solution (in capped test tube prepared in Lab 5.1)
- Universal Indicator strips (3)
- Sucrose (table sugar), 1 gram\* Distilled water
- Knife for cutting lactase tablet in half\* Spoons (for crushing lactase tablet) (2)\*
- Whole milk\*

## Cellular Energetics Labs: Photosynthesis (Part A) and Cellular Respiration (Part B)

Semester 2: 2.2.8

- Plastic syringes, 60 cc (2)
- Liquid soap - Dawn®\* (approx. 5 mL of dish washing soap in 250 mL of water)
- Pipets (2)
- Stopwatch
- Living leaves\* (spinach, ivy, etc.)
- Baking soda\* (sodium bicarbonate -  $\text{NaHCO}_3$ ) (1 g)
- Hole punch\*
- Clear plastic cups (2)\*
- Light Source\*

If the experimental design is looking at quantifying light intensity differences, it is highly recommended that a PAR meter (photosynthetically active radiation) be used instead of foot-candles (which is more of an outdated, subjective measure of luminance). A PAR meter counts photons in the PAR spectrum and will greatly facilitate the experimental design. These can be purchased for around \$35.

## Bacterial Transformation

Semester 2: 3.1.8

- Handouts:
  - Blue colored Plasmid Sequence Strips
  - Pink colored Human DNA Base Sequence Strips
  - Yellow/Golden colored Restriction Enzyme Sequence Cards
- Procedure Booklet
- Bacterial transformation kit
- Thermometer
- Stopwatch
- Scissors\*
- Tape\*
- Incubator oven at 37 °C (optional)\*
- Ice water bath (crushed ice)\*
- Warm water baths (Styrofoam cups) at 42 °C and 37 °C\*
- Distilled water (if making agar from a powder) \*
- Microwave oven or heat source for hot water\*
- Marking pens (red and green)\*
- Masking tape\*

## Energy Dynamics

### Semester 2: 4.1.8

- Yeast packet
- Beakers, glass 50-mL (2) and plastic 150 mL
- Graduated cylinder, 10-mL
- Syringe, 5-mL
- Serological graduated pipet, 1 mL
- Stopwatch
- Thermometer
- Corn syrup (dark) 1 mL\*
- Distilled water (it should be about 25-27 °C)\*
- Food coloring (red)\*
- Tall glass jar or water glass\* (to hold inverted respirometer)
- Tape\*