



Biology Skills for Success in the Pre-AP® Years

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Biology Skills for Success in the Pre-AP Years

Academic skills

- Effective mechanisms to record lecture notes
- Synthesis of information
- Critical thinking
- Active learning
- Problem solving
- Creativity/innovation
- Research
- Observing overviews and fine details
- Observing similarities and differences

Communication skills

- Written materials
- Oral/visual presentation
- Active listening
- Informed discussion to show knowledge and understanding

Investigative skills

- Use safe practices
- Collect data and make measurements with precision
- Organize, analyze, evaluate, make inferences, and predict trends from data
- Communicate valid conclusions
- Present data as tables, graphs, bar charts, and/or pie charts
- Make calculations using data and formulae
- Evaluate procedures

Self-management skills

- Reflection on learning
- Self-awareness/assessment
- Decision making
- Time management
- Initiative
- Group work

Biology Skills for Success in the Pre-AP Years Section 1

Day 1

Topics

Introduction to biology

- Characteristics of living things
- Levels of organization
- Scientific method

Implementing Skills

Fluency exercise: Students list the common characteristics they believe all living things share (without teacher input). Students then separately list examples of living things. The two lists are compared and a correct list of the characteristics of living things is developed.

Skills emphasized:

- Academic skills—synthesis of information, critical thinking (Why is breathing not considered a requirement to be a living organism?), observing similarities and differences (living vs. not)
- Communication skills—informed discussion to show knowledge and understanding

Day 2

Topics

Inorganic chemistry

- Matter (phases, physical/chemical properties)
- Atom (subatomic particles, neutrons, ions, isotopes)
- Elements
- Periodic table (calculating atomic number, mass number)
- Bonding

Implementing Skills

Notes/review on the basics of chemistry

Skills emphasized:

- Academic skills—using mechanisms to record lecture notes, observing overviews and fine details (the atom as a whole and then its components), synthesizing information
- Communication skills—active listening, informed discussion to show knowledge and understanding

Activity for making calculations regarding atoms given limited information

Skills emphasized:

- Investigative skills—make calculations using data and formulae (determining atomic number, mass number, number of subatomic particles, etc.)

Day 3

Topics

- Quiz: Introduction to inorganic
- Water
 - Features of:
 - Solutions
 - Acids/bases/salts
- Lab activity: Acids, bases, and cells

Implementing Skills

Inorganic chemistry quiz

Skills emphasized:

- Self-management skills—reflection on learning (studying), decision making

Lab activity: Acids, bases and cells. This lab activity requires students to work with liver and potato homogenates by measuring the changes in pH after adding drops of HCl and NaOH and graphing the data in a point-line graph. They also graph the change in pH of a control (tap water solution) and a commercial buffer solution of neutral pH. The students have to determine, on the basis of their data, if tissues have buffers. The lab is written up in a formal lab report.

Skills emphasized:

- Communication skills—written material (via lab write-up)
- Investigative skills—evaluate procedures (measure pH only after adding the directed number of drops of acid), use safe practices in handling equipment (safely handle strong acids and bases), collect data and make measurements (pH measurements), organize data (data table), analyze data, present data as graph (point-line), communicate valid conclusions
- Self-management skills—reflection on learning, decision making, time management (following procedures in a timely manner so the lab will be completed during class time allotted), group work

Day 4

Topics

Organic chemistry

- Nature of carbon
- Dehydration synthesis/hydrolysis
- Major biomolecules (carbohydrates, lipids)

Implementing Skills

The use of manipulatives to demonstrate dehydration synthesis/hydrolysis

Skills emphasized:

- Academic skills—problem solving (How do the manipulatives work?), active learning

Day 5

Topics

Organic chemistry

- Major biomolecules (proteins, nucleic acids)
- Enzyme focus
- Lab activity: Major biomolecules

Implementing Skills

Lab activity: Major biomolecules. This exercise allows the student to determine the molecular characteristics of organic molecules and to put together models representing their union.

Skills emphasized:

- Academic skills—synthesizing information, recognizing overviews and fine details
- Investigative skills—evaluating procedures
- Self-management skills—time management, reflection on learning (What from the class discussion has the lab reinforced?)

Day 6

Topic

- Lab activity: Enzymes

Implementing Skills

Lab activity: Enzymes. In this lab, the student investigates the action of the enzyme catalase in various materials. Temperature measurements are taken to determine the speed of the reactions. The lab is written up in a formal lab report.

Skills emphasized:

- Investigative skills—use safe lab practices (working with numerous pieces of glassware); evaluate procedures; collect data and make measurements with precision (temperature); organize, analyze, and evaluate data; present data in a graph (point-line); make calculations using data and formulae (calories, change in heat); communicate valid conclusions (Does living tissue contain catalase? Why is it important?)
- Communication skills—written materials
- Self-management skills—time management, self-awareness, group work, budgeting (Budgeting this class homework and others), initiative (Get started and work effectively)

Day 7

Topics

- Test chemistry
- Microscopes
 - Types
- Letter to Leeuwenhoek

Implementing Skills

The students write a letter to Leeuwenhoek to let him know about the impact he had on science today.

Skills emphasized:

- Academic skills—creativity, research (Find more information on topic than was provided in class)

Day 8

Topics

- Microscopes
- Cell theory
- Cell
 - Organelles
 - “Cell city” writing
- Lab activity: Plant vs. animal cells

Implementing Skills

Lab activity: Plant vs. animal cells. The students write about a cell as if it was a “city,” with each of the organelles serving some function in that “city.”

Skills emphasized:

- Academic skills—creativity, research

This lab requires the students to look and recognize the differences in structure between animal and plant cells. The lab is presented in a formal lab write-up.

Skills emphasized:

- Academic skills—observing differences and similarities
- Investigative skills—use safe practices, evaluate procedures, communicate valid conclusions
- Self-management—self-awareness/assessment, time management, group work

Day 9

Topics

- Cell
 - Organelles
- Passive transport

Day 10

Topics

- Organelle quiz
- Active/bulk transport
- Lab activity: Diffusion and cell size

Implementing Skills

Lab activity: Diffusion and cell size. This lab requires students to work with different sizes of agar “cells” to determine if the rate of diffusion is changed by the size of the “cells.” Additionally, students cut “cells” into different shapes to see if the rate is affected by cell shape. A formal lab write-up is required.

Skills emphasized:

- Communication skills—written materials via lab report
- Investigative skills—use safe practices; evaluate procedures; collect data; make measurements with precision; organize, analyze, and evaluate data; present data as point-line graph; make calculations from data (surface area ratios); communicate valid conclusions
- Self-management skills—self-awareness (Are procedures being followed?), reflection on learning, decision making, time management, initiative, group work

Day 11

Topics

- Active/bulk transport
- Cell types

Day 12

Topic

- Cell test

Day 13

Topics

- ATP cycle
- Sources of energy
- Photosynthesis

Implementing Skills

Teaching biochemistry can be very daunting. The use of visual aids, media, and manipulatives makes the task much easier for the students. The laserdisc *Biology: The Web of Life* has great animation.

Skills emphasized:

- Academic skills—synthesis of information, critical thinking, active learning, observation of overviews and fine details, observation of similarities and differences
- Communication skills—written materials, oral/visual presentation (Describe processes to others orally), active listening, informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Day 14

Topics

- Photosynthesis
- Lab activity: Plant pigment chromatography

Day 15

Topics

- Photosynthesis
 - Light/dark reactions

Biology Skills for Success in the Pre-AP Years Section 2

Day 1

Topics

- Photosynthesis quiz
- Begin cellular respiration
 - Defined, happening in ALL cells
 - Requirements/steps/outcomes/equation of aerobic
 - ATP, NADH, FADH₂, pyruvate (pyruvic acid), glucose

Implementing Skills

Students are given a blank outline of each of the steps of aerobic respiration, and they fill it in together. Very simplified flow diagrams are made to show the steps. The diagrams are very general, focusing on the main requirements and main outcomes of each step.

Skills Emphasized:

- Academic skills—effective mechanisms to record lecture notes, synthesis of information, active learning, observation of overviews and fine details, observation of similarities and differences
- Communication skills—active listening, informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Get your hands on (video, videodisc) to supplement your lesson. Students have to see this in action to “get it.”

Day 2

Topics

- Aerobic respiration, finish
- Anaerobic respiration
 - Lactic acid/alcoholic fermentation

Implementing Skills

Students are given an 8½ x 14 piece of paper and four different colors of markers. They fold the paper into fours. The first section of the paper represents glycolysis. They draw the steps together (very simplified) in one color. They circle the products of the phase that is used in the next phase and draw an arrow to the beginning of the next phase (pyruvic acid conversion). After switching the colors, they draw the steps. Once again, they circle the products and draw an arrow to the next phase (Kreb's). They draw the cycle in the third color, circle the products, and bring them to the final section of the paper, which represents electron transport. Then they draw it in a fourth color. They circle all NADHs and FADH₂s produced in earlier phases and draw an arrow to show them going into the ETC.

Skills emphasized:

- Academic skills—synthesis of information (This activity shows how each step is a requirement for the next and ultimately how much ATP is spent and made in the process), observation of overviews and fine details

Notes/lecture on anaerobic respiration

Day 3

Topics

- Lab activity: Fermentation
- Review for photosynthesis/CR test

Implementing Skills

Lab activity: Fermentation. There are many good fermentation labs that can be done. Some labs are as simple as adding yeast and a sweetener together and putting them in a balloon to see what happens. Another good lab uses yeast and the milk sugar lactose. In this lab, students add lactose/yeast to one test tube, yeast/dextrose to another, and yeast/lactose/Lactaid or Dairy Ease to a third. The test tubes are sealed, inverted, and warmed in a water bath. Students measure CO₂ production as the gas forces the yeast solutions out of the tubes. Yeast cannot ferment lactose, thus no carbon dioxide is produced. However, the enzyme provided by Lactaid breaks down the lactose into galactose and glucose, and fermentation occurs. Students graph the results.

Skills emphasized:

- Communication skills—written materials via lab report
- Investigative skills—use safe practices: evaluate procedures; collect data; make measurements with precision; organize, analyze, and evaluate data; present data as point-line graph; communicate valid conclusions
- Self-management skills—self-awareness (Are procedures being followed?), reflection on learning, decision making, time management, initiative, group work

Day 4

Topic

- Photosynthesis and cellular respiration test

Day 5

Topics

- DNA
 - Discoveries
 - Structure (nucleotides, bonding, anti-parallel nature)
- Hand models
- DNA extraction activity

Implementing Skills

Articles about Watson, Crick, Wilkins, and Franklin are very interesting to the students.

One particularly helpful demonstration is to turn their hands into nucleotides. Students draw a nucleotide on their left hand. Their thumb is a phosphate, the palm is the sugar, and their fingers represent the base. Standing shoulder to shoulder, students line up in a row with their left arms outstretched, palms up. They then can connect their hands together. They will notice that alternating units of phosphate-sugars form the “backbone” of their molecule and the bases point to the “inside” of the molecule. You can also show the anti-parallel nature of DNA, because on each side of the strand, the thumbs are

pointing in opposite directions. If you do not want them to draw on their hands, use round self-adhesive stickers. One color is the phosphate (attach to thumb), another color is the sugar (attach to palm), and a third is the base (attach to tip of middle finger).

Skills emphasized:

- Academic skills—synthesis of information

DNA extraction from strawberries is the best I have ever seen.

Skills emphasized:

- Investigative skills—safe practice (This is a good chance to review cell structure as you break apart the cells to “get at” the DNA.)

Day 6

Topics

- DNA replication
 - Process, including enzymes involved
- Act it out

Implementing Skills

Base pairing rules are discussed, along with process of replication.

Use the hand demos again to pair up the nucleotides and form a DNA “model.” Assign some students to be enzymes (one to unwind the helix—helicase; one to get the process started—primase; one to add “free-floating nucleotides”—DNA polymerase; one to remove primer and repair—ligase).

Skills emphasized:

- Academic skills: Creativity/innovation (Creativity really helps this process.)

Any video or simulation will be helpful so they can see this process in action.

Day 7

Topics

- RNA
- Protein synthesis
 - Transcription/translation, including enzymes involved

Implementing Skills

Give notes on RNA structure and the detailed process of protein synthesis.

Have the students practice, practice, practice using codon sheets.

Any media would be helpful so they can see the process in action.

Day 8

Topics

- Mutations

Implementing Skills

Discuss the types of mutations and then do practice worksheets to demonstrate the mutations (which means they will again practice protein synthesis). The groundwork laid here will help when reaching the Evolution section of curriculum.

Skills Emphasized:

- Academic skills—synthesis of information

Day 9

Topics

- Biotechnology
 - DNA recombination
- Lab activity

Implementing Skills

Lab activity: You can go way expensive or way cheap on this lab. There are paper labs that are very effective in demonstrating DNA recombination.

Day 10

Topics

- Biotechnology
 - Gel electrophoresis
- Lab activity

Implementing Skills

Lab activity: Again, this can go way expensive to way cheap on this lab. If you have the equipment, try rainbow electrophoresis (uses food coloring) as a minimum. It gets students working with equipment they will see in AP Biology and college science classes. There are paper labs to demonstrate electrophoresis too.

Day 11

Topics

- DNA Test

Day 12

Topics

- The cell cycle
- Mitosis
- Lab activity

Implementing Skills

Lab activity: A popular mitosis lab involves looking at the root tip of onion cells. There are also labs that can be done online. However, I don't use the online lab because I try to get students to use lab equipment every chance I get.

Day 13

Topics

- Meiosis
- Lab activity

Implementing Skills

Lab activity: Have the students analyze and describe drawings of the different phases of meiosis.

Day 14

Topics

- Mitosis/meiosis quiz
- Introduction to genetics
 - Mendel's crosses
 - Dominance/recessiveness
 - Genotype/phenotype

Implementing Skills

Use a worksheet that covers homologous chromosomes. It is helpful in practicing the above-mentioned topics.

Skills emphasized:

- Communication skills—written materials to show mastery. Students need to have mastered these concepts before moving on to genetic crosses.

Day 15

Topics

- Mendel's laws
- Genetic crosses
 - Monohybrid, dihybrid

Implementing Skills

Give students a “Punnett packet” to work through.

Skills emphasized:

- Academic skills—synthesis of information, active learning, problem solving

Biology Skills for Success in the Pre-AP Years Section 3

Day 1

Topics

- Genetic crosses
 - Polygenic traits, incomplete dominance, co-dominance, sex-linked

Implementing Skills

Have students complete Punnett packet assignment.

Day 2

Topics

- Human genetics
- Address disorders (sex-linked, autosomal dominant and recessive, nondisjunction)
- Detection, prevention (karyotypes, amniocentesis, chorionic villi biopsy)
 - Pedigree analysis
 - Lab activity: Karyotype

Implementing Skills

Students are given a Pedigree Analysis Worksheet. This shows them how to utilize a pedigree to make predictions about future offspring.

Skills emphasized:

- Academic skills—problem solving

Lab activity: Karyotype. Students are given different karyotypes and determine what nondisjunction disorder, if any, the individual has.

Skills emphasized:

- Academic skills—observation of similarities and differences (Students have to pair up homologous chromosomes), active learning

Day 3

Topics

- Lab activity: Genetic testing
- Modeling genetic and environmental influences

Implementing Skills

Lab activity: Genetic testing. A Socratic seminar follows the genetic testing lab. Students view a genetic testing simulation that elicits responses from them regarding how cystic fibrosis might affect their lives as well as the lives of their future children. Topics such as abortion and mandatory genetic testing come up. It is a great activity to get them thinking.

Skills emphasized:

- Communication skills—active listening, informed discussion
- Self-management skills—reflection on learning, group work

The second activity demonstrates how both genetics and certain environmental factors will affect a trait such as height.

Day 4

Topic

- Genetic symposium

Implementing Skills

Students give oral presentations on the theme of genetic disorders.

Skills emphasized:

- Academic skills—synthesis of information, research
- Communication skills—oral/visual presentation
- Self-management skills—time management, initiative, decision making

Day 5

Topic

- Genetics test

Day 6

Topics

- Evolution
 - Theory vs. hypothesis
- Lab activity: Money

Implementing Skills

Lab activity: Money. In the money activity, students are given old checks dating back several years. Using the checks, they theorize about what happened to the check user (someone died) and develop a hypothesis as to who it was. After finishing this activity, students should have an idea about the differences.

Skills emphasized:

- Academic skills—problem solving, thinking critically, synthesizing information

Day 7

Topics

- History
- Evidence
 - Fossils, biochemistry, anatomy
- Lab activity: Amino acid sequencing

Implementing Skills

Lab activity: Amino acid sequencing. Students compare and contrast amino acid sequences in proteins of several vertebrates and infer evolutionary relationships.

Skills emphasized:

- Academic skills—observing similarities and differences
- Investigative skills—evaluating and making inferences based on data

Day 8

Topics

- Darwin/Wallace
- Mechanisms of evolution
 - Natural selection, migration, genetic drift, isolation, mutation
- Patterns of evolution
 - Divergent, convergent, co-evolution

Implementing Skills

Because this is such a hot topic in Texas, there is plenty of opportunity for emphasizing the skill of informed discussion!

Day 9

Topics

- Micro/macro evolution
- Rate of evolution
 - Gradualism, punctuated equilibrium
- Therapsid activity

Implementing Skills

The Therapsid activity shows the change in a species over time. The students sit in rows. The person at the back of each row is given a drawing of a Therapsid. They are given 10 seconds to re-draw the picture. Their drawing is passed to the person in front of them, who then adds to the picture for another 10 seconds and passes it forward. This continues until the picture reaches the person in front. The front-row individuals draw their species on the board. The group then gets together and talks about their evolved animals' adaptations. Ensure that they use correct terminology and don't just think this (evolution) would happen over night. They tend to fall back into Lamarck if you do not guide them in the right direction.

Day 10

Topic

- Evolution test

Day 11

Topics

- Classification
 - History, rules, categories
- Lab activity: Classification using keys
- Assign Christmas reading
- *Microbe Hunters* (Ch. 11—Walter Reed)

Implementing Skills

Lab activity: Classification using keys. The lab requires students to key out different members of the class Chondrichthyes. They are also required to develop a key to identify four unknown fish.

Skills emphasized:

- Academic skills—observing overviews and fine details
- Investigative skills—evaluating procedures

The assigned reading takes some self-management skills, but it is a good read.

Skills emphasized:

- Self-management skills—decision making, time management, initiative

Days 12, 13, 14, 15

Topic

- Semester exams

Biology Skills for Success in the Pre-AP Years Section 4

Day 1

Topics

- Reading discussion
- Microbiology
 - Virus—characteristics, structures, replication, discovery, examples, uses
 - Non-viroid particles (prion/viroid)

Implementing Skills

Students watch a video about influenza.

Skills emphasized:

- Academic skills—using mechanisms to record lecture notes, active learning

Day 2

Topics

- “Most Wanted” project assigned
- Library research

Implementing Skills

Students are assigned a disease caused by a virus, bacterium, or protist. The disease is researched and students make a “Most Wanted” poster of the disease and write a short fictional story using facts about the disease.

Skills emphasized:

- Academic skills—research
- Self-management skills—decision making, time management, initiative

Day 3

Topics

- Microbiology
 - Bacteria—classification, characteristics, structures, reproduction, ecological roles, pathogens, control
- Lab activity: Bacterial isolation and sensitivity test

Implementing Skills

Lab activity: Bacterial isolation and sensitivity test. Students exercise conditions for bacterial growth, techniques for isolation, and aseptic transfer. Antibacterial substances are also tested.

Skills emphasized:

- Academic skills—active learning
- Investigative skills—using safe practices, making measurements with precision, communicating valid conclusions

Day 4

Topics

- Bacteria lab, finish
- Microbiology
 - Protist—characteristics, classification, diseases, protist in biosphere
 - Endosymbiotic theory

Implementing Skills

After incubation, data is taken on the inoculated dishes.

Skills emphasized:

- Communication skills—written materials (lab write-up)

Discussing the endosymbiotic theory brings back a lot of information from the first semester.

Skills emphasized:

- Academic skills—synthesis of information

Day 5

Topic

- Lab activity: Protist

Implementing Skills

Lab activity: Protist. Students use microscopes to look at a variety of protists.

Skills emphasized:

- Academic skills—observing similarities and differences
- Investigative skills—safe practices

Day 6

Topic

- Microbiology test

Day 7

Topics

- Fungi
 - Characteristics, classification, reproduction
- Lab activity: Fungi

Implementing Skills

Lab activity: Fungi. The fungi lab I set up is a station lab. At each station, information and specimens are available to help students answer the questions.

Skills emphasized:

- Academic skills—active learning, research
- Communication skills—written materials
- Self-management skills—reflection on learning

Day 8

Topics

- Invertebrate animals
 - Porifera and Cnidaria—characteristics, classification
- Specimens

Implementing Skills

I pass around specimens as we discuss these two phyla. The specimens can also be used by having the students observe them and come up with a list of characteristics on their own.

Skills emphasized:

- Academic skills—observing details

Day 9

Topic

- Lab activity: Sponge, Cnidarian

Implementing Skills

Lab activity: Sponge, Cnidarian. In this lab, students fill in information based on the specimens (preserved and living).

Day 10

Topics

- Worms—characteristics, classification
 - Flatworms
- Lab activity: Planaria behavior

Implementing Skills

Lab activity: Planaria behavior. Students fill in a chart that compares the three groups of worms.

Skills emphasized:

- Academic skills—observing similarities and differences

The behavior lab is fun because the students get to work with a living animal.

Day 11

Topics

- Round/segmented worms
- Specimens

Implementing Skills

Students continue filling in the worm chart.

Day 12

Topics

- Echinoderms—characteristics, classification
- Mollusk—characteristics, classification
- Specimens

Day 13

Topic

- Arthropods—characteristics, classification

Implementing Skills

Students again compare the different groups of arthropods. This is done with ease by filling in a chart. Specimens also supplement the lesson.

Day 14

Topic

- Invertebrate test

Day 15

Topics

- Vertebrate introduction
- Lab activity: Fish
 - Characteristics, classification, development

Implementing Skills

Lab activity: Fish. The fish lab is a station lab. At each station are specimens and information to help students find the answers they are looking for.

Skills emphasized:

- Academic skills—active learning, research
- Communication skills—written materials
- Self-management skills—reflection on learning

Biology Skills for Success in the Pre-AP Years Section 5

Day 1

Topic

- Fish lab, finish

Day 2

Topics

- Fish
- Class Amphibia—characteristics, classification
- Specimens

Implementing Skills

Skills emphasized:

- Academic skills—active learning
- Communication skills—informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Day 3

Topics

- Class Reptilia—characteristics, classification
- Specimens

Implementing Skills

Skills emphasized:

- Academic skills—active learning
- Communication skills—informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Day 4

Topics

- Class Aves—characteristics, classification
- Lab activity: Harris' Hawk Bird

Implementing Skills

Lab activity: Harris' Hawk Bird. This lab revisits DNA technology. Students are given gel electrophoresis samples from various nests and then try to figure out if only the Alpha birds are mating or if the Beta birds get to mate as well.

Skills emphasized:

- Academic skills—synthesis of information, active learning, problem solving
- Investigative skills—analyze and evaluate data

Day 5

Topic

- Mammals—characteristics, classification

Implementing Skills

Skills emphasized:

- Academic skills—active learning
- Communication skills—informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Day 6

Topic

- Rat dissection

Implementing Skills

Skills emphasized:

- Academic skills—active learning, observation of similarities and differences
- Communication skills—informed discussion
- Investigative skills—using safe practices, evaluating procedures
- Self-management—self-awareness/assessment, group work

Day 7

Topic

- Vertebrate test

Day 8

Topics

- Human body
 - General overview of systems
- Muscle system focus
 - Types, muscle cell components

Implementing Skills

Focus on muscles and muscle physiology is difficult. Any visual aids will be very helpful.

Skills emphasized:

- Academic skills—active learning, synthesis of information (re-visit respiration), critical thinking
- Communication skills—informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Day 9

Topics

- Muscles
 - Contraction
- Muscle models

Implementing Skills

The students build muscles out of common household items such as thread, stir straws, drinking straws, and coin wraps. We start with the thread (represents actin and myosin). The thread is put into the stir straws to represent a myofibril. The stir straws are then inserted into the drinking straws to represent a muscle cell. Muscle cells are incorporated into a coin wrap to represent a whole muscle.

Skills emphasized:

- Academic skills—synthesis of information, critical thinking, active learning, creativity/innovation, observation of overviews and fine details
- Communication skills—active listening
- Self-management skills—reflection on learning

Day 10

Topics

- Nervous system
 - Parts, specialized cells, nerve transmission, drugs that affect, reflex arc
- Lab activity: Senses

Implementing Skills

Nerve transmission is a little tough to understand. Provide any visual aid possible.

Skills emphasized:

- Academic skills—synthesizing information, critical thinking, active learning, observing similarities and differences
- Communication skills—active listening, informed discussion

Lab activity: Senses. The senses lab requires students to do various tests of different senses (vision, hearing, touch, etc.).

Skills emphasized:

- Investigative skills—using safe practices, evaluating procedures, evaluating data

Day 11

Topics

- Senses lab, finish
- Circulatory system
 - Heart
 - Electricity, transmission of excitation, vessels

Day 12

Topic

- Lab activity: Cardiovascular

Implementing Skills

Lab activity: Cardiovascular. In this lab, students palpate different pulse points and measure factors that affect blood pressure and pulse (posture, exercise, cold stimulus, dive reflex).

Skills emphasized:

- Investigative skills—using safe practices, collecting data and making measurements with precision, evaluating data
- Self-management skills—time management, initiative, group work

Day 13

Topics

- Respiratory system—components, pigments, ventilation, neural regulation, factors affecting
- Lab activity: Respiratory

Implementing Skills

Lab activity: Respiratory. The lab measures lung capacities. Students then compare their results to the others in the class.

Skills emphasized:

- Investigative skills—using safe practices, collecting data and making measurements, analyzing data

Day 14

Topics

- Digestion—organs and functions, enzymes
- Hamburger paper

Implementing Skills

Students write a creative paper that traces the digestion of a hamburger, from entrance to exit. They have to discuss all the enzymes involved.

Skills emphasized:

- Academic skills—synthesis of information, critical thinking, creativity
- Communication skills—written materials
- Self-management skills—reflection on learning

Day 15

Topic

- Human body test

Biology Skills for Success in the Pre-AP Years Section 6

Day 1

Topics

- Introduction to plants
 - Evolution of
 - Adaptations to life on land
- Lab activity: Plant classification and characteristics

Implementing Skills

Lab activity: Plant classification and characteristics. The lab is designed as a station lab. The students can utilize information and specimens at stations to get the needed information.

Skills emphasized:

- Academic skills—active learning, research
- Communication skills—written materials
- Self-management skills—time management

Day 2

Topics

- Energy, growth, and transport in plants
- Lab activity: Deer corn

Implementing Skills

Lab activity: Deer corn. This lab measures the viability of corn seeds based on two tests. One test is a tetrazolium test. Living tissue reacts with tetrazolium by turning pink. The second test is a germination test.

Skills emphasized:

- Communication skills—written materials (lab write-up)
- Investigative skills—using safe practices, collecting data; organizing, analyzing, and evaluating data; communicating valid conclusions; presenting data in a table; evaluating procedures

Day 3

Topics

- Deer corn lab, finish
- Lab activity: Transpiration

Implementing Skills

Lab activity: Transpiration. The transpiration lab compares the rates of transpiration in monocot and dicot leaves. You can also introduce other variables such as wind and light exposure.

Skills emphasized:

- Communication skills—written materials (lab write-up)
- Investigative skills—using safe practices, collecting data; organizing, analyzing, and evaluating data; communicating valid conclusions; presenting data in a table; evaluating procedures

Day 4

Topics

- Transpiration lab, finish
- Reproduction
 - Structures, specialized cells

Implementing Skills

Skills emphasized:

- Academic skills—effective mechanisms to record lecture notes, synthesis of information, active learning
- Communication skills—active listening, informed discussion to show knowledge and understanding
- Self-management skills—reflection on learning

Day 5

Topic

- Lab activity: Plant reproduction

Implementing Skills

Lab activity: Plant reproduction. In this lab, students label the flower, compare monocots and dicots, investigate seed dispersal, and differentiate between the different types of fruit.

Skills emphasized:

- Academic skills—synthesis of information, active learning, observation of similarities and differences
- Communication skills—written materials, active learning
- Investigative skills—using safe practices, evaluating procedures
- Self-management skills—reflection on learning, time management, group work

Day 6

Topic

- Plant test

Day 7

Topics

- Introduction to ecology
- Lab activity: Biome

Implementing Skills

Lab activity: Biome. The biome lab requires students to analyze and graph climatograms for different biomes.

Skills emphasized:

- Communication skills—written materials, active listening, informed discussion
- Investigative skills—evaluating procedures; organizing, analyzing, and evaluating data; communicating valid conclusions; presenting data as graphs

Day 8

Topics

- Biomes project
- Ecosystem structure
 - Food chains, webs, pyramids

Implementing Skills

The biome project is great for all the right-brained people. Partners are assigned a biome to research. They then have to provide information about their biome on a poster, in a poem, and in a skit.

Skills emphasized:

- Academic skills—synthesis of information, critical thinking, active learning, creativity/innovation, research
- Communication skills—oral/visual presentation
- Self-management skills—reflection on learning, self-awareness, decision making, time management, initiative, group work

Day 9

Topics

- Populations
 - Population growth
 - Limiting factors
 - Carrying capacity
- Communities
 - Predator/prey relationships
 - Symbiotic relationships
- Population sampling
- Cougar hunt

Implementing Skills

There are varieties of population sampling activities you can do. Any will show the students a technique used by ecologists to estimate population sizes.

Skills emphasized:

- Investigative skills—collect data, communicate valid conclusions, make calculations using data and formulae

The cougar hunt is very fun. The students are cougars and are hunting for food (foam cups). The cups represent squirrel, deer, porcupines, beaver, and rabbits. The cougars must get a certain amount of food to survive. This activity illustrates carrying capacity and limiting factors.

Skills emphasized:

- Academic skills—active learning
- Investigative skills—collect data, organize and predict trends from data, communicate valid conclusions, evaluate procedures

Day 10

Topics

- Chemical cycles
- Carbon, nitrogen, water

Implementing Skills

Skills emphasized:

- Academic skills—using mechanisms to record lecture notes, synthesizing information, observing similarities and differences

Day 11

Topic

- Biome presentation

Day 12

Topic

- Ecology quiz

Days 13, 14, 15

Topic

- Exams