

Resource Guide to the
Arkansas Curriculum
Framework for Students with
Disabilities for Tenth Grade
Science

Summer 2007
Amended 2009

Purpose and Process

The Individuals with Disabilities Education Act and No Child Left Behind mandate that schools provide access to the general education curriculum for all students receiving special education services. In recognizing the challenge of providing opportunities for students with disabilities to access general education curriculum, it is the desire of the Arkansas Department of Education to assist educators with this process. The goal is to assist school personnel who serve children with disabilities in conceptualizing, planning, and implementing activities that are aligned to the Arkansas Curriculum Framework.

The following document contains ideas for linking activities to the same science framework used for the general education curriculum. When selecting appropriate activities, decisions must be based on individual student needs and abilities. Collaboration with science personnel will provide assistance in linking science curriculum with the State framework. The Arkansas Alternate Portfolio Assessment must align to the Arkansas Curriculum Framework. Specifically, the Tenth Grade Science Portfolio Assessment for Students with Disabilities must align with the same Biology content standards upon which other tenth grade students are assessed. The Tenth Grade Science Portfolio Assessment must contain one entry from each of the nine content standards that are embedded in the four strands for Biology listed below.

Science Curriculum Framework

Biology Strands:

- Molecules and Cells (3 content standards)
- Heredity and Evolution (3 content standards)
- Classification and the Diversity of Life (1 content standard)
- Ecology and Behavioral Relationships (2 content standards)

In May 2007, the Arkansas Department of Education convened a task force of general education science teachers, teachers of students with disabilities, and administrators to collaborate and develop the following resource guide to be used to help with the process of developing a tenth grade science portfolio assessment for students with disabilities not accessing Biology or any equivalent course.

The committee identified which student learning expectations (SLEs) from the Arkansas Biology Science Curriculum Framework would be appropriate to include in this resource guide. Each SLE was evaluated by the committee to determine the essence of learning. Using the essence of the SLE, different levels of complexity of learning were written and organized within a matrix from least complex to most complex. This allows students to have access to the same content standards. Ideas for corresponding sample activities were also included. Each individual student's abilities must first be considered when selecting ideas from this guide. Augmentative communication equipment and/or other adaptations should be used to make accommodations for students who require them to meet the SLE. Teachers will need to use creativity in adapting the suggested activities to meet students' individual needs.

Although this publication is not intended for generating specific test item activities for the Arkansas Alternate Portfolio System for Students with Disabilities, its purpose is to provide Arkansas educators with a process for determining alignment between models of education that have been to some extent separate. Using the activities as idea starters, the educators can then individualize and develop specific activities that align with the education program, demonstrate performance of skills, and document educational opportunities. The members of the committee do not intend this publication to be used as a checklist, a menu of alternate assessment "test activities or items," or as Individualized Education Plan (IEP) goals and objectives. The resources listed in this document are meant to give teachers some ideas of ways to access materials for teaching science to students with disabilities. This is not an exhaustive list and Web sites may change over time.


COMMITTEE MEMBERS

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Biology

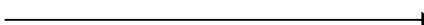
Strand	Content Standard
Molecules and Cells	
	1. Students shall demonstrate an understanding of the role of chemistry in life processes.
	2. Students shall demonstrate an understanding of the structure and function of cells.
	3. Students shall demonstrate an understanding of how cells obtain and use energy (<i>energetics</i>).
Heredity and Evolution	
	4. Students shall demonstrate an understanding of <i>heredity</i> .
	5. Students shall investigate the molecular basis of genetics.
	6. Students shall examine the development of the <i>theory of biological evolution</i> .
Classification and the Diversity of Life	
	7. Students shall demonstrate an understanding that organisms are diverse.
Ecology and Behavioral Relationships	
	8. Students shall demonstrate an understanding of ecological and behavioral relationships among organisms.
	9. Students shall demonstrate an understanding of the ecological impact of global issues.


* changes made due to alignment study requested by USDOE in January 2009


Molecules and Cells	Content Standard 1: Students shall demonstrate an understanding of the role of chemistry in life processes.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
<p>MC.1.B.1 Describe the structure and function of the major organic molecules found in living systems:</p> <ul style="list-style-type: none"> • <i>carbohydrates</i> • <i>proteins</i> • <i>enzymes</i> • <i>lipids</i> • <i>nucleic acids</i> <p>Resources: United Streaming</p>	<p>*Describe the structure and function of organic molecules in living things</p>	<p>Group foods as starches (carbohydrates), fats (lipids), and proteins</p> <p>*Example: Use pictures or actual food to sort and classify foods by primary nutrient (e.g., bread is a carbohydrate, chicken is a protein)</p>	<p>*Compare examples of carbohydrates, lipids, and proteins to their functions</p> <p>*Example: Using two identical sets of pictures of various foods, create two posters; on the first poster, group the foods as carbohydrates, lipids, or proteins; on the second poster, group the same foods by function: stored energy (lipids), quick energy (carbs), proteins (build muscle); compare the type of food to its function</p>	<p>*Apply knowledge of organic molecules (carbohydrate, lipid, protein) to foods</p> <p>*Example: Record a food diary; identify the organic compounds found in the foods eaten (some foods may contain more than one group); Relate foods to functions in the body (e.g., chart with words or pictures)</p> <p>see Appendix</p>	<p>*Describe the structure of organic molecules (carbohydrate, lipid, protein) and their functions</p> <p>*Example: Create chart comparing elements found in carbohydrates, lipids, and proteins</p> <p>see Appendix</p>

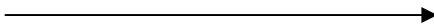
Molecules and Cells	Content Standard 1: Students shall demonstrate an understanding of the role of chemistry in life processes.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
MC.1.B.3 Investigate the properties and importance of water and its significance for life: <ul style="list-style-type: none"> • surface tension • <i>adhesion</i> • <i>cohesion</i> • <i>polarity</i> • <i>pH</i> 	*Investigate why the properties of water are important to life	Determine the effects of water on living things Example: Using two (2) plants, water one plant, do not water the other; record observations of both plants	*Investigate the properties of water and relate to a function in living things *Example: Conduct penny activity demonstrating surface tension and cohesion of water See Appendix	*Investigate the properties of water and relate to a function in living things *Example: Conduct celery activity demonstrating adhesion and cohesion See Appendix	*Research the effects of water deprivation on living things *Example: Respond to one or more writing prompts (e.g., investigate the effects of prolonged dehydration on the human body)

Molecules and Cells	Content Standard 1: Students shall demonstrate an understanding of the role of chemistry in life processes.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
MC.1.B.4 Explain the role of energy in chemical reactions of living systems: <ul style="list-style-type: none"> • <i>activation energy</i> • <i>exergonic reactions</i> • <i>endergonic reactions</i> 	Describe how energy can be taken in or given off in living systems	Identify food as a source of chemical energy for animals and humans Example: Match pictures of food to pictures of appropriate animals (e.g., grass-cow, lion-antelope)	Recognize that food contains chemical energy which is measured in calories Example: Collect nutrition labels from a variety of foods; group labels from least energy to most energy (calories)	Compare the number of calories in several foods to the number of calories burned during common activities Example: Create a poster or other visual comparing calories in foods to amount of exercise needed to “burn” those calories	Demonstrate how food has energy to produce heat Example: Burn potato chips or peanuts in a soda can oven and describe what is happening with the energy
		Resources: AGFC	Resources: Energy	Resources: Energy	Resources: Scientific American website, Diagram

Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
MC.2.B.2 Compare and contrast <i>prokaryotes</i> and <i>eukaryotes</i>	Compare cells with and without a nucleus	Recognize cells with and without a nucleus Example: Place hair gel in two (2) sandwich bags; place a marble in one bag; student recognizes one bag represents a cell without a nucleus and one bag represents a cell with a nucleus	Identify cells with and without a nucleus Example: Take two (2) half cored oranges and fill each with gelatin adding a grape to one; student identifies which represents a cell with or without a nucleus	Develop and identify models of a cell with and without a nucleus Example: Use various colors of modeling clay, create and label cell models with and without a nucleus	Compare cells with and without a nucleus Example: Observe cells using a microscope or internet Web site and record results on lab sheet Resources: Cells Alive Web site

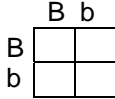
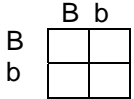
Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
<p>MC.2.B.5 Compare and contrast the structures of an animal cell to a plant cell</p> <p>Resources: Cells</p>	<p>*Demonstrate differences between animal and plant cells</p>	<p>*Demonstrate common structures found in both plant and animal cells (cell membrane, cytoplasm, nucleus)</p> <p>*Example: Using a picture of an animal cell and a picture of a plant cell, identify structures the cells have in common</p>	<p>*Create plant and animal cell models</p> <p>*Examples: Craft foam, edible cell models, colored felt</p> <p>(plant cell model should include chloroplast, cell wall, and large vacuole)</p>	<p>Compare and contrast plant and animal cells</p> <p>Examples: Create a Venn diagram using gallon bags divided into three (3) sections, placing like items in the center section and different items in the outer sections; create a paper Venn diagram</p> <p>See Appendix</p>	<p>Analyze the differences between plant and animal cells</p> <p>*Examples: Observe cells through a microscope and record findings on a lab sheet (plant cell - elodea and animal cell -cheek); draw both a plant and animal cell and label cell structures on both; create a T-chart to compare cell structures; observe plant and animal cells (e.g., video, pictures) and complete observation chart</p> <p>See Appendix</p>

Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
MC.2.B.6 Compare and contrast the functions of <i>autotrophs</i> and <i>heterotrophs</i>	Compare and contrast what producers and consumers do in an ecosystem	Identify producers and consumers Example: Create a visual by grouping pictures of organisms that use energy from the sun (producers) and organisms that get energy directly from plants or animals (consumers)	Determine consumers and producers in a system Example: Create a balanced classroom terrarium identifying both consumers and producers	Classify consumers and producers in an ecosystem Example: Take photos of organisms in the environment (e.g., flowers and bees) then use the photos to create a page/poster about of consumers and a page/poster about producers	Create and label examples of interactions between producers and consumers Example: Create a biome in a box or a diorama that shows labeled consumers and producers in action (e.g., deer eating grass)
Resources: Ecology					

Molecules and Cells	Content Standard 2: Students shall demonstrate an understanding of the structure and function of cells.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
MC.2.B.11 Discuss <i>homeostasis</i> using <i>thermoregulation</i> as an example	*Demonstrate how organisms maintain body temperature	*Demonstrate the importance of organisms maintaining their temperature *Example: Take and record the temperature of every student in the room over a period of time and chart the results to demonstrate regulation of body temperature	*Compare body temperatures *Example: Take and record the temperature of every student in the room over a period of time and graph the results, then discuss the results in relation to maintenance of body temperature	*Demonstrate how physical activity affects the regulation of body temperature *Example: Take student's temperature before and after physical activity (e.g., physical therapy and/or occupational therapy, walking to and from lunch, regular or adaptive physical education class) and use the data to create a chart comparing the before and after temperatures, then discuss the results	*Research methods that birds and mammals use to regulate their body temperature (e.g., blubber, thick fur, fluffing feathers, panting) *Examples: Write a report; create a poster or slide presentation

Molecules and Cells	Content Standard 3: Students shall demonstrate an understanding of how cells obtain and use energy (<i>energetics</i>).				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
MC.3.B.3 Compare and contrast <i>aerobic</i> and <i>anaerobic respiration</i> : <ul style="list-style-type: none"> ▪ <i>lactic acid fermentation</i> ▪ <i>alcoholic fermentation</i> 	*Demonstrate cellular respiration with and without the use of oxygen	*Observe anaerobic (without oxygen) and aerobic (with oxygen) cellular respiration (mitochondria of plants and animals) *Examples: Shake milk and lemon juice together in a jar demonstrating lactic acid fermentation; complete a T-chart comparing fermentation to cellular respiration; bake Amish bread or fruitcake	*Demonstrate the results of alcoholic fermentation (yeast) and cellular respiration (mitochondria of plants and animals) *Example: Sample experiment: Ingredients <ul style="list-style-type: none"> • 125 ml of warm water • 60 ml of sugar • soda bottle • package of yeast • balloon that fits neck of soda bottle Combine sugar and water in the bottle, shake to mix, add yeast, quickly place a balloon over the neck of the bottle and agitate bottle for a few seconds, record results; compare results to cellular respiration in animals and plants	*Record practical applications of aerobic and anaerobic respiration (e.g., making cheese or yogurt; sewage treatment, athletic endurance) *Examples: Watch video on how cheese is made and complete a listening sheet; contact American Dairy Council for information which can be used to create a student project	*Compare and contrast lactic acid fermentation, alcoholic fermentation and cellular respiration *Example: Create and label a poster with examples of cellular respiration, lactic acid fermentation, and alcoholic fermentation
Resources: Lab Descriptions		Resources: Recipe	Resources: Lab Descriptions	Resources: United Streaming	Resources: Lab Descriptions

Molecules and Cells	Content Standard 3: Students shall demonstrate an understanding of how cells obtain and use energy (<i>energetics</i>).				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
MC.3.B.5 Compare and contrast <i>cellular respiration</i> and <i>photosynthesis</i> as energy conversion pathways	*Demonstrate how organisms produce and transfer energy	<p>Recognize that photosynthesis stores energy and cellular respiration releases energy for cell use</p> <p>Example: Create visual comparing photosynthesis and cellular respiration</p> <p>See Appendix</p>	<p>Determine the outcome of energy conversion in respiration and photosynthesis</p> <p>*Example: Sample experiment:</p> <ul style="list-style-type: none"> • place clear plastic bag over plant • place plant in sunlight • observe water collection in bag over 2-3 days • chart results <p>(water is a by-product of cellular respiration)</p> <p>Resources: Lab Descriptions</p>	<p>Interpret the results of cellular respiration</p> <p>*Example: Sample experiment:</p> <ul style="list-style-type: none"> • obtain seeds and soak overnight • place potting soil in container with clear lid • plant seeds in soil and cover with clear lid • observe for several days and record the results <p>(water should collect on the bottom surface of the lid)</p> <p>Resources: Lab Descriptions</p>	<p>Compare cellular respiration and photosynthesis</p> <p>Examples: Construct a Venn diagram; create a poster or slide presentation</p> <p>Resources: United Streaming</p>


Heredity and Evolution		Content Standard 4: Students shall demonstrate an understanding of <i>heredity</i> .			
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
HE.4.B.1 Summarize the outcomes of Gregor Mendel's experimental procedures Resources: Genetics, United Streaming	*Compare dominant and recessive traits	Identify traits of plants and animals given real examples or photographs *Example: Identify traits, such as height, hair color, eye color, flower color Resources: Animals and Plants	Sort plants or animals based on dominant and recessive traits given real examples or photographs Examples: Sort by tall/short, dark hair/light hair, dark eyes/light eyes	Distinguish traits as dominant or recessive *Examples: Give specific examples of dominant and recessive traits using pictures, charts, or case studies of various traits	*Explain how offspring acquire dominant and recessive traits (e.g., guinea pigs, pea plants) *Example: Create imaginary animal with dominant and recessive traits (Reebops activity) Resources: Genetics
HE.4.B.3 Use the <i>laws</i> of probability and <i>Punnett squares</i> to predict <i>genotypic</i> and <i>phenotypic ratios</i> Resources: Genetics, United Streaming	Predict appearance of organisms based on inherited genes	Identify inherited traits Example: Match offspring to parents using picture cards of living things (e.g., chick to chicken, puppy to dog)	Predict the appearance of offspring based on observation of parents Example: Use picture cards depicting various traits such as height, hair color, eye color, flower color	Predict appearance of offspring using manipulatives with a pre-constructed Punnett square Example: Use colored candy or checkers 	Complete a Punnett square to predict the appearance of offspring Example: 

Heredity and Evolution	Content Standard 4: Students shall demonstrate an understanding of <i>heredity</i> .				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
HE.4.B.5 Analyze the historically significant work of prominent geneticists Resources: Genetics, United Streaming	*Recognize major genetic discoveries that have had an impact on society	*Recognize major genetic discoveries and their impact on society *Example: Create a collage depicting genetic discoveries (e.g., DNA structure, Human Genome Project, genetically modified foods) Resources: Genetics	*Recognize that major discoveries in genetics have occurred over time *Example: Create a timeline of major genetic discoveries (e.g., Mendel, Watson and Crick, Human Genome Project) Resources: Genetics	Research a major discovery in genetics and its impact on society *Examples: Write a report; create a poster Resources: Genetics	*Create a multi-media presentation outlining the genetic discovery of one major geneticist including the impact on society Resources: Genetics


Heredity and Evolution		Content Standard 5: Students shall investigate the molecular basis of genetics.			
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
HE.5.B.3 Compare and contrast the structure and function of <i>DNA</i> and <i>RNA</i> Resources: Genetics, United Streaming	Identify the differences between DNA and RNA	Recognize DNA (double strand) and RNA (single strand) models Examples: Models made of licorice candy, pull and peel candy, yarn, string cheese	Distinguish between the appearances of DNA and RNA Examples: Sort materials by appearance such as a zipper, string, string cheese, fabric hook and loop fasteners, pull and peel candy	Depict or illustrate the appearances of DNA and RNA Example: Label or assemble a model of DNA and RNA Resource: Genetics	Make 3-D models of DNA and RNA and identify their functions Examples: Design a puzzle; create model from marshmallows and toothpicks
HE.5.B.4 Describe and model the processes of replication, <i>transcription</i> , and <i>translation</i> Resources: Genetics, United Streaming	Model DNA replication	Model DNA replication through physical movement Example: Compare processes from daily routine, such as imitation of motor movements (cross-lateral movement) or calisthenics, to the process of DNA replication	*Model replication of DNA by using common items *Example: Make copies using carbon paper or fabric hook and loop fasteners and compare that to the process of DNA replication	Model replication of DNA by repeating a pattern to create a two-dimensional model *Example: Using objects with four different colors and/or shapes, create two strands representing a DNA molecule, separate the two strands and use each strand to make a new strand (the result will be two double-stranded DNA models)	*Assemble a 3-D model of DNA replication using a prepared model or puzzle Example: Use index cards to make puzzle pieces Resources: Genetics

Heredity and Evolution	Content Standard 5: Students shall investigate the molecular basis of genetics.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
<p>HE.5.B.6 Identify effects of changes brought about by <i>mutations</i>:</p> <ul style="list-style-type: none"> • beneficial • harmful • neutral <p>Resources: Genetics, United Streaming</p>	<p>Identify the effects of changes in DNA</p>	<p>Recognize that mutations are changes in DNA</p> <p>Example: Using a DNA model (e.g., colored paper, colored candies or marshmallows) remove or change a section to represent a mutation; take before and after pictures</p>	<p>Identify harmful or beneficial changes</p> <p>Example: Group examples of changes caused by mutations as either beneficial (e.g., animal or plant camouflage, larger fruit or flowers in plants) or harmful (e.g., sickle-cell anemia, cystic fibrosis, antibiotic resistant bacteria)</p> <p>Note: Resistance to antibiotics is helpful to bacteria, but harmful to humans.</p>	<p>Distinguish among mutations in living things as beneficial, harmful, or neutral</p> <p>Example: Create a visual (e.g., poster, slide show) comparing effects of harmful mutations (e.g., sickle-cell anemia, cystic fibrosis, antibiotic resistant bacteria) and beneficial mutations (e.g., animal or plant camouflage, larger fruit or flowers in plants)</p>	<p>Research a genetic disorder caused by a mutation</p> <p>Examples: Write a report; create a poster or slide show presentation</p>

Heredity and Evolution		Content Standard 6: Students shall examine the development of the <i>theory of biological evolution</i> .			
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
HE.6.B.1 Compare and contrast Lamarck's explanation of <i>evolution</i> with Darwin's <i>theory of evolution</i> by <i>natural selection</i>	Recognize how organisms change over time	*Describe changes in organisms that have taken place over time *Example: Compare pictures of fossils to present-day animals (e.g., elephant, horse, whale)	*Organize pictures of an organism's evolutionary history *Example: Organize pictures showing how a species of animal has changed over time (e.g., whale, horse, birds)	*Create a picture timeline of an organism's evolutionary history *Example: Create a timeline showing the evolution of an animal (e.g., whale, horse, birds)	*Compare and contrast Lamarck's explanation and Darwin's Theory of Evolution *Examples: Compare using Venn diagram or T-chart
Resources: Evolution					
HE.6.B.3 Analyze the effects of <i>mutations</i> and the resulting <i>variations</i> within a <i>population</i> in terms of <i>natural selection</i>	Recognize how natural selection results in variations within populations	Recognize that populations vary Example: Group pictures of various species into an appropriate population (e.g., different breeds of dogs, horses, cows, cats)	Identify changes that occur in organisms for survival Example: Use pictures of organisms that show camouflage, mimicry, other adaptations	Compare traits that allow natural selection Example: Compare two animals and identify traits that enable them to survive in their environment	Analyze adaptations needed for natural selection Example: Select pictures of terrestrial animals and describe or draw changes that would allow the animals to adapt to life in water
Resources: Evolution					

Heredity and Evolution	Content Standard 6: Students shall examine the development of the <i>theory of biological evolution</i> .				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
HE.6.B.4 Illustrate <i>mass extinction</i> events using a time line	Identify events of mass extinction over time	Recognize that mass extinction is the loss of a species Example: Using pictures, create a timeline depicting time before and after the mass extinction of the dinosaurs	Identify species on Earth that have become extinct Examples: Dinosaurs, saber-tooth cats, woolly mammoth, dodo bird	Depict mass extinction events Example: Create a timeline that depicts two or more mass extinction events	Research an extinct or endangered animal Examples: Write a report; create a poster or slide show presentation
Resources: Evolution, Mass Extinction					

Heredity and Evolution	Content Standard 6: Students shall examine the development of the <i>theory of biological evolution</i> .				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
HE.6.B.5 Evaluate <i>evolution</i> in terms of evidence as found in the following: <ul style="list-style-type: none"> • fossil record • <i>DNA</i> analysis • <i>artificial selection</i> • morphology • embryology • viral <i>evolution</i> • geographic distribution of related <i>species</i> • <i>antibiotic</i> and <i>pesticide resistance</i> in various organisms Resources: Evolution, United Streaming	Recognize that the theory of evolution is supported by evidence	Recognize that organisms leave proof of their existence Examples: Place a finger in mud or plaster, fingerprint; cooking activities that use moldings	Identify specific evidences of evolution *Example: Create a representation of how fossils can be found in various layers on the Earth's surface	Construct a model of a fossil Examples: Create drawing, clay model, or plaster model of a fossil	Research evidences of fossil records *Examples: Report on fossils found in Arkansas; create slide presentation on fossils found in Arkansas

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
<p>CDL.7.B.2 Differentiate the characteristics of the six kingdoms:</p> <ul style="list-style-type: none"> • Eubacteria • Archaea • Protista • <i>Fungi</i> • Plantae • Animalia <p>Resources: Classification</p>	<p>*Categorize organisms based on the characteristics of the six kingdoms</p>	<p>Identify different kingdoms</p> <p>Example: Match pictures of organisms to the correct kingdom, based on its characteristics (e.g., tree to plant kingdom, dog to animal kingdom, mushroom to fungi kingdom)</p> <p>Resources: AGFC</p>	<p>Match organisms to their correct kingdom based on common characteristics</p> <p>Examples: Use question & answer, quiz game, matching game</p>	<p>Place appropriate organisms in their corresponding kingdom based on common characteristics</p> <p>Example: Design photo pages of organisms using pictures taken on campus; group and label according to kingdom</p>	<p>Create a model of a new organism and justify its inclusion into an existing kingdom based on common characteristics</p> <p>Examples: Create model using cardboard, chenille wire, clay, plaster, or multimedia slide</p>

Classification and the Diversity of Life		Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.			
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
CDL.7.B.4 Classify and name organisms based on their similarities and differences applying <i>taxonomic nomenclature</i> using <i>dichotomous keys</i> Resources: Classification	Recognize similarities and differences of organisms by using a classification key	Determine organisms can be classified by similarities and differences by use of a one step key Example: Use pictures with yes or no answer key	Classify an organism by using 3-4 step keys Example: Choose animals and classify them based on where they live (e.g., rain forest, ocean, livestock, zoo)	Classify a collection of organisms by using a classification key Examples: Make leaf collection, insect collection, seed collection, wildflower collection	Design a classification key Example: Create a key to identify common objects (e.g., eraser, pencil, paperclip, marble, donuts) Resources: Classification
CDL.7.B.5 Investigate Arkansas' <i>biodiversity</i> using appropriate tools and <i>technology</i> Resources: Ecology	*Investigate <i>biodiversity</i> in Arkansas	Identify trees and animals in Arkansas Examples: Identify through campus field study or picture study (e.g., cardinal, gray squirrel, pine tree, oak tree)	Identify organisms native to Arkansas Example: Identify plants and/or animals native to Arkansas Resources: AGFC	Categorize the biodiversity of Arkansas by state or regions Example: Scavenger hunt by state or region (e.g., fish animals, birds, plants) Resource: Arkansas State Parks	Create a depiction of Arkansas biodiversity Examples: Create a mural or poster


Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
CDL.7.B.8 Compare and contrast life cycles of familiar organisms <ul style="list-style-type: none"> ▪ sexual reproduction ▪ asexual reproduction • metamorphosis • <i>alternation of generations</i> Resources: United Streaming, Reproduction	Describe how organisms reproduce and develop	Sequence different metamorphic organisms Examples: Ladybugs, frogs, butterflies	Illustrate types of asexual reproduction Example: Create a visual of one or more asexual processes (e.g., budding, regeneration, binary fission, vegetative propagation)	Distinguish different steps of fertilization Example: Label the steps in the fertilization of an egg	Compare and contrast sexual and asexual reproduction Example: Create a Venn diagram

Classification and the Diversity of Life		Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.			
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
CDL.7.B.17 Describe the structure and function of the major parts of a plant: <ul style="list-style-type: none"> ▪ roots ▪ stems ▪ leaves ▪ flowers Resources: Plants	*Identify the various parts of a plant and the corresponding function(s)	Examine a live plant and identify its parts Examples: Lily, zinnia, rose	Label the parts of a plant Example: See diagram in Appendix	Identify the function of each part of the plant. (root, stem, leaf, flower) Example: Label each plant part with the corresponding function(s) by playing pin the function on the plant game	Construct a model of a plant Examples: Create model using clay, paper, chenille wire, foam board, plaster, multimedia slide
CDL.7.B.19 Evaluate the medical and economic importance of plants Resource: Plants, United Streaming	Explore the impact that plants have on our lives	Identify important plants that are used by humans Examples: Corn, potato, carrots, peas, cotton	Associate plant products with the plant source Examples: Corn meal for human consumption or animal feed is made from corn; cloth for clothing or bedding is made from cotton	Identify plants that are economically important Examples: Soybeans or cotton can be used to produce many products; cash crops, such as coffee or rice are sold in markets	Research plants that are medically beneficial Examples: Aloe vera, chamomile or aspirin (willow tree)

Classification and the Diversity of Life	Content Standard 7. Students shall demonstrate an understanding that organisms are diverse.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
<p>CDL.7.B.22 Compare and contrast the major vertebrate classes according to their nervous, respiratory, excretory, circulatory, digestive, reproductive and integumentary systems</p> <p>Resources: United Streaming, Body Systems</p>	<p>*Investigate the major body systems of vertebrates</p>	<p>*Recognize the major body systems of vertebrates</p> <p>*Example: Outline the human body, include one body system, and label the major organs (e.g., digestive, respiratory)</p>	<p>*Match body systems to their major functions</p> <p>Example: Use Internet activity to match body systems to their functions</p> <p>Resources: Body Systems</p>	<p>Explain the function of body systems</p> <p>Examples: Use graphic organizer or foldables</p>	<p>*Research and report information about the functions of various body systems</p> <p>*Examples: Write a report; create a poster or slide presentation</p>

Ecology and Behavioral Relationships	Content Standard 8. Students shall demonstrate an understanding of ecological and behavioral relationships among organisms.				
<i>Student Learning Expectation</i>	<i>Essence of Student Learning Expectation</i>	<i>Less Complex</i> → <i>More Complex</i>			
EBR.8.B.1 Cite examples of abiotic and <i>biotic factors</i> of <i>ecosystems</i> Resources: Ecology, United Streaming	Identify living and nonliving things	Recognize living and nonliving things Example: Match or sort living/nonliving things using picture cards	Locate pictures or representations of living and nonliving things Examples: Scavenger hunt; find pictures in magazines	Collect examples of living and nonliving things Example: Collect and label examples of living things (e.g., insects, leaves, wildflowers) and nonliving things (e.g., rocks, minerals, soil)	Model an ecosystem with living and nonliving things Example: Terrarium, aquarium, diorama
EBR.8.B.2 Compare and contrast the characteristics of <i>biomes</i> Resources: Ecology, United Streaming	*Compare characteristics of biomes	*Recognize that there are a variety of biomes on Earth *Examples: Using pictures, group biomes by characteristics (e.g., hot-cold, dry-wet, trees-no trees)	Determine the types of biomes *Examples: Match pictures of biomes to the appropriate name; create a biome collage or notebook	Classify organisms to their biomes Example: Match plants and animals to the appropriate biome	Illustrate the characteristics of a biome *Examples: Create a representation of a biome (e.g., diorama, slide presentation, poster)

Ecology and Behavioral Relationships	Content Standard 8. Students shall demonstrate an understanding of ecological and behavioral relationships among organisms.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex → More Complex			
EBR.8.B.5 Identify and predict the factors that control <i>population</i> , including <i>predation</i> , <i>competition</i> , crowding, water, nutrients, and shelter Resources: Ecology	Identify factors that control population size	Recognize basic needs of organisms Examples: Food, water, shelter, air, space	Recognize factors that limit population size Example: See camouflaged butterfly activity in Resources Resources: Ecology	Predict the effect of factors on population growth Examples: Predator/prey relationships, mutualism, water supply, food supply, natural disasters	Analyze population growth Example: Construct a graph displaying change in population size over time
EBR.8.B.8 Identify the properties of each of the five levels of <i>ecology</i> : <ul style="list-style-type: none"> • Organism • <i>Population</i> • <i>community</i> • <i>ecosystem</i> • <i>biosphere</i> Resources: Ecology, United Streaming	Distinguish among the levels of ecology	Identify levels of ecology Example:	Sequence the levels of ecology from specific to whole Example: Arrange pictures in order of ecological levels	Model the levels of ecology Example: Construct diagram displaying relationships existing among parts of an ecosystem	Examine levels of ecology Example: Mark off a three (3) square meter area outside, record examples of ecological levels within the area, and complete the Student Lab/Activity Report (see Appendix)

Ecology and Behavioral Relationships	Content Standard 9. Students shall demonstrate an understanding of the ecological impact of global issues.				
Student Learning Expectation	Essence of Student Learning Expectation	Less Complex  More Complex			
EBR.9.B.1 Analyze the effects of human <i>population</i> growth and <i>technology</i> on the environment/ <i>biosphere</i> Resources: Ecology	Describe effects that humans have on the environment	Recognize that humans affect the environment Examples: Pollution, global warming, picking up trash, recycling	Identify positive and negative human effects on the environment Examples: Construct a list of ways to conserve energy; create flyers and/or brochures	Predict the effects of human population growth on the environment Examples: Food shortage, loss of habitat, extinct species	Research positive/negative human impacts on the environment Examples: Create an informative poster, report, or multi-media presentation defending the protection of an endangered species
EBR.9.B.3 Assess current world issues applying scientific themes (e.g., global changes in climate, <i>epidemics</i> , <i>pandemics</i> , ozone depletion, UV radiation, natural resources, use of <i>technology</i> , and public policy)	Examine current science issues that affect the world	Recognize that science is in the news Examples: Create a scrapbook, bulletin board, or journal using newspaper articles	Identify a current world issue with a scientific theme Example: Classify articles or multimedia presentations around a particular scientific topic reported in the news	Describe a current world issue with a scientific theme Example: Write and perform a skit	Research and report causes and effects of current world issues with scientific themes Examples: Write report; create poster or slide presentation

Biology Glossary for Grade 10 Science

Abiotic factor	Any nonliving component of an <i>ecosystem</i> (e.g., sunlight, air, water, soil)
Activation energy	The kinetic energy required to initiate a chemical reaction
Active transport	The movement of a substance across a plasma (cell) membrane against a concentration gradient
Adhesion	The property of sticking to some other substance
Aerobic respiration	Growing or metabolizing only in the presence of molecular oxygen
Alcoholic fermentation	The process by which pyruvic acid is converted to ethyl alcohol
Alleles	Alternate forms of a <i>gene</i> or <i>DNA</i> sequence, which occur on either of two homologous <i>chromosomes</i> in a diploid organism
Alternation of generation	Alternating sexual and asexual generation reproduction
Amino acid	Any of 20 basic building blocks of <i>proteins</i> --composed of a free amino (NH ₂) end, a free carboxyl (COOH) end, and a side group (R)
Anaerobic respiration	Growing or metabolizing only in the absence of molecular oxygen
Anaphase	Third phase of <i>mitosis</i> , beginning when sister <i>chromatids</i> separate from each other and ending when a complete set of daughter <i>chromosomes</i> have arrived at each of the two poles of the cell
Antibiotic resistance	The ability of a microorganism to produce a <i>protein</i> that disables an antibiotic or prevents transport of the antibiotic into the cell
Applied science	The practical use of scientific information to improve human life
Artificial selection	Breeding organisms by humans for specific phenotypic characteristics
Asexual reproduction	Nonsexual means of reproduction which can include grafting and budding
Autotroph	An organism that uses energy to synthesize organic molecules from inorganic substances
Bacteria	A single-celled, microscopic prokaryotic organism
Base pair (bp)	A pair of <i>complementary nitrogenous bases</i> in a <i>DNA</i> molecule
Biodiversity	The wide diversity and interrelatedness of earth organisms based on genetic and environmental factors
Biological evolution	Change in allele frequency of a <i>species</i> or <i>population</i> over time
Biome	A geographic area characterized by specific kinds of plants and animals
Biosphere	The area on and around Earth where life exists
Biotic factor	A living component of an <i>ecosystem</i>
Carbohydrates	Compound containing carbon, hydrogen, and oxygen in the approximate ratio of C:2H:O (e.g., sugars, starches, and cellulose)

Cell cycle	The events of cell division; includes <i>interphase</i> , <i>mitosis</i> , and <i>cytokinesis</i>
Cellular respiration	The process by which cells generate ATP through a series of redox (chemical) reactions
Cell theory	The <i>theory</i> that all living things are made of cells, that cells are the basic units of organisms, and that cells come only from existing cells
Centromere	The central portion of the <i>chromosome</i> to which the spindle fibers attach during mitotic and meiotic division
Chloroplasts	A plastid containing chlorophyll; the site of <i>photosynthesis</i>
Chromatid	Each of the two daughter strands of a duplicated <i>chromosome</i> joined at the <i>centromere</i> during <i>mitosis</i> and <i>meiosis</i> .
Chromosome	A single <i>DNA</i> molecule, a tightly coiled strand of <i>DNA</i>
Chromosome theory of heredity	The <i>theory</i> that states that <i>genes</i> are located on <i>chromosomes</i> and that each <i>gene</i> occupies a specific place on a <i>chromosome</i>
Citric acid cycle (Kreb's)	Series of chemical reactions in <i>aerobic respiration</i> in which a acetyl coenzyme A is completely degraded to carbon dioxide and water with the release of metabolic energy that is used to produce ATP; also known as <i>Kreb's cycle</i>
Cladogram	A branching diagram that illustrates taxonomic relationships based on the principles of claudistics
Codominance	An inheritance relationship in which neither of two <i>alleles</i> of the same <i>gene</i> totally mask the other
Cohesion	The property of sticking together; like substances sticking together
Commensalism	The close association of two or more dissimilar organisms where the association is advantageous to one and doesn't affect the other(s)
Community	All the <i>populations</i> in one area
Cytokinesis	The division of cytoplasm of one cell into two new cells
Cytoskeleton	Framework of the cell composed of a variety of filaments and fibers that support cell structure and drive cell movement
Deletion	<i>Chromosome</i> abnormality in which part of the <i>chromosome</i> is missing; loss of one or more <i>base pairs</i> from <i>DNA</i> which can result in a frameshift
Dichotomous key (classification key)	Classification tool used in identifying organisms or materials
Diffusion	The process by which molecules move from an area of greater concentration to an area of lesser concentration
DNA (Deoxyribonucleic acid)	An organic acid and polymer composed of four <i>nitrogenous bases</i> --adenine, thymine, cytosine, and guanine; the genetic material of most organisms; exists as a double-stranded molecule held together by <i>hydrogen bonds</i>
Domain	Taxonomic category that includes one or more kingdom (e.g., Bacteria, Archaea, Eukarya)
Dominance	A characteristic in which an allele that expresses its <i>phenotype</i> even in the presence of a recessive allele
Double helix	The <i>DNA</i> molecule, resembling a spiral staircase in which the paired bases form the steps and the sugar-phosphate backbones form the rails
Ecology	The study of the interactions of organisms with their environment and with each other
Ecosystem	The organisms in a plant <i>population</i> and the biotic and <i>abiotic factors</i> which impact on them
Electron transport chain	Series of chemical reactions in the thylakoid membrane or inner <i>mitochondrial</i> membrane during which hydrogens or their electrons are passed along with the release of energy

Endergonic reaction	A reaction requiring a net input of free energy
Endocytosis	The process by which a cell surrounds and engulfs substances
Energetics	Use of energy
Energy pyramid	Summarizes interactions of matter and energy at each trophic level
Enzymes	<i>Proteins</i> that control the various steps in all chemical reactions
Epidemic	An outbreak of a contagious disease that spreads widely and rapidly
Eukaryote	An organism whose cells possess a <i>nucleus</i> and other membrane-bound vesicles, including all members of the protist, fungi, plant and animal kingdoms; and excluding <i>viruses</i> , bacteria, and blue-green algae
Evolution	The long-term process through which a <i>population</i> of organisms accumulates genetic changes that enable its members to successfully adapt to environmental conditions and to better exploit food resources
Exergonic reaction	A reaction that gives off free energy
Exocytosis	The process in which a vesicle inside a cell fuses with a cell membrane and releases its contents to the external environment
Frameshift mutation	A <i>mutation</i> that results in the misreading of the code during <i>translation</i> because of the change in the reading frame
Fungi	Microorganisms that lacks chlorophyll
Gamete	A haploid sex cell, egg or sperm, that contains a single copy of each <i>chromosome</i>
Gene	The functional unit of heredity; a locus on a <i>chromosome</i> that encodes a specific <i>protein</i> or several related <i>proteins</i>
Genome	The complete genetic material contained in an individual; the genetic complement contained in the <i>chromosomes</i> of a given organism, usually the haploid <i>chromosome</i> state
Genotype	The structure of <i>DNA</i> that determines the expression of a trait
Genus	A category including closely related <i>species</i> ; interbreeding between organisms within the same category can occur
Germ Theory of Disease (Koch's Postulates)	A set of criteria used to establish that a particular infectious agent causes a disease
Glycolysis	A pathway in which glucose is oxidized to pyruvic acid
Heterotroph	An organism that obtains organic food molecules by eating organisms or their by-products
Homeostasis	The stable internal conditions of a living thing
Host	Animal or plant on which or in which another organism lives
Human Genome Project	A project coordinated by the National Institutes of Health (NIH) and the Department of Energy (DOE) to determine the entire <i>nucleotide</i> sequence of the human <i>chromosomes</i>
Hydrogen bond	A relatively weak bond formed between any hydrogen atom (which is covalently bound to a nitrogen or oxygen atom) and a nitrogen or oxygen with an unshared electron pair
Hypotheses	Statement or predictions that can be tested
Incomplete dominance	A condition where a heterozygous off- spring has a <i>phenotype</i> that is distinctly different from, and intermediate to, the parental <i>phenotypes</i>

Independent assortment	The <i>law</i> stating that pairs of <i>genes</i> separate independently of one another in <i>meiosis</i>
Interphase	Period of time where a cell carries on metabolism and replicates <i>chromosomes</i> prior to cell division
Inversion	A <i>mutation</i> that occurs when a <i>chromosome</i> piece breaks off and reattaches in reverse orientation
k-strategist	<i>Species</i> characterized by slow maturation, few young, slow <i>population</i> growth and reproduction late in life
Karyotype	All of the <i>chromosomes</i> in a cell or an individual organism, visible through a microscope during cell division
Law	An observation that happens every time under a certain set of conditions
Lactic acid fermentation	The process by which pyruvic acid is converted to lactic acid
Light dependent	Reaction of <i>photosynthesis</i> that requires light; light energy is absorbed converted to chemical energy in the form of ATP and NADPH
Light independent	The fixing of carbon dioxide in a 3 carbon compound for use in sugar production or other end products
Lipid	Any of a group of organic compounds that are insoluble in water but soluble in nonpolar solvents; serve as energy storage and are important components of cell membranes
Lysogenic cycle	A type or phase of the <i>virus</i> life cycle during which the <i>virus</i> integrates into the <i>host chromosome</i> of the infected cell, often remaining essentially dormant for some period of time
Lytic cycle	A phase of the <i>virus</i> life cycle during which the <i>virus</i> replicates within the <i>host</i> cell, releasing a new generation of <i>viruses</i> when the infected cell lyses
Mass extinction	One of the brief periods of time during which large numbers of <i>species</i> disappeared
Meiosis	The reduction division process by which haploid <i>gametes</i> and <i>spores</i> are formed consisting of a single duplication of the genetic material followed by two mitotic divisions
Metaphase	Second phase of <i>mitosis</i> in which the <i>chromosomes</i> line up across the equator of the cell
Microbe	A microorganism
Mitochondria	<i>Organelles</i> that are the sites of <i>aerobic respiration</i> in eukaryotic cells
Mitosis	The replication of a cell to form two daughter cells with identical sets of <i>chromosomes</i>
Molecular biology	The study of the biochemical and molecular interactions within living cells
Molecular genetics	The branch of genetics that deals with the expression of <i>genes</i> by studying the <i>DNA</i> sequences of <i>chromosomes</i>
Multiple alleles	Three or more <i>alleles</i> of the same <i>gene</i> that code for a single trait
Mutation	An alteration in <i>DNA</i> structure or sequence of a <i>gene</i>
Mutualism	A form of <i>symbiosis</i> in which both organisms benefit from living together
Natural selection	The differential survival and reproduction of organisms with genetic characteristics that enable them to better utilize environmental resources
Nitrogenous bases	The purines (adenine and guanine) and pyrimidines (thymine, cytosine, and uracil) that comprise <i>DNA</i> and <i>RNA</i> molecules
Nonvascular plant	A plant that lacks vascular tissue and true roots, stems, and leaves
Nucleic acids	The two <i>nucleic acids</i> , deoxyribonucleic acid (<i>DNA</i>) and ribonucleic acid (<i>RNA</i>), are made up of long chains of molecules called <i>nucleotides</i>
Nucleotide	A building block of <i>DNA</i> and <i>RNA</i> , consisting of a nitrogenous base, a five-carbon sugar, and a phosphate group

Nucleus	The membrane-bound region of a eukaryotic cell that contains the <i>chromosomes</i>
Organelle	A cell structure that carries out a specialized function in the life of a cell
Osmosis	The <i>diffusion</i> of water across a selectively permeable membrane
Parasitism	The close association of two or more dissimilar organisms where the association is harmful to at least one
Passive transport	The movement of substances across a plasma (cell) membrane without the use of cell energy
Pandemic	An epidemic over a wide geographic area and affecting an exceptionally high proportion of the population
Pathogen	Organism which can cause disease in another organism
Pesticide	A substance that kills harmful organisms (e.g., an insecticide or fungicide)
pH	Indicates the relative concentration of hydrogen ions and hydroxide ions in a substance
Pinocytosis	A type of <i>endocytosis</i> in which a cell engulfs solutes of fluids
Phagocytosis	A type of <i>endocytosis</i> in which a cell engulfs large particles or whole cells
Phenotype	The observable characteristics of an organism, the expression of <i>gene alleles</i> (<i>genotype</i>) as an observable physical or biochemical trait
Phospholipids	A class of <i>lipid</i> molecules in which a phosphate group is linked to glycerol and two fatty acetyl groups; a chief component of biological membranes
Photosynthesis	The process by which light energy is converted to chemical energy stored in organic molecules
Plasma (cell) membrane	A selectively permeable surface that encloses the cell contents and through which all materials entering or leaving a cell must pass
Point mutation	A change in a single <i>base pair</i> of a <i>DNA</i> sequence in a <i>gene</i>
Polarity	Molecules having uneven distribution of charges
Population	A local group of organisms belonging to the same <i>species</i> and capable of interbreeding
Primary succession	Succession that occurs in a newly formed habitat that has never before sustained life
Prokaryote	A bacterial cell lacking a true <i>nucleus</i> ; its <i>DNA</i> is usually in one long strand
Prophase	First phase of <i>mitosis</i> in which duplicated <i>chromosomes</i> condense and mitotic spindle fibers begin to form
Protein	An organic compound composed of one or chains of polypeptides which in turn are formed from <i>amino acids</i>
Protein synthesis	A formation of <i>proteins</i> using information coded on <i>DNA</i> and carried by <i>RNA</i>
Pure science	The gathering of new information or the discovery of a new relationship or fact for sake of knowledge
Punnett square	A type of grid used to show the gametes of each parent and their possible offspring; a type of grid that can indicate all the possible outcomes of a genetic cross
Radioactive dating	A method of determining the age of an object by measuring the amount of a specific radioactive isotope it contains
Recessive gene	Characterized as having a <i>phenotype</i> expressed only when both copies of the <i>gene</i> are mutated or missing
Relative dating	A method of determining the age of fossils by comparing them to other fossils in different layers of rock
Ribosome	A sub-cellular structure that is the site of <i>protein synthesis</i> during <i>translation</i> .
RNA (ribonucleic acid)	An organic acid composed of a single strand of <i>nucleotide</i> that acts as a messenger between <i>DNA</i> and the <i>ribosomes</i> and carries out the process of <i>protein synthesis</i> : composed units of adenine, guanine, cytosine, and uracil
Secondary succession	The sequential replacement of <i>population</i> in a disrupted habitat

Segregation	The <i>law</i> stating that pairs of <i>genes</i> separate in <i>meiosis</i> and each <i>gamete</i> receives one <i>gene</i> of a pair
Sex influenced	Description of a trait that is caused by a <i>gene</i> whose expression differs in male and females; (e.g., male patterned baldness)
Sex linkage	The presence of a <i>gene</i> on a <i>sex chromosome</i> ; (e.g., hemophilia, color-blindness)
Sexual reproduction	The process where two cells (<i>gametes</i>) fuse to form one hybrid, fertilized cell
Species	A classification of related organisms that can freely interbreed
Spore	A form taken by certain <i>microbes</i> that enables them to exist in a dormant stage. It is an asexual reproductive cell
Symbiosis	The close association of two or more dissimilar organisms where both receive an advantage from the association
Taxonomic nomenclature	The procedure of assigning names to the kinds and groups of organisms according to their taxa
Technology	Practical use of scientific information to improve the quality of human life: see also <i>applied science</i>
Telophase	Final phase of <i>mitosis</i> during which <i>chromosomes</i> uncoil, a nuclear envelope returns around the chromatin, and a nucleolus becomes visible in each daughter cell
Theory	A well tested explanation of natural events
Thermoregulation	The maintenance of internal temperature within a range that allows cells to function efficiently
Translation	The process of converting the genetic code in <i>RNA</i> into the <i>amino acid</i> sequence that makes up a <i>protein</i>
Transcription	Process in which <i>RNA</i> is made from <i>DNA</i>
Vaccine	A preparation of dead or weakened <i>pathogen</i> that is used to induce formation of antibodies or immunity against the <i>pathogen</i>
Variation	Differences in the frequency of <i>genes</i> and traits among individual organisms within a <i>population</i>
Vascular plants	A plant that has phloem and xylem
Virus	An infectious particle composed of a <i>protein</i> capsule and a nucleic acid core, which is dependent on a <i>host</i> organism for replication

Appendix

Resources for Grade 10 Science Alternate Assessment

Resource	Where to find it
Animals and Plants	Arkansas Game and Fish Commission (AGFC): http://www.agfc.com/education-class/programs.aspx Plant and animal characteristics: http://www.epa.ie/researchandeducation/education/ Parts of a plant: http://www.primaryresources.co.uk/online/powerpoint/flower.ppt http://its.guilford.k12.nc.us/webquests/plantquest/ http://www.uen.org/utahlink/activities/view_activity.cgi?activity_id=6988
Body Systems	http://www.sciencenetlinks.com/interactives/systems.html http://www.getbodysmart.com/ http://www.medtropolis.com/VBody.asp
Cells	http://pers.dadeschools.net/prodev/world_of_cells.htm http://www.cellsalive.com/ http://www.usoe.k12.ut.us/curr/science/sciber00/7th/cells/sciber/cellcomp.htm http://www.ecostudies.org/chp/Module1/1C8A_Aquatic_Interactions.pdf
Classification	Dichotomous Key: http://sciencespot.net/Media/sillysci.pdf http://www.scribd.com/doc/9682508/Classification-Dichotomous-Key-Doughnut-Sort http://watershed.csUMB.edu/ron/roncor/cor/did.htm Insects: http://sciencespot.net/Pages/kdzinsect.html Kingdoms: http://www.ric.edu/ptiskus/Six_Kingdoms/Index.htm Leaf collection: http://forestry.about.com/od/treeidentification/a/leaf_collection.htm
Cooperative Extension Service	http://www.uaex.edu/
Ecology	Camouflaged Butterfly Activity: http://sftrc.cas.psu.edu/LessonPlans/Wildlife/AnimalCamouflage.html Missouri Botanical Gardens: http://www.mbgnet.net/ How to make a terrarium: http://www.instructorweb.com/lesson/maketerrarium.asp Biodiversity: http://www.naturalheritage.com/ State Parks: http://www.arkansasstateparks.com/ Food Chains and Biomes: http://www.picadome.fcps.net/lab/currl/food_chain/default.htm http://www.thewildclassroom.com/biomes/biomes/index.html http://www.harcourtschool.com/activity/food/food_menu.html Cycles: http://www.kidzone.ws/water/ http://epa.gov/climatechange/kids/carbon_cycle_version2.html Ecosystems: http://necsi.org/projects/evolution/co-evolution/pred-prey/co-evolution_predator.html Human impact: http://www.census.gov/main/www/popclock.html http://www.hobart.k12.in.us/jkousen/Biology/impact.html

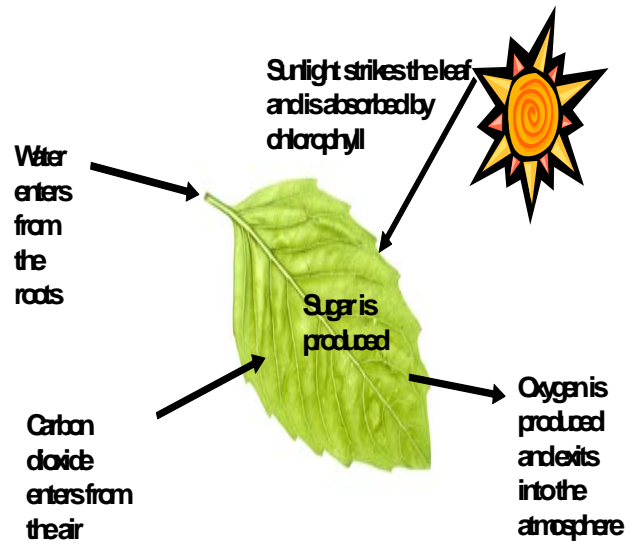
Energy	Calories burned: http://www.tooelehealth.org/Community_Health/CVD/Calories_Burned.html Learning about calories: http://kidshealth.org/kid/stay_healthy/food/calorie.html How to read a nutrition label: http://www.cfsan.fda.gov/~dms/foodlab.html#twoparts American Dairy Council Nutrition Games: http://www.adadc.com/index_files/EducatorsArea.html
Genetics	Interactive Genetics website: http://www.dnalc.org/home.html Elementary genetics: http://www.ology.amnh.org/genetics/index.html http://www.yourgenome.org/ Geneticists: http://www.pbs.org/wgbh/aso/databank/index.html Punnett squares: http://www.emints.org/ethemes/resources/S00001476.shtml DNA model: http://school.discovery.com/lessonplans/programs/modeldna/ Interactive DNA model: http://learn.genetics.utah.edu/units/basics/builddna/ Reebops: http://www.scpub.org/data//files/copyreebops-9742.pdf Major discoveries in genetics: http://science.discovery.com/convergence/100discoveries/big100/genetics.html Sickle cell anemia: http://school.discoveryeducation.com/lessonplans/programs/bodybydesign/ DNA model lesson: http://www.umaine.edu/nsfgk-12/images/PDFs/gumdrop.pdf Build a DNA model: http://nobel.scas.bcit.ca/resource/dna/dna_sweets.htm
Lab Descriptions	Diffusion and other labs: http://www.biology-resources.com/biology-experiments2.html#Diffusion Collecting water from a plant: http://scene.asu.edu/habitat/activities/leaf_transpiration.html Anerobic Respiration (fermentation): http://www.lesaffreyeastcorp.com/SoY/educators.html http://www.funsci.com/fun3_en/exper1/exper1.htm Assorted: http://www.middleschoolscience.com/life.htm http://www.madsci.org/ http://school.discovery.com/ http://powayusd.sdcoe.k12.ca.us/pusdcvcs/er_fourth.htm
Mass Extinction	http://dsc.discovery.com/earth/wide-angle/mass-extinctions-timeline.html
Properties of Water	Arkansas Project Wet:: http://www.adeg.state.ar.us/water/branch_planning/watershed_outreach_education/projectwet.htm Iowa Project Wet: http://www.uni.edu/~iowawet/H2OProperties.html
Recipe	Amish Bread recipe: http://www.armchair.com/recipe/bake002.html
Reproduction	Asexual reproduction: http://biology.about.com/library/gallery/blhydra.htm http://www.saburchill.com/chapters/chap0031.html Sexual reproduction: http://www.saburchill.com/chapters/chap0037.html Insect metamorphosis video: http://www.pbs.org/wgbh/nova/satoyama/transform.html Frog metamorphosis pictures: http://www.countrysideinfo.co.uk/metimage.htm

Science News	http://science.nasa.gov/ http://www.cnn.com/TECH/space/ http://www.eurekalert.org/ http://www.pbs.org/saf/educators.htm http://www.nasa.gov/vision/space/livinginspace/index.html http://pumas.jpl.nasa.gov/ http://health.discovery.com/
United Streaming videos, blackline masters and quizzes on a variety of science topics	www.unitedstreaming.com
	Animal Adaptations
	Basics of Biology, The: How Living Things are Structured
	Biologically Speaking: Genetics and Heredity
	Biologically Speaking: Systems of the Human Body
	Biology: The Science of Life: Ecology: Organisms in Their Environment
	Biology: The Science of Life: Making New Life: The Basics of Reproduction
	Biology: The Science of Life: The Flow of Matter and Energy in the Living World: Photosynthesis and Cellular Respiration
	Biomes: Our Earth's Major Life Zones
	Cheese Factory
	Energy and the Chemistry of Life
	Evolution
	Greatest Discoveries with Bill Nye: Genetics
	Importance of Plants, The
	Learning About Ecology
Life Science: Viruses	
Natural Selection of Plants and Animals	
Reproduction in Organisms	
Simply Science: Maintaining Equilibrium	
TLC Elementary School: Life Cycles	
Viruses	http://www.bam.gov/ http://www.archives.gov/exhibits/influenza-epidemic/

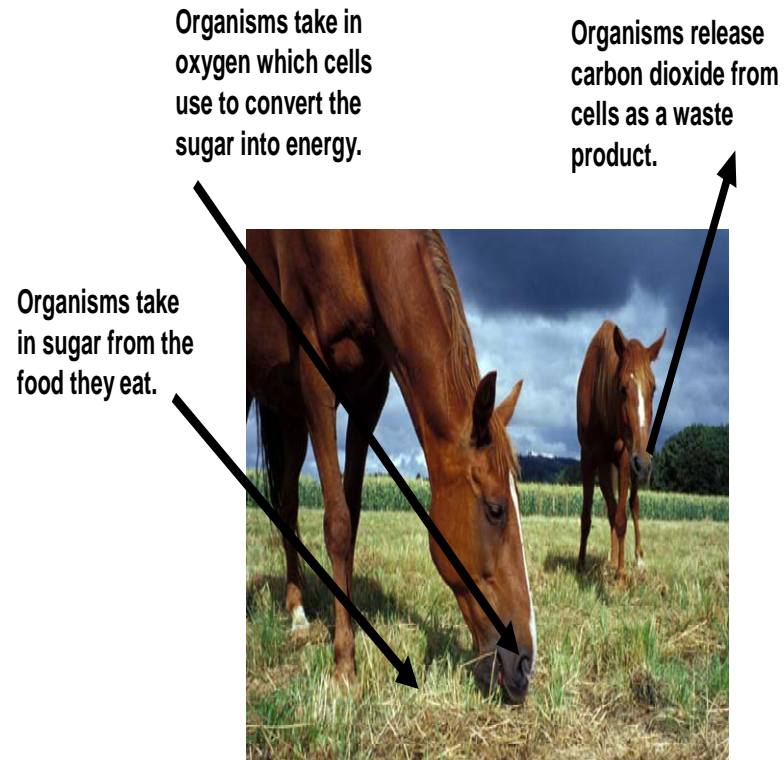
Activities and Worksheets

1. Photosynthesis and Respiration
2. Comparison of Mitochondria and Chloroplasts
3. Label the Parts of a Plant
4. Aerobic and Anaerobic Respiration
5. Animal and Plant Cell Observation Chart
6. Food Diary
7. Compare carbohydrates, lipids, proteins, and nucleic acids
8. Celery Activity: Investigate the properties and importance of water
9. Penny Activity: Investigate the properties and importance of water
10. Pollution Activity
11. Science Lab/Activity Report Sheet

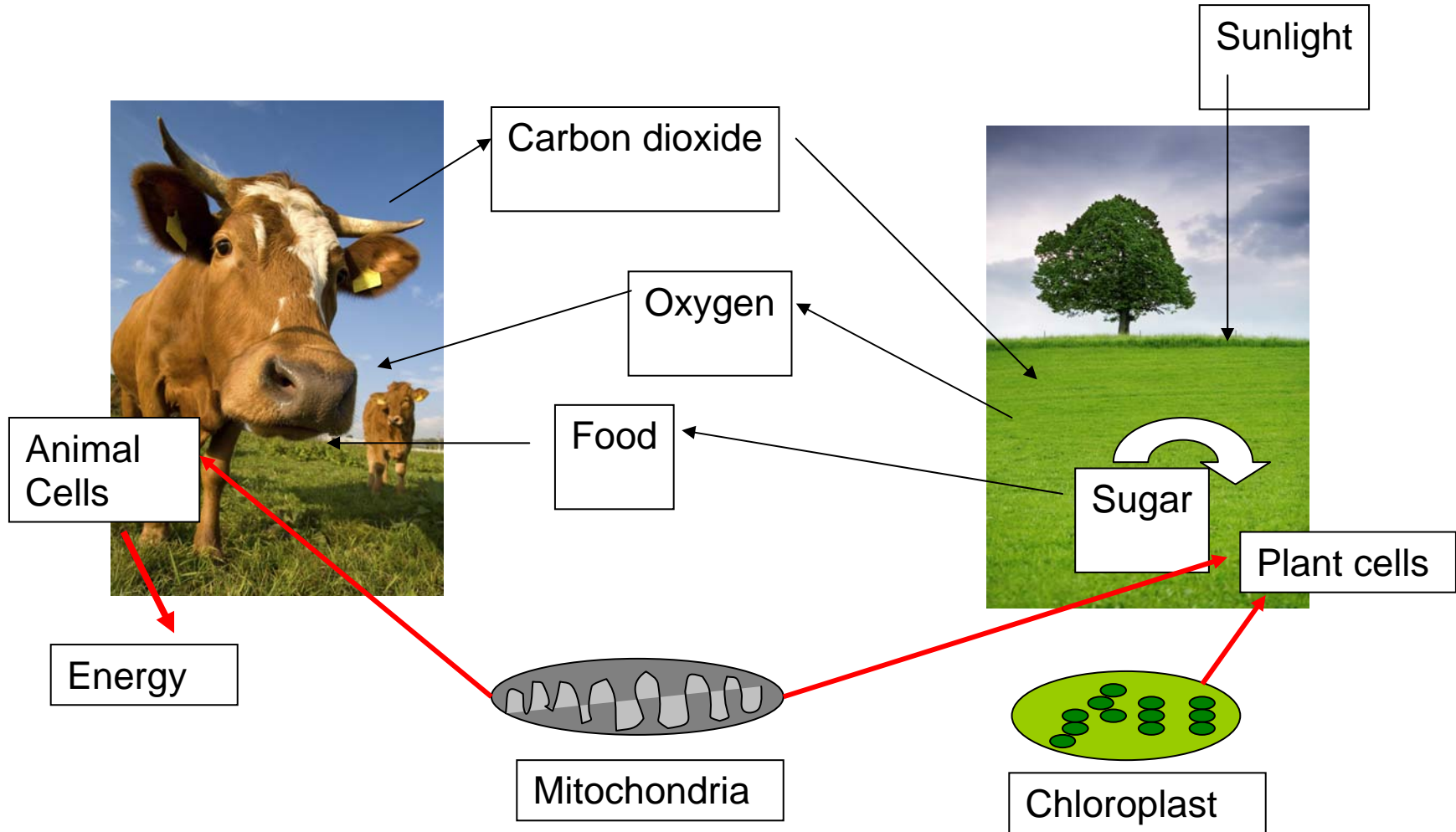
Photosynthesis



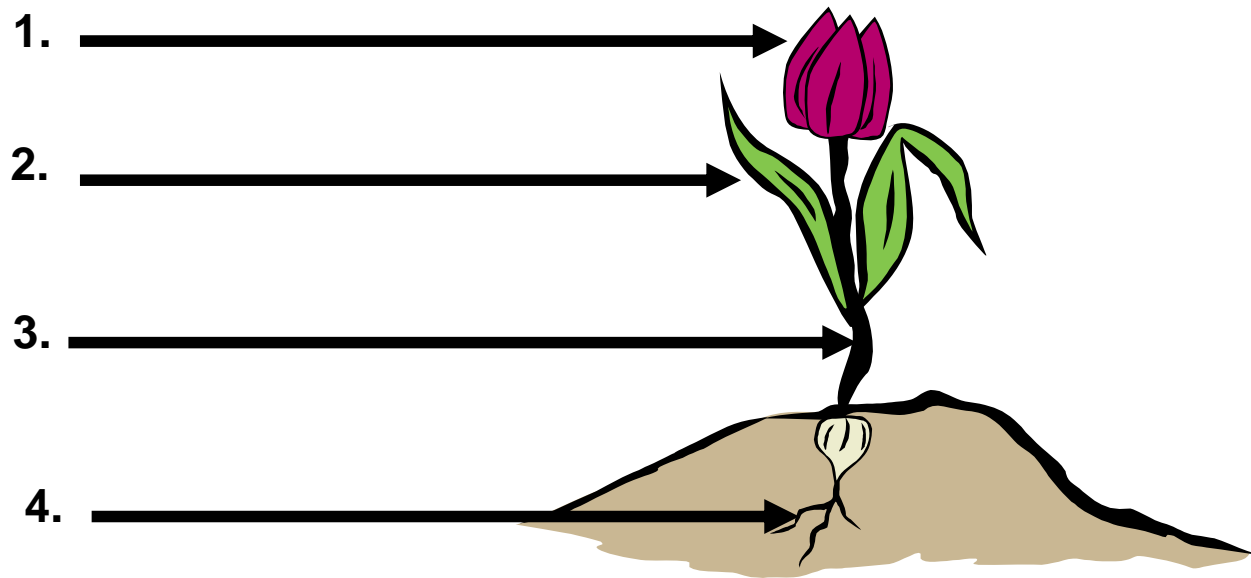
Respiration



Comparison of Mitochondria and Chloroplasts



Label the Parts of a Plant



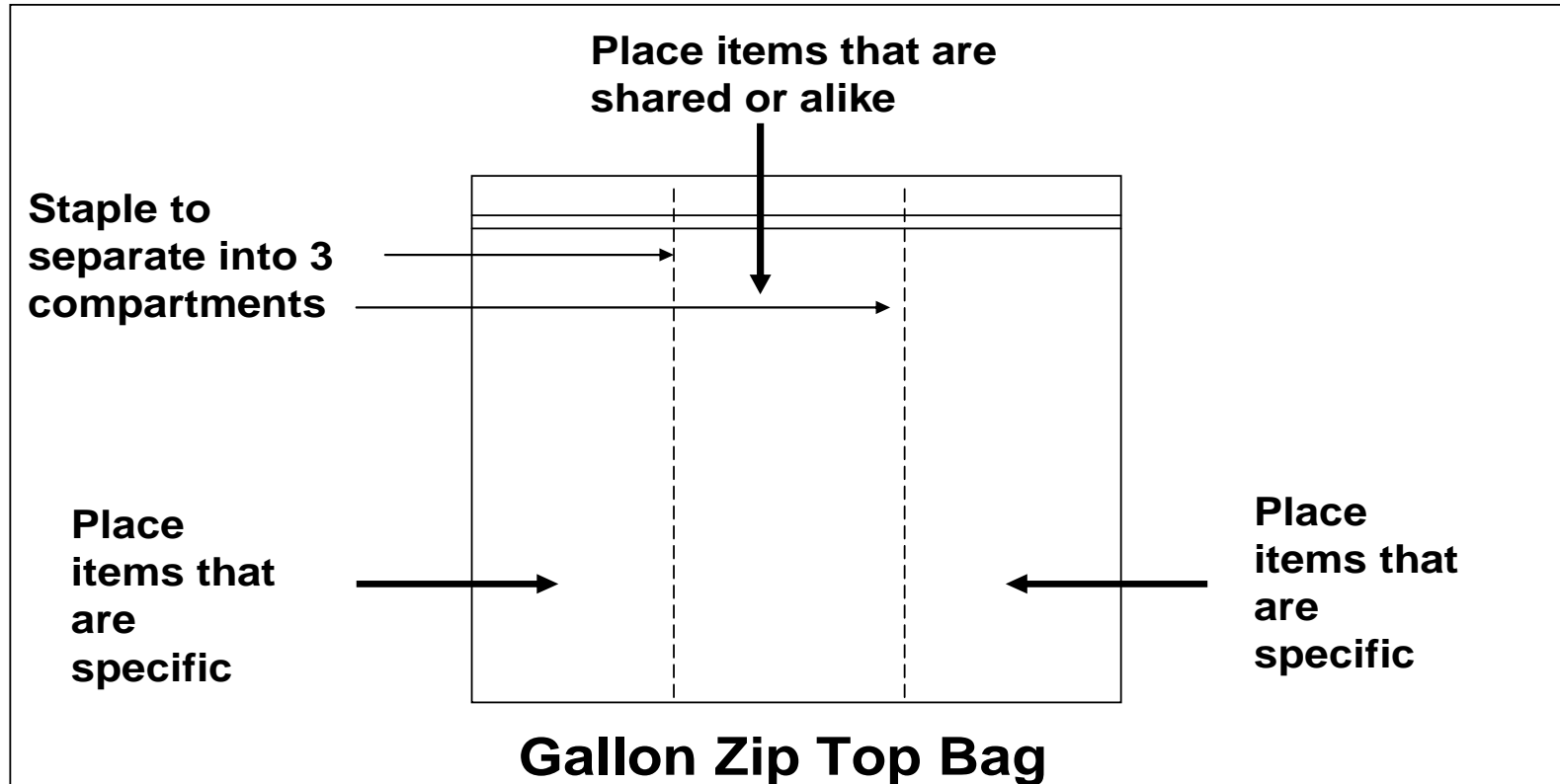
Stem

Root

Flower

Leaf






Physical Example of a Venn Diagram



Name: _____ Date: _____

Aerobic and Anaerobic Respiration

Compare the processes of aerobic and anaerobic respiration by placing an X in the correct box.

Process		With oxygen	Without oxygen
Cow getting energy from eating grass			
Changing milk into buttermilk			
Kids using energy to play soccer			
Yeast making bread rise			
Making yogurt from milk			

Animal and Plant Cell Observation Chart

If you observe the cell structure, write "YES" in the space.
If you do **not** observe the cell structure, write "NO" in the space.

Cell Structures	Animal Cell	Plant Cell
Cell membrane		
Nucleus		
Ribosome		
Endoplasmic Reticulum		
Mitochondria		
Golgi Complex		
Chloroplast		
Cell wall		
Vacuole		

Name: _____ Date: _____

MC.1.B.1

Food Diary

	Foods	Carbs	Lipids	Proteins	Stored Energy	Quick Energy	Builds Muscle
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

MC.1.B.1

Compare carbohydrates, lipids, proteins, and nucleic acids by completing the table below.

	Carbohydrates	Lipids	Proteins	Nucleic Acids
Contains which elements? (circle all that apply)	Carbon Hydrogen Oxygen Phosphorous Nitrogen	Carbon Hydrogen Oxygen Phosphorous Nitrogen	Carbon Hydrogen Oxygen Phosphorous Nitrogen	Carbon Hydrogen Oxygen Phosphorous Nitrogen
Examples of foods				Your body makes nucleic acids from the foods that you eat
How is it used by your body?				

1. List the elements that are found in all of the molecules.

2. What molecule(s) contain nitrogen?

3. Which molecule is made up of only carbon, hydrogen, and oxygen?

Celery Activity: Investigate the properties and importance of water

Materials:

- Stalks of celery with leaves attached
- Glass or jar of water
- Red or blue food coloring
- Table knife

Background:

Adhesion is the attraction of a water molecule to other types of molecules (like the inside surface of a straw). Cohesion is the attraction of water molecules to other water molecules. Together these properties allow water molecules to travel up a tube such as a plant stem.

Activity:

1. Add enough food coloring to the water to give it a dark color
2. The teacher should use a knife and cut about an inch off of the bottom of the end of each stalk
3. Place the celery stalks in the water.
4. Observe the celery several times a day to determine if the color has moved up the stalk and leave overnight.
5. The next day observe the color of the leaves of on the stalk. Starting at the bottom of the stem, the teacher should cut off an inch at a time and allow the students to observe the tiny holes that have the same color as the food coloring.

Observations:

1. Describe how the celery appeared after 1 hour

2. Describe how the celery appeared the next day.

3. Describe how the celery looked on the inside.

4. Describe the two properties of water that allowed the water to move up the stem of the celery.

5. Describe why these properties are important to plants.

Answers:

1. Student should record their observations
2. The leaves of the celery should have taken on the color of the food coloring
3. There should be small round holes that are stained the color of the food coloring (these are called xylem tubes)
4. Adhesion- the property of water sticking to surfaces

Cohesion – the property of water molecules sticking to other water molecules

5. These properties are important because they allow water to move through tubes from the soil to all parts of a plant. The plant would not be able to grow very tall if water could not move through the plant.

Note: This activity also works well with carnations or white daisies.

Name: _____ Date: _____

Penny Activity: Investigate the properties and importance of water

Materials: A penny, an eyedropper or pipette, a cup of water, and paper towels for each team of students.

Background:

Sometimes we call water H₂O. That's because water molecules each have two hydrogen atoms and one oxygen atom. While water molecules are neutral as a whole, one end of the water molecule tends to have a positive charge while the other has a negative charge (polarity). Each end of a water molecule is attracted to the opposite charged end of another water molecule. This is called "hydrogen bonding."

Predict: How many drops of water can you put on the top of a penny before it spills over? More than you may think!

Activity:

1. Clean a penny using a paper towel. Do not use soap!
2. Place the penny on a flat surface.
3. Using the eye dropper, drop water one drop at a time onto the penny.
4. Count the number of drops the penny will hold before the water spills over.
5. Try it again...see how many drops it will hold the second time.

Observations:

2. Do the water drops stay together or apart? _____
3. What property of water causes this? _____
4. Is the water flat on top of the penny or rounded up? _____
5. What property of water causes this? _____

Significance for Living Things:

6. Describe an example of why the property of cohesion is important for plants.

7. Describe an example of how certain insects use the surface tension of water.

Answers:

2. The water molecules stay together on top of the penny.
3. This property is called cohesion
4. The water is rounded up on top of the penny.
5. This property is called surface tension
6. Water moves from the soil, up the tubes inside the roots, through the tubes inside the stem to all the cells in the plant.
7. Certain insects called water striders "walk" on water using the thin film created by surface tension.

Pollination Activity



Use pipe cleaners as bee legs (6) and tape to the bee.



Place powder in the center of the flower to represent “pollen”. Press “bee legs” into pollen then “fly” your bee to another student’s “flower” and land on their “flower”. This simulates the act of cross-pollination.

Science Lab/Activity Report Sheet

Name _____

What is the date? _____

What is the month? _____

Hypothesis: What did you do today? _____

What do you think would happen? _____

Materials-What supplies did you use? _____

Procedures-What did you do? _____

Observations-What did you see happen? _____

Results-Illustrate what happened. _____