

Portales Municipal Schools
CURRICULUM MAP

Subject: Biology	2009	Grade Level: 9-12
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ESSENTIAL QUESTIONS: Why is it important to use safe procedures during a lab investigation? Why is it important to use controlled variables when designing an experiment? Why is it important to use appropriate measurements and measurement techniques during a lab investigation?					
STRAND I. Scientific Thinking and Practice			Benchmark I: Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results..		
STANDARD I. Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.					
	PERFORMANCE STANDARD (YEAR LONG)	CONCEPTS/SKILLS R= Review & Extend	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
1 s t 9 W E K S	<p>1) Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.</p> <p>2) Design and conduct scientific investigations that include: testable hypotheses, controls and variables, methods to collect, analyze, and interpret data , results that address hypotheses being investigated, predictions based on results , re-evaluation of hypotheses and additional experimentation as necessary, error analysis.</p> <p>3)Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes).</p> <p>4)Convey results of investigations using scientific concepts, methodologies, and expressions, including: scientific language and symbols, diagrams, charts, and other data displays , mathematical expressions and processes (e.g., mean, median, slope, proportionality, clear, logical, and concise communication , reasoned arguments.</p> <p>5)Understand how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of the atom).</p>	<ul style="list-style-type: none"> • Describe appropriate methodologies • Use proper equipment and safety precautions • When designing and experiment, include a testable hypothesis, controls and variables, methods to collect/analyze/interpret data, obtain results that address the hypotheses being investigated, make predictions based on results of experiments, and re-evaluate hypotheses based on results 	<ol style="list-style-type: none"> 1. Students will participate in a lab activity using metric measurements 2. Students will participate in a lab activity using metric conversions. 3. Students will demonstrate and discuss lab safety procedures 4. Students will identify actual pieces of lab equipment in a lab setting. 5. Students will design controlled experiment, execute experiment, critique classmates experiment 	<ol style="list-style-type: none"> 1. Complete lab activity sheet and analysis questions 2. Complete lab activity sheet and analysis questions 3. Lab safety quiz and contract 4. Complete lab activity sheet and analysis questions 5. Rubric/critique form 	<ul style="list-style-type: none"> • Lab Manual A • Specific equipment: beakers, graduated cylinders, balances, metric rulers, items to measure

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ESSENTIAL QUESTIONS: How do you produce valid, reliable results in an experiment? What is the difference between observations and inferences? What can data tell you about scientific knowledge?					
STRAND I: Scientific Thinking and Practice			Benchmark II: Understand that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected		
STANDARD I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.					
	PERFORMANCE STANDARD (YEAR LONG)	CONCEPTS/SKILLS R= Review & Extend	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
1 s t 9 w e k s	<p>1) Understand how scientific processes produce valid, reliable results, including: consistency of explanations with data and observations, openness to peer review, full disclosure and examination of assumptions, testability of hypotheses, repeatability of experiments and reproducibility of results.</p> <p>2) Use scientific reasoning and valid logic to recognize: faulty logic, cause and effect, the difference between observation and unsubstantiated inferences and conclusions, potential bias.</p> <p>3) Understand how new data and observations can result in new scientific knowledge.</p> <p>4) Critically analyze an accepted explanation by reviewing current scientific knowledge.</p> <p>5) Examine investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe).</p> <p>6) Examine the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently.</p>	<ul style="list-style-type: none"> • Describe appropriate methodologies • Use proper equipment and safety precautions • When designing and experiment, include a testable hypothesis, controls and variables, methods to collect/analyze/interpret data, obtain results that address the hypotheses being investigated, make predictions based on results of experiments, and re-evaluate hypotheses based on results 	<p>1. Students will participate in a lab activity using metric measurements</p> <p>2. Students will participate in a lab activity using metric conversions.</p> <p>3. Students will demonstrate and discuss lab safety procedures</p> <p>4. Students will identify actual pieces of lab equipment in a lab setting.</p> <p>5. Students will design controlled experiment, execute experiment, critique classmates experiment</p>	<p>1. Complete lab activity sheet and analysis questions</p> <p>2. Complete lab activity sheet and analysis questions</p> <p>3. Lab safety quiz and contract</p> <p>4. Complete lab activity sheet and analysis questions</p> <p>5. Rubric/critique form</p>	<ul style="list-style-type: none"> • Lab Manual A • Specific equipment: beakers, graduated cylinders, balances, metric rulers, items to measure

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ESSENTIAL QUESTIONS: How will a measurement error effect the outcome of an experiment? What are some ways to convert measurements within the SI system? What common objects are similar to some metric measurements?

STRAND I: Scientific Thinking and Practice	BENCHMARK III: Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns and relationships, evaluate findings, and draw conclusions.
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STANDARD I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS R= Review & Extend	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
1 s t 9 w e k s	<p>1) Create multiple displays of data to analyze and explain the relationships in scientific investigations.</p> <p>2) Use mathematical models to describe, explain, and predict natural phenomena.</p> <p>3) Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling).</p> <p>4) Identify and apply measurement techniques and consider possible effects of measurement errors.</p>	<p>1) Record and analyze data obtained during an investigation</p> <p>2) Use models to explain and predict outcomes of investigations</p> <p>3) Use calculators and computers to quantify data</p> <p>4) Understand how to make a measurement and realize what can happen if there are errors in measurement</p>	<p>1) Students will use a variety of lab equipment to make measurements using the SI system in a lab setting</p> <p>2) Students will calculate conversions within the SI system by using calculators and by moving decimal places</p> <p>3) Students will identify common objects and correlate relationships within the SI system so they can develop a working knowledge of the SI system by recording information in a table</p> <p>4) Students will participate in scientific investigation where one measurement error will produce a variety of outcomes</p>	<p>1) Students complete lab activity sheet and analysis questions</p> <p>2) Students complete guided practice worksheet</p> <p>3) Students complete guided practice worksheet</p> <p>4) Students complete lab activity sheet and analysis questions</p>	<ul style="list-style-type: none"> • Lab Manual A • Teacher generated activity worksheet • Teacher generated guided practice worksheet

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ESSENTIAL QUESTIONS: How can matter be classified? How can the pH scale be used to determine if a solution is acid, base, or neutral? What criteria determines if matter is an element, compound, or mixture?

STRAND II: The Content of Science | **BENCHMARK I:** Understand the properties, underlying structure, and reactions of matter.

STANDARD I: Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS R= Review & Extend	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
1 s t 9 w e e k s	Properties of Matter 1. Classify matter in a variety of ways (e.g., element, compound, mixture; acidic, basic, neutral). 2. Identify, measure, and use a variety of physical and chemical properties, specifically pH	1A. Classify an object as an element, compound or mixture. 1B. Classify a solution as an acid, base, or neutral. 2. Identify the pH of a substance and classify as acid, base or neutral.	1A. Students will use information gathered from note taking and textbook to determine whether their selection of objects is an element, compound or mixture in a lab setting. 1B. Student will use litmus paper to test a variety of substances is acid (pink), base (blue), or neutral (no change in either). 2. Students will use Vernier probe pH indicator to gather a pH number, record information in a table, which will help them to determine whether a solution is acid, base, or neutral.	1A. Complete lab activity sheet and analysis questions. 1B. Complete lab activity sheet and analysis questions. 2. Complete lab activity sheet and analysis questions.	1A. Teacher generated lab activity sheet. 1B. Biology Lab Manual A 2. Vernier lab activity sheet, computer interface, laptops, pH probe, neutralizing solution

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ESSENTIAL QUESTIONS: What makes up matter? What are the particles that make up an atom's structure? What is the role of carbon in organic structures? How is the periodic table of elements organized? What does an isotope look like?

STRAND II: The Content of Science | **BENCHMARK I:** Understand the properties, underlying structure, and reactions of matter.

STANDARD I: Understand the structure and properties of matter, the characteristics of energy, and the interactions between matter and energy.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS R= Review & Extend	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
1 s t 9 w e e k s	<p>Structure of Matter</p> <p>5) Understand that matter is made of atoms and that atoms are made of subatomic particles.</p> <p>6) Understand atomic structure, including:</p> <ul style="list-style-type: none"> • most space occupied by electrons • nucleus made of protons and neutrons • isotopes of an element • masses of proton and neutron 2000 times greater than mass of electron • atom held together by proton-electron electrical forces. <p>7) Explain how electrons determine the properties of substances by:</p> <ul style="list-style-type: none"> • interactions between atoms through transferring or sharing valence electrons • ionic and covalent bonds • the ability of carbon to form a diverse array of organic structures. 	<ol style="list-style-type: none"> 1. Visualize levels of subatomic particles including relative size 2. Understand the relationship between carbon based elements and organic structures 3. Visualize isotopes 4. Explain differences and similarities among isotopes of an element 5. Develop working knowledge of how to use the periodic table of elements 6. Visualize how ionic and covalent bonds work in organic elements. 	<ol style="list-style-type: none"> 1a. Students will visualize atomic structure by watching an instructional video. 1b. Students will visualize atomic structure by labeling diagrams of various elements on a guided practice worksheet. 1c. Students will visualize atomic structure by constructing models of various elements. 2. Students will work in cooperative groups to research on the internet how carbon relates to organic structures. 3. Students will work in cooperative groups to construct models of various isotopes; models will be explained to rest of class. 4. Students will complete a Venn diagram that will show differences and similarities among isotopes of an element. 5. Students will color code a periodic table in order to visualize its structure. 6. Students will complete a guided practice worksheet that includes diagrams and vocabulary terms. 	<ol style="list-style-type: none"> 1a. Video quiz 1b. Complete guided practice worksheet 1c. Complete lab activity sheet w/ analysis questions 2. Complete web quest 3. Presentation Rubric 4. Complete Venn diagram and analysis questions 5. Complete worksheet w/ analysis questions 6. Quiz 	<ul style="list-style-type: none"> • Teacher generated video quiz • Atomic structure worksheet • Lab activity sheet • Web quest outline • Materials for model construction • Venn worksheet • Teacher generated worksheets and quizzes

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ESSENTIAL QUESTIONS: What factors contribute to ecosystems changing over time? How do organisms compete for food in an ecosystem?					
STRAND II: The Content of Science		BENCHMARK I: Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.			
STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.					
	PERFORMANCE STANDARD	CONCEPTS/SKILLS <i>M = Master</i>	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
1 s t 9 w e e k s	<p>Ecosystems</p> <ol style="list-style-type: none"> 1. Know that an ecosystem is complex and may exhibit fluctuations around a steady state or may evolve over time. 2. Describe how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, mutualism). 3. Understand and describe how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients). 4. Critically analyze how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology). 	<ol style="list-style-type: none"> 1. Understand the structure of an ecosystem and how it may change over time 2. Describe cooperation and competition among organisms in an ecosystem 3. Understand there are limits on energy, water, oxygen and nutrients that effect how much life can be supported in an ecosystem. 4. Recognize how harvesting, pollution, population growth and technology used by humans effects ecosystems. 	<p>Students will work in cooperative groups and develop a presentation for the rest of their peers so they can visualize the complexity of a variety of biomes. Visual presentation will include: producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiotic relationships, mutualistic relationships; description of available resources including energy, water, oxygen, and nutrients; description of effects that harvesting, pollution, population growth and technology could have on the biome...also compose test questions for their biome to be included on examination</p>	<ul style="list-style-type: none"> • Completed PPT presentation; • Rubric will be provided to communicate expectations <p>*Complete written test</p>	<p>Laptops, outline, in-focus machine and connections, jump drive for presentation review</p>

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ESSENTIAL QUESTIONS: What effects do various cycles and processes (water, nitrogen, respiration, photosynthesis) have on the environment?					
STRAND II: The Content of Science		BENCHMARK I: Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.			
STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.					
	PERFORMANCE STANDARD	CONCEPTS/SKILLS M = Master	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
2 n d 9 w e e k s	<p>Energy Flow in the Environment</p> <p>5. Explain how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment.</p> <p>6. Describe how energy flows from the sun through plants to herbivores to carnivores and decomposers.</p> <p>7. Understand and explain the principles of photosynthesis (i.e., chloroplasts in plants convert light energy, carbon dioxide, and water into chemical energy).</p>	<p>1. Understand how matter and energy are conserved and released in the environment</p> <p>2. Describe the flow of energy from the sun to plants to herbivores to carnivores to decomposers</p> <p>3. Describe the process of photosynthesis and explain the importance to all living things</p>	<p>1. Students will construct detailed food web including references to water cycle, nitrogen cycle, photosynthesis and respiration in order to demonstrate conservation of matter and energy</p> <p>2. Students will watch video in order to visualize the flow of energy in the environment</p> <p>3. Students will participate in class discussion and complete PPT notes outline in order to verbalize the process of photosynthesis</p>	<p>1. Rubric</p> <p>2. Video quiz</p> <p>3. Completed notes outline & quiz</p> <p>*Complete written test</p>	<ul style="list-style-type: none"> • Laptops • PPT notes presentation generated by teacher reference • http://www.worldofteaching.com/biologypowerpoints.html • VCR/DVD player • Teacher generated quiz

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ESSENTIAL QUESTIONS: What are cells made of? What specialized structures are found inside cells? What is stored in DNA? How are plant and animal cells different? How are plant and animal cells similar? What are the differences between a prokaryote and eukaryote?					
STRAND II: The Content of Science		BENCHMARK III: Understand the characteristics, structures, and functions of cells.			
STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.					
	PERFORMANCE STANDARD	CONCEPTS/SKILLS M = Master	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
2 n d 9 w e e k s	Structure and Function 1. Know that cells are made of proteins composed of combinations of amino acids. 2. Know that specialized structures inside cells in most organisms carry out different functions, including: <ul style="list-style-type: none"> • parts of a cell and their functions (e.g., nucleus, chromosomes, plasma, and mitochondria) • storage of genetic material in DNA • similarities and differences between plant and animal cells • prokaryotic and eukaryotic cells. 	1. Describe the composition of cells. 2. Know the various structures contained inside of a cell and the functions of each. 3. Tell what is stored in DNA. 4. Discuss similarities and differences between plant and animal cells 5. Compare and contrast prokaryotic and eukaryotic cells	1. Students will participate in class discussion and take notes as directed in PPT presentation. 2. Students will complete diagram worksheets in order to visualize cellular organelles. 3. Students will construct models of a plant cell and animal cell out of play dough or jello. 4. Students will use a Venn diagram to compare plant and animal cells. 5. Students will use a comparison matrix graphic organizer to compare prokaryotic and eukaryotic cells.	1. Notes quiz 2. Completion of lab activity sheet 3. Model construction Rubric 4. Quiz/Test plant and animal cells 5. Completion of comparison matrix *Complete written test	<ul style="list-style-type: none"> • Lab activity sheets • • Teacher generated diagram worksheet using website for example: http://www.writedesignonline.com/organizers/comparecontrast.html • Play dough, jello w/ objects, marker boards for bases • Teacher generated quiz and test

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ESSENTIAL QUESTIONS: How do cells store energy? How do cells transport materials? How do cells dispose of wastes? How does the cell membrane control what enters and leaves a cell? Why do cells need to differentiate and specialize?

STRAND II: The Content of Science | **BENCHMARK III:** Understand the characteristics, structures, and functions of cells.

STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS M = Master	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
2 n d 9 w e e k s	<p>Structure and Function</p> <p>3. Describe the mechanisms for cellular processes (e.g., energy production and storage, transport of molecules, waste disposal, synthesis of new molecules).</p> <p>4. Know how the cell membrane controls which ions and molecules enter and leave the cell based on membrane permeability and transport (i.e., osmosis, diffusion, active transport, passive transport).</p> <p>5. Explain how cells differentiate and specialize during the growth of an organism, including:</p> <ul style="list-style-type: none"> • differentiation, regulated through the selected expression of different genes • specialized cells, response to stimuli (e.g., nerve cells, sense organs). <p>6. Know that DNA directs protein building (e.g., role of RNA).</p>	<p>3. Describe how cells produce and store energy, transport materials, dispose of wastes and make new molecules.</p> <p>4. Understand how the cell membrane controls materials entering and leaving a cell including osmosis, diffusion, active transport, and passive transport.</p> <p>5. Explain how cells differentiate and specialize.</p> <p>6. Understand that the role of DNA is to direct the building of proteins.</p>	<p>3. Students will watch video and complete notes outline in order to visualize how materials are stored, transported and disposed of within a cell.</p> <p>4. Students will use decalcified eggs, syrup, and water to demonstrate how a cell membrane controls materials entering and leaving a cell.</p> <p>5. Students will visualize variety of cell types under magnification of a microscope and prepare wet mount of cheek swab to view cells under microscope, draw what is seen and visualize how they differ.</p> <p>6. Students will participate in class discussion and complete PPT notes outline to gain understanding about the role DNA and RNA play in the building of proteins.</p>	<p>3. Complete video notes outline</p> <p>4. Complete lab activity sheet and analysis questions</p> <p>5. Complete lab activity sheet and analysis questions</p> <p>6. Notes quiz</p> <p>*Complete written test</p>	<ul style="list-style-type: none"> • Video/DVD • In focus machine • VCR • Biology Lab Manual A • Decalcified eggs, syrup, balance, distilled water, beakers • Teacher generated activity sheet, quiz, test

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ESSENTIAL QUESTIONS: What is the function of enzymes? What is cellular respiration? How do cells communicate with each other?

STRAND II: The Content of Science | **BENCHMARK III:** Understand the characteristics, structures, and functions of cells.

STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS M = Master	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
3 r d 9 w e e k s	<p>Biochemical Mechanisms</p> <p>7. Describe how most cell functions involve chemical reactions, including:</p> <ul style="list-style-type: none"> • promotion or inhibition of biochemical reactions by enzymes • processes of respiration (e.g., energy production, ATP) • communication from cell to cell by secretion of a variety of chemicals (e.g., hormones). 	<ol style="list-style-type: none"> 1. Understand how enzymes promote or inhibit biochemical reactions. 2. Explain the chemical reactions involved in the processes of respiration, energy production and ATP formation. 3. Describe how cells communicate through secretion of hormones. 	<ol style="list-style-type: none"> 1. Students will familiarize themselves with vocabulary terms related to biochemical reactions, cellular processes, and cellular communication by reading textbook, notes outline and watching videos. 2. Students will participate in a virtual lab and complete guided practice that demonstrates how enzyme catalysts effect liver cells 3. Students will complete diagrams that demonstrate the processes of respiration, energy production and ATP production 	<ol style="list-style-type: none"> 1. Completed worksheet, vocabulary quiz, video outline 2. Completed lab activity sheet and analysis questions 3. Complete diagram worksheets <p>*Complete written test</p>	<ul style="list-style-type: none"> • Teacher generated worksheets • Cellular respiration video • Biology Virtual Labs CD ROM, laptop, in-focus machine, worksheet

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ESSENTIAL QUESTIONS: What does DNA do? What is the difference between phenotype and genotype? What are some examples of dominant/recessive alleles? What kinds of traits are inherited? Are there some traits that are not inherited? What are the results of gene mutation? What causes gene mutations?

STRAND II: The Content of Science | **BENCHMARK II:** Understand the genetic basis for inheritance and the basic concepts of biological evolution.

STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS <i>M = Master</i>	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
3 r d 9 w e e k s	<p>Genetics</p> <ol style="list-style-type: none"> Know how DNA carries all genetic information in the units of heredity called genes, including: <ul style="list-style-type: none"> the structure of DNA (e.g., subunits A,G,C,T) information-preserving replication of DNA alteration of genes by inserting, deleting, or substituting parts of DNA. Use appropriate vocabulary to describe inheritable traits (i.e., genotype, phenotype). Explain the concepts of segregation, independent assortment, and dominant/recessive alleles. Identify traits that can and cannot be inherited. Know how genetic variability results from the recombination and mutation of genes, including: <ul style="list-style-type: none"> sorting and recombination of genes in sexual reproduction result in a change in DNA that is passed on to offspring radiation or chemical substances can cause mutations in cells, resulting in a permanent change in DNA. 	<ol style="list-style-type: none"> Describe the structure and function of DNA as well as how it replicates. Verbalize the difference between a genotype and phenotype. Describe concepts of segregation, independent assortment, and dominant/recessive alleles. Identify some traits that can and cannot be inherited. Describe how mutation of genes occurs including factors that contribute to gene mutation and how it effects the mutated cells DNA. 	<ol style="list-style-type: none"> Students will complete PPT notes outline, watch video, complete diagram worksheets, and construct models to demonstrate the structure and function of DNA as well as visualizing how it replicates. Students will participate in coin flip lab in order to gain understanding of genotypes and phenotypes; Students will complete Punnet square diagram worksheets and participate in guided practice activities so they can verbalize the difference between genotype and phenotype. Students will participate in a lab activity where a cup of beans are marked so they can gain understanding of segregation, independent assortment and dominant/ recessive alleles. Students will complete PPT notes outline and guided practice worksheet that identifies some of the traits that can and cannot be inherited; complete pedigree charts. Students will complete PPT notes to gain understanding of what factors contribute to the mutation of genes; view pictures of effects of mutated genes 	<ol style="list-style-type: none"> Completion of PPT notes outline, video outline, diagram worksheets, rubric for models Completion of lab activity sheets Completion of model construction Completion of notes outline, pedigree charts, Punnet square worksheets Complete notes outline, complete notes quiz <p>*Test</p>	<ul style="list-style-type: none"> Teacher generated worksheets, tests and quizzes Reference for PPT: http://www.worldofteaching.com/biologypowerpoints.html Biology Lab Manual A Genetics DVD DNA replication video Materials for model construction (kit) Coins Embryology textbook

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ESSENTIAL QUESTIONS: What are the similarities between sexual and asexual reproduction? What are the differences between sexual and asexual reproduction? How many pairs of chromosomes do most human cells have? What types of chromosomes do females have? What types of chromosomes do males have?

STRAND II: The Content of Science | **BENCHMARK II:** Understand the genetic basis for inheritance and the basic concepts of biological evolution.

STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS <i>M = Master</i>	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
3 r a 9 w e e k s	<p>Genetics</p> <p>6. Understand the principles of sexual and asexual reproduction, including meiosis and mitosis.</p> <p>7. Know that most cells in the human body contain 23 pairs of chromosomes including one pair that determines sex, and that human females have two X chromosomes and human males have an X and a Y chromosome.</p>	<p>1. Determine by cell type whether a cell reproduces sexually or asexually.</p> <p>2. Explain process of meiosis.</p> <p>3. Explain process of mitosis.</p> <p>4. Understand that most cells in the human body contain 23 pairs of chromosomes, one pair determines sex.</p> <p>5. Understand that females have two X chromosomes and males have an X and a Y chromosome, thus males determine the sex of an offspring.</p>	<p>1. Students will watch video, complete outline during PPT notes presentation in order to determine whether a cell produces sexually or asexually.</p> <p>2. Students will complete PPT notes, complete guided practice worksheets and label diagrams, construct models out of yarn and index cards, and put series of models in the correct sequence in order to explain the process of meiosis.</p> <p>3. Students will complete PPT notes, complete guided practice worksheets and label diagrams, identify mitotic stages of an onion root tip or whitefish blastula, and put a series of models in the correct sequence in order to explain the process of mitosis.</p> <p>4. Students will watch video, complete PPT notes outline and guided practice worksheet so they may gain understanding of the chromosomes in the human body.</p> <p>5. Students will participate in lab activity where a coin representing X and a Y chromosome determines the sex of an offspring.</p>	<p>1. Video quiz. Complete notes outline</p> <p>2. Complete notes outline, guided practice worksheets. Complete models</p> <p>3. Complete lab activity sheet and analysis questions</p> <p>4. Complete notes and video quiz</p> <p>5. Complete lab activity sheet and analysis questions.</p> <p>*Test</p>	<ul style="list-style-type: none"> • Teacher generated worksheets, quizzes, test • PPT notes presentation w/ reference: http://www.worldofteaching.com/biologypowerpoints.html • Microscopes, prepared slides of onion root tips and whitefish blastula • Coins • Yarn, index cards, scissors, markers • Marker boards, dry erase markers • Video, DVD, VCR, in-focus machine, laptop

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ESSENTIAL QUESTIONS: What evidence has been revealed about the first appearance of life on Earth? Why do some scientists believe humans evolved from a single celled organism? What evidence led to conclusions that humans evolved from distinctly different species? What factors contribute to the development of the Theory of Evolution? What is natural selection? What do fossil records tell us about the evolution of various species?

STRAND II: The Content of Science **BENCHMARK II:** Understand the genetic basis for inheritance and the basic concepts of biological evolution.

STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.

	PERFORMANCE STANDARD	CONCEPTS/SKILLS <i>M = Master</i>	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
3 r d 9 w e e k s	<p>Biological Evolution</p> <p>8. Describe the evidence for the first appearance of life on Earth as one-celled organisms, over 3.5 billion years ago, and for the later appearance of a diversity of multicellular organisms over millions of years.</p> <p>9. Critically analyze the data and observations supporting the conclusion that the species living on Earth today are related by descent from the ancestral one-celled organisms.</p> <p>10. Understand the data, observations, and logic supporting the conclusion that species today evolved from earlier, distinctly different species, originating from the ancestral one-celled organisms.</p> <p>11. Understand that evolution is a consequence of many factors, including the ability of organisms to reproduce, genetic variability, the effect of limited resources, and natural selection.</p> <p>12. Explain how natural selection favors individuals who are better able to survive, reproduce, and leave offspring.</p> <p>13. Analyze how evolution by natural selection and other mechanisms explains many phenomena including the fossil record of ancient life forms and similarities (both physical and molecular) among different species.</p>	<p>1. Describe various theories on the beginning of life on Earth.</p> <p>2. Review evidence related to the Theory of Evolution.</p> <p>3. Explain Charles Darwin’s role in the development of the Theory of Evolution.</p> <p>4. Describe what is meant by the term “natural selection” and tell how it affects the survival and reproduction of offspring.</p> <p>5. Give evidence from fossil records that supports the theory of evolution.</p> <p>6. Understand the difference between macro- and micro-evolution.</p>	<ul style="list-style-type: none"> • Students will use a variety of resources including internet and textbooks to gather information and weigh evidence about the theory of evolution, produce a written report and participate in a class debate on evolution. 	<p>1. Rubric will be provided to asses written report</p> <p>2. Participation grade given according to contributions during debate</p>	<p>Laptops w/ internet, textbook, outside sources, teacher generated rubric</p>

Portales Municipal Schools
CURRICULUM MAP

Subject:	Biology	2009	Grade Level: 9-12
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ESSENTIAL QUESTIONS: What characteristics determine how an organism is classified? What factors affect the survival of a species?					
STRAND II: The Content of Science		BENCHMARK I: Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.			
STANDARD II: Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.					
	PERFORMANCE STANDARD	CONCEPTS/SKILLS M = Master	STUDENT ACTIVITIES AND INSTRUCTIONAL STRATEGIES	ASSESSMENTS	STUDENT MATERIALS AND RESOURCES
4 t h 9 w e e k s	<p>Biodiversity</p> <p>8. Understand and explain the hierarchical classification scheme (i.e., domain, kingdom, phylum, class, order, family, genus, species), including:</p> <ul style="list-style-type: none"> • classification of an organism into a category • similarity inferred from molecular structure (DNA) closely matching classification based on anatomical similarities • similarities of organisms reflecting evolutionary relationships. <p>9. Understand variation within and among species, including:</p> <ul style="list-style-type: none"> • mutations and genetic drift • factors affecting the survival of an organism • natural selection. 	<p>1. Recognize the hierarchical classification scheme.</p> <p>2. Classify organisms into domain, kingdom, phylum, class, order, family, genus and species based on characteristics.</p> <p>3. Determine similarities and differences among organisms in the same kingdom.</p> <p>4. Determine similarities and differences among organisms in different kingdoms.</p> <p>5. Identify factors that affect the survival of an organism.</p> <p>6. Understand that there are differences among organisms at the species level.</p>	<p>1. Students will complete PPT notes outline, participate in class discussion, and watch a video to receive information on the hierarchical classification scheme.</p> <p>2. Students will construct a table and classify a list of organisms according to domain, kingdom, phylum, class, order, family, genus and species.</p> <p>3-4. Students will dissect a variety of organisms...some from the same kingdoms or different kingdoms in order to determine similarities and differences; visualize a variety of microorganisms under magnification of microscope and recognize structures in order to determine kingdom.</p> <p>5. Students will complete PPT notes outline and guided practice worksheet to identify factors that affect survival of an organism.</p> <p>6. Students will cite examples during class discussion to demonstrate understanding that organisms differ even at the species level</p>	<p>1. Completion of PPT notes outline, video quiz</p> <p>2. Completion of table</p> <p>3-4. Completion of lab activity and analysis questions</p> <p>5-6. Completion of notes outline. Participation in class discussion</p> <p>*Quiz *Test</p>	<ul style="list-style-type: none"> • PPT notes outline w/ reference to: http://www.worldofteaching.com/biologypowerpoints.html • Teacher generated worksheets, quizzes, tests • Biology Lab Manual A • Dissection kits, pans • Biological specimens including: earthworm, snail, sea star, crayfish, frogs, grasshoppers, fetal pigs, flowers • Prepared slides of monerans and protists • Video/DVD, VCR, in-focus