

8TH GRADE SCIENCE CURRICULUM MAP

2023-2024



Wa-Nee Community Schools
NorthWood Middle School

8th Grade Science Scope and Sequence

Nature of Science-2 weeks

| Objectives | Activities/Labs |
|--|---|
| Experimental design Measurements (English → SI) Temperature conversions Precision vs. Accuracy % error | Introduction to Vernier sensors and graphing* Density of water lab |

Chemistry- 16 weeks

| Matter and Atoms | Activities/Labs |
|--|--|
| Properties of matter Substance vs mixture Solute/Solvent Atomic Structure | Properties of water* I.D. pure substances* Ice water* Temperature and solubility* Atomic Theory Timeline Revisit and summarize density of water |

| States of Matter | Activities/Labs |
|---|--|
| Changes of State Energy of phase change Boyles Law Charles Law | Intermolecular Attractions* Boyle's Law* Charles's Law* Balloon in a bottle |

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| Periodic Table | Activities/Labs |
|---|---------------------------|
| Organization Trends Metals/nonmetals/metalloids | Element research QR codes |

| Bonding | Activities/Labs |
|--|--|
| Bohr models Lewis Dot Diagrams Covalent Ionic Metallic | Build/draw models Bond with a classmate |

| Chemical Reactions | Activities/Labs |
|---|---|
| Balance equations 6 types of reactions Reaction energy Stoichiometry | Enthalpy changes* Reaction Stoichiometry* Reaction Rates* Endothermic/Exothermic reactions* Heat of Combustion* |

1st Semester Assessment-Lab Practicum

Biology- 13 weeks

| Reproduction | Activities/Labs |
|---|---|
| Cell Types Asexual Cell Cycle Mitosis Sexual Meiosis | Cell types-microscope intro Onion Root Animation Karyotype activity Meiosis Dance Concept Map |
| Genetics | Activities/Labs |
| Flower Anatomy Genes and Inheritance Pedigrees Punnett Squares | Gene Wheel Passing DNA through generations Sickle Cell/Heart disease pedigree drawing and analysis DNA and genetics analysis-tying it all together |
| DNA | Activities/Labs |
| Structure Replication Protein synthesis Mutations | Model build DNA extraction (plant and animal) Replication model Transcription and translation (mutations day 2) Concept map |
| Genetic Disorders | Activities/Labs |
| Using Karyotypes to diagnosis | Research Essay |

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| Evolution | Activities/Labs |
|---|---|
| Darwin Natural Selection Artificial Selection Evidence for evolution | Bunny lab Bird beak lab Finch lab |

| Animal Diversity | Activities/Labs |
|--|-----------------|
| Taxonomy Invertebrate phyla Vertebrate classes | I.D. labs |

Earth Science-5 weeks

| Weather | Activities/Labs |
|---|---|
| Atmosphere Energy Transfer Water Cycle Cloud Formation/types Weather Variables Air masses Fronts Station models and weather maps Severe weather Ocean currents | Concept map Heating land and water* RH lab* Absorbing radiant energy* Weather log and analysis Winds and convection current labs Drawing weather maps |

| Climate and Climate Change | Activities/Labs |
|---|--------------------|
| People and environment Greenhouse gasses | Greenhouse effect* |

*denotes labs available with new Vernier software!

2nd Semester Assessment-Climate Change Research Project

| Lesson: 1 Pre-Assessment: Matter and Interactions | | | Unit: Matter and It's Interactions | |
|--|---|---|---|--|
| Essential Question(s): What do you know about matter? | | | | |
| Key Terms: Matter, Element, Insoluble, Physical Change, Soluble | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 1.1-1.8 (Pre-Assessment Stations) 2-3 periods total | 8.PS.2 Distinguish between atoms, elements, molecules, and compounds. | Describe the properties of matter. <ul style="list-style-type: none"> Organize, analyze, and interpret data about characteristic physical and chemical properties of substances before and after they interact. Identify patterns and cause-and-effect relationships of matter. Describe the properties of matter. <ul style="list-style-type: none"> Organize, analyze, and interpret data about characteristic physical and chemical properties of substances before and after they interact. Identify patterns and cause-and-effect relationships of matter. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: "Have You Ever Wondered?: What is Matter?" and "Extending Your Knowledge: Where Did Matter Come From?" Science Lab supplies from Matter and Its Interactions Kit Student Sheet 1.R Copies of Student Self-Assessment |
| Assessment(s): Self-Assessment Quiz | | | | |
| Self-Assessment and Student Sheet are found at http://carolinascienceonline.com/#/teacher/resources?layout=tiles&limit=20&offset=0 | | | | |

| Lesson: 2 The Nature of Matter | | | Unit: Matter and It's Interactions | |
|--|--|---|---|--|
| Essential Question(s): What can properties of matter help you determine? | | | | |
| Key Terms: Atom, Chemical Change, Chemical Property, Physical Change, Physical Property, Mass, Matter, Molecule, Volume | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 2.1 Investigation 2.2 Investigation 2.3 Investigation 2.4 7 periods total | 8.PS.6 Compare and contrast physical vs. chemical change. Analyze the properties of substances before and after substances interact to determine if a chemical reaction has occurred. | <ul style="list-style-type: none"> ●Learn about Chemical and Physical Properties that could be used to identify a substance. ●Organize, analyze, and interpret data on the characteristic properties of substances before and after they interact. ●Organize, analyze, and interpret data to analyze patterns (similarities and differences) between known and unknown substances. ●Organize, analyze, and interpret data about characteristic properties of substances before and after they interact. ●Use experimental evidence to argue that a new substance forms and a chemical reaction occurs. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: "Building Your Knowledge: Atoms and Molecules, Properties of Matter, Variables and Controls, Acids and Bases" and "Extending Your Knowledge: Alchemy Into Chemistry, Bent Into Shape: Looking at Malleability, A Brief History of Flammability" Science Lab supplies from Matter and Its Interactions Kit Student Sheet 2.4 |
| Assessment(s): Atomic Structure Drawings Atomic Structure Timeline | | | | |

| Lesson: 3 Density Makes a Difference | | | Unit: Matter and It's Interactions | |
|--|---|---|---|--|
| Essential Question(s): How can density be used to identify a substance and predict how it will behave under different conditions? | | | | |
| Key Terms: Density, Mass, Volume, Characteristic Property, Contraction, Expansion | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 3.1 Investigation 3.2 Investigation 3.3 Investigation 3.4 Investigation 3.5 8 periods total | 8.PS.5 Investigate the property of density and provide evidence that properties, such as density, do not change for a pure substance. | <ul style="list-style-type: none"> ● Understand that density is a characteristic property that can be used to identify substances. ● Use mass and volume to calculate density ● Calculate and compare the densities of various regular solids ● Measure the densities of irregularities of objects ● Use density to predict whether objects will sink or float in liquids. ● Infer the relative density of a liquid from the behavior of solids of known densities. ● Explain how density affects the behavior of objects in the real world. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: “Building Your Knowledge: Density as a Physical Property, Calculating Density, Why Bother With Density?” and “Extending Your Knowledge: Archimedes’ Crowning Moment, Panning for Gold, Panda Poop” Science Lab supplies from Matter and Its Interactions Kit Student Sheet 3.1 Student Sheet 3.2 Student Sheet 3.4 Student Sheet 3.5 |
| Assessment(s): Density of Water Summary | | | | |

| Lesson: 4 Just a Phase | | | Unit: Matter and It's Interactions | |
|--|--|---|---|---|
| Essential Question(s): How is energy related to physical changes in matter? | | | | |
| Key Terms: Kinetic energy, thermal energy, phase change, sublimation, condensation, evaporation, Kelvin | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 4.1 Investigation 4.2 Investigation 4.3 6 periods total | 8.PS.6 Compare and contrast physical change vs. chemical change. Analyze the properties of substances before and after substances interact to determine if a chemical reaction has occurred. | <ul style="list-style-type: none"> ●Develop models of phase changes that describe changes in particle motion, temperature, and state of matter when thermal energy is added or removed. ●Plan and carry out an investigation into the mass of water when it melts in a closed container. ●Observe the motion of particles in different states of matter. ●Analyze and discuss the motion of particles of matter during changes of state. ●Use data collected during investigations to apply to revised explanations. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | <p>Student texts: “Building Your Knowledge: Thermal Energy, Phases of Matter, Phase to Shining Phase” and “Extending Your Knowledge: Feeling the Heat, Measuring Temperature by Degrees, Chemistry of Eating Chocolate, Boiling Oil.”</p> <p>Science Lab supplies from Matter and Its Interactions Kit</p> <p>Student Sheet 4.1 Student Sheet 4.2 Student Sheet 4.3</p> |
| Assessment(s): Boyle’s Law/Charles’s Law Balloon in a Bottle | | | | |

| Lesson: 5 Building Blocks of Matter | | | Unit: Matter and It's Interactions | |
|--|--|---|--|--|
| Essential Question(s): How can you use a model to describe the composition of matter? | | | | |
| Key Terms: Atom, Bond, Element, Molecule, Periodic Table, Chemical Reaction, Physical Property | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 5.1 Investigation 5.2 Investigation 5.3 7 periods total | <p>8.PS.1 Create models to represent the arrangement and charges of subatomic particles in an atom (protons, neutrons, and electrons). Understand the significance that the currently 118 known chemical elements combine to form all the matter in the universe.</p> <p>8.PS.3 Use basic information provided for an element to determine its place on the Periodic Table. Use this information to find the number of protons, neutrons, and electrons in an atom.</p> <p>8.PS.4 Identify organization patterns (radius, atomic number, atomic mass, properties and radioactivity) on the Periodic Table.</p> | <ul style="list-style-type: none"> ●Collect and organize information about elements into a table. ●Group elements according to their characteristic properties. ●Use physical models to describe the atomic composition of simple molecules. ●Use computer representations to model the atomic composition of simple molecules. ●Compare element classification systems with the periodic table used by chemists. ●Describe how atoms combine with each other in various ways to form substances. | <p>Data in Lab Notebooks</p> <p>Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks</p> | <p>Student texts: “Building Your Knowledge: Atoms and Molecules, Down and Across: Understanding the Periodic Table, Make Bonds, Break Bonds,” and “Extending Your Knowledge: Dmitri’s Card Game, Little Boxes, Molecular Modeling in Cutting Edge Science, and World’s Strongest Element?”</p> <p>Science Lab supplies from Matter and Its Interactions Kit</p> <p>Student Sheet 5.1 Student Sheet 5.2 Student Sheet 5.3</p> |

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| Lesson: 5 Building Blocks of Matter | | Unit: Matter and It's Interactions | | |
|---|------------------|---|-------------------------------|------------------|
| Essential Question(s): How can you use a model to describe the composition of matter? | | | | |
| Key Terms: Atom, Bond, Element, Molecule, Periodic Table, Chemical Reaction, Physical Property | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| | | | | |
| Assessment(s): Element Research and Sway Presentation | | | | |

| Lesson: 6 Pure Substances and Mixtures | | | Unit: Matter and Its Interactions | |
|---|---|---|--|---|
| Essential Question(s): How can Mixtures be Separated? | | | | |
| Key Terms: Heterogeneous, Homogeneous, Mixture, Chromatograph, Chromatography | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigations 6.1-6.5 10 periods total | 8.PS.5 Investigate the property of density and provide evidence that properties, such as density, do not change for a pure substance. | -Identify substances as elements, compounds, or mixtures on the basis of their atomic and molecular composition. -Differentiate between homogeneous and heterogeneous mixtures. -Separate ink into its components using paper chromatography. -Develop a solution for solving a problem. | Data in lab notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks. Lab conclusions for the following: -Analyzing Inks -Separating Mixtures -Intermolecular attractions | Science lab supplies from Matter and its Interactions Vernier lab supplies and resources Student texts: <i>“Water to Drink”</i> , <i>“The Challenge of Separation”</i> , and <i>“Salty Sea”</i> . Students sheet 6.4 |
| Assessment(s): Chromatography Crime Scene Evaluation | | | | |

| Lesson: 7 Reacting Chemically | | Unit: Matter and Its Interactions | | |
|---|---|--|---|--|
| Essential Question(s): How can the properties of matter be used to determine if a chemical reaction has occurred? | | | | |
| Key Terms: chemical bond, ionic, covalent, chemical change, reactant, electrolysis, precipitate, combustion | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigations 7.1-7.3 6-8 periods total | 8.PS.1 Create models to represent the arrangement and charges of subatomic particles in an atom (protons, neutrons, and electrons). | -Relate chemical reactions to changes in properties of substances and to changes in their atomic composition. -Plan and carry out an investigation using solubility to determine if a precipitate has formed. -Analyze and interpret data before and after substances interact. -Plan and carry out an investigation involving chemical reactions. -Describe how the atomic-level structure of substances relate to physical changes and chemical reactions. | Data in lab notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks. Lab conclusions for the following: -Electrolysis -Formation of Precipitate -Heat of Combustion | Science lab supplies from Matter and its Interactions Vernier lab supplies and resources Student texts: <i>“Engineered for Success”</i> and <i>“In the Heat of the Moment”</i> and <i>“Cold Weather Chemistry”</i> . Students sheet 7.1 and 7.2 |
| Assessment(s): Quiz 6 types of reactions conclusion | | | | |

| Lesson: 8 Releasing Energy | | | Unit: Matter and Its Interactions | |
|---|---|--|---|--|
| Essential Question(s): What is the relationship between changes in substances and changes in thermal energy? | | | | |
| Key Terms: kinetic energy, enthalpy, reaction rate, endothermic, exothermic, delta | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigations 8.1 and 8.2 8-10 days | 8.PS.7 Balance chemical equations to show how the total number of atoms for each element does not change in chemical reactions and as a result, mass is always conserved in a closed system. (Law of Conservation of Mass.) | -Describe the components within a system that either release or absorb thermal energy by chemical processes. -Investigate how changing the mass or a component relates to changes in thermal energy. -Evaluate how well a solution meets design criteria and constraints. -Describe the components in a system that release thermal energy by chemical processes. | Data in lab notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks. Lab conclusions for the following: -enthalpy changes -reaction rates -endothermic/exothermic reactions | Science lab supplies from Matter and its Interactions Vernier lab supplies and resources Student texts: <i>“Engineered for Success”</i> and <i>“In the Heat of the Moment”</i> and <i>“Cold Weather Chemistry”</i> . Students sheet 8.1 |
| Assessment(s): Lab Notebook Check Quiz | | | | |
| Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson: 9 Conservation of Matter | | | Unit: Matter and Its | |
|---|---|--|---|--|
| Essential Question(s): What Happens to Matter in a Chemical Reaction? | | | | |
| Key Terms: Law, Conservation of matter, product, reactant, chemical reaction | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigations 9.1 and 9.2 6-7 class periods | 8.PS.7 Balance chemical equations to show how the total number of atoms for each element does not change in chemical reactions and as a result, mass is always conserved in a closed system. (Law of Conservation of Mass.) | -Conduct an investigation to compare the mass of reactants and the mass of products. -Observe the oxidation of iron, predict changes in mass due to the oxidations, and explain why the prediction was correct or incorrect. -Relate data collected in investigations 9.1 and 9.2 to the concept of conservation mass. Describe the processes involved at the atomic and molecular level. | Data in lab notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks for reaction stoichiometry. | Science lab supplies from Matter and its Interactions Vernier lab supplies and resources Student texts: " <i>Mass and Matter</i> " |
| Assessment(s): Self-assessment Quiz | | | | |
| Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson: 10 Compounds from Natural Resources | | | Unit: Matter and Its Interactions | |
|---|--|--|--|---|
| Essential Question(s): How are synthetic compounds made and used? | | | | |
| Key Terms: biochemistry, organic chemistry, synthetic compound, monomer, polymer | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 10.1 3-5 periods total | 8.PS.6 Compare and contrast physical change vs. chemical change. Analyze the properties of substances before and substances interact to determine if a chemical reaction has occurred. | -Introduce natural and synthetic compounds and their use. -Identify patterns and relationships between compounds that react with sodium alginate and those that do not. -Explain why synthetic compounds are important and useful. | Data in lab notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks. | Science lab supplies from Matter and its Interactions Student texts: <i>“From Natural to Synthetic.”</i> and <i>“Plastics, Making Biodiesel, Petroleum & Medicine: What’s the Connection?”</i> |
| Assessment(s): Self-Assessment Quiz Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson: 11 Assessment: Matter and Its Interaction | | | Unit: Matter and Its Interactions | |
|---|--|--|--|--|
| Essential Question(s): How can we use our knowledge of matter and its interactions to solve problems? | | | | |
| Key Terms: Refer to key terms listed in previous lessons. | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Performance assessment Design experiment 5-6 periods total | 6-8. LST. 6.2 Use technology to produce and publish writing and present the relationships between information and ideas clearly and efficiently. | -Use knowledge of matter and its interactions to evaluate competing design solutions, optimize design solutions, prepare a working prototype, and present design solutions. -Apply knowledge and skills to answer questions in a Written Assessment about concepts related to matter and its interactions | Data in Lab Notebooks | Science lab supplies from Matter and its Interactions Student sheets 11.PA, 11.WA Vernier lab supplies and resources |
| Assessment(s): Written summative assessment Lab Practicum Formal written lab report Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson: 1 Pre-Assessment Genes and Molecular Machines | | | Unit: Genes and Molecular Machines | |
|---|--|--|---|---|
| Essential Question(s): How has human understanding of inheritance allowed us to influence change in biodiversity? | | | | |
| Key Terms: Cells, Genetics, Reproduction, Selection, Variation | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 1.1 Investigation 1.2 Investigation 1.3 Investigation 1.4 Investigation 1.5 Investigation 1.6 5 periods total | 8.LS.2 Demonstrate how genetic information is transmitted from parent to offspring through chromosomes via the process of meiosis. Explain how living things grow and develop. | Describe ideas about cells reproduction and genetics. <ul style="list-style-type: none"> • Begin investigation with germinating Wisconsin Fast Plants – learn about variation & inherited traits • Begin rooting Coleus plants to learn about reproduction. • Identify similarities and differences between slides of cells and Zebrafish, Glofish, Casper Fish • Predict which organisms are the parents of a set of offspring. • Integrate Information to begin to begin to explain genetics and reproduction. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: “Extending Your Knowledge: Model Organisms” Science Lab supplies from Genes and Molecular Machines Kit Student Sheet 1.1 Student Sheet 1.4 Copies of Student Self-Assessment |
| Assessment(s): KWL Self-Assessment, Reflection Questions | | | | |

| Lesson: 2 | | Unit: Genes and Molecular Machines | | |
|---|---|---|---|--|
| Essential Question(s): What do you already know about cells, reproduction, and genetics? | | | | |
| Key Terms: Cells, Multicellular, Unicellular, Prokaryotic, Eukaryotic, Organelles, Nucleus, Cell Membrane, Cytoplasm | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 2.1 Investigation 2.2 Investigation 2.3 4.5 periods total | Review of 7.LS.1 Investigate and observe cells in living organisms and collect evidence showing that living things are made of cells. Compare and provide examples of prokaryotic and eukaryotic organisms. Identify the characteristics of living things. | <ul style="list-style-type: none"> ●Review how cells relate to living things. ●Form connections between how the structure of cells is important to living things. ●Observe and discuss different structures observed in the plant cells. ●Discover that an entire living thing can be composed of one cell. ●Analyze different cells to propose different functions based on shape and structure. ●Explore the pattern that all living things are composed of one cell. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: “Building Your Knowledge: Discovery of Cells, and Introduction of Cell Types” Science Lab supplies from Genes and Molecular Machines Kit Student Sheet 2.3 Lesson Master 2.3 |
| Assessment(s): Reflection Questions, Cell Drawings and Diagrams | | | | |

| Lesson: 3 Organism Reproduction | | | Unit: Genes and Molecular Machines | |
|--|---|--|---|--|
| Essential Question(s): What can cells tell us about how organisms reproduce? | | | | |
| Key Terms: Asexual Reproduction, Sexual Reproduction, Binary Fission, Budding, Cross Pollination, Pistil, Stamen, Anther, Sperm | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 3.1 Investigation 3.2 Investigation 3.3 Investigation 3.4 Investigation 3.5 6 periods total | 8.LS.1 Compare and Contrast the transmission of genetic information in sexual and asexual reproduction. Research organisms that undergo these two types of reproduction. | <ul style="list-style-type: none"> • Extend prior understanding of living cells and explore reproduction. • Consider the mechanics of sexual reproduction in flowering plants. • Observe a unicellular organism that undergoes asexual reproduction • Observe a multicellular animal that undergoes asexual reproduction. • Observe the progress of a previous clipping experiment in a multicellular plant that undergoes asexual reproduction. • Consider the advantages and disadvantages of sexual versus asexual reproduction | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: “Building Your Knowledge: Methods of Reproduction” and “Extending Your Knowledge: Zebrafish Reproduction” Science Lab supplies from Genes and Molecular Machines Kit |
| Assessment(s): Reflection Questions, Sexual/Asexual Reproduction Compare & Contrast Chart | | | | |

| Lesson: 4 Cellular Reproduction | | | Unit: Genes and Molecular Machines | |
|--|--|---|---|---|
| Essential Question(s): Where do cells come from? | | | | |
| Key Terms: Chromosomes, DNA, Mitosis, Meiosis, Gametes, Ovum, Zygote, Mutation | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 4.1 Investigation 4.2 Investigation 4.3 Investigation 4.4 Investigation 4.5 5 periods total | 8.LS.2 Demonstrate how genetic information is transmitted from parent to offspring through chromosomes via the process of meiosis. Explain how living things grow and develop. | <ul style="list-style-type: none"> • Predict how the process of cell division differs between prokaryotic and eukaryotic organisms • Make observations of cells during mitosis and note differences at various stages. • Design and construct a model of mitosis that predicts cell division. • Depict the behavior of chromosomes during cell division • Observe cells during meiosis and determine how the chromosomes move during meiosis. • Gain an understanding of the phases of meiosis and how it promotes genetic diversity. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: “Building Your Knowledge: Mitosis, Meiosis: Creating Sex Cells” and “Extending Your Knowledge: When Mitosis Goes Wrong.” Science Lab supplies from Genes and Molecular Machines Kit Student Sheet 4.1 Student Sheet 4.3 |
| Assessment(s): Reflection Questions, Mitosis/Meiosis Quiz, Concept Map | | | | |

| Lesson: 5 Genetics | | Unit: Genes and Molecular Structure | | |
|---|--|---|---|---|
| Essential Question(s): Why do family members look similar but not identical to each other? | | | | |
| Key Terms: Genes, Traits, Heterozygous, Homozygous, Allele, Recessive, Dominant, Phenotype, Punnett Square | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 5.1 Investigation 5.2 Investigation 5.3 Investigation 5.4 5 periods total | 8.LS.6 Create models to show how the structures of chromatin, chromosomes, chromatids, genes, alleles, and deoxyribonucleic acid (DNA) molecules are related and differ. 8.LS.3 Create and analyze Punnett squares to calculate the probability of specific traits being passed from parents to offspring using different patterns of inheritance. 8.LS.4 Differentiate between and provide examples of acquired and genetically inherited traits. | <ul style="list-style-type: none"> • Demonstrate an understanding of the difference between genotype and phenotype • Demonstrate how genes, through homozygous or heterozygous pairing, interact to express dominant or recessive traits. • Discover how alleles are passed from parents to offspring. • Discover that variation is widespread in sexually reproducing organisms. • Use a Punnett square model to determine possible offspring and given offspring to determine parents. • Use a model to study Mendelian inheritance | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: “Building Your Knowledge: The Mystery Behind our Traits, Heredity: Passing it on, What are the Chances” and “Extending Your Knowledge: Dominant Ideas and Recessive Breakthroughs: How Modern Genetics Was Born, Inheritance: Not Just Dominant and Recessive” Science Lab supplies from Matter and Its Interactions Kit Student Sheet 5.2 Student Sheet 5.2B Student Sheet 5.2C Student Sheet 5.3 Student Sheet 5.4 |
| Assessment(s): Reflection Questions, Concept Map, Quiz | | | | |

| Lesson 6: DNA to Trait | | | Unit: Genes and Molecular Machines | |
|---|---|--|---|--|
| Essential Question(s): How does DNA determine the traits that organisms have? | | | | |
| Key Terms: DNA, nitrogenous base, Nucleotide, amino acid, mRNA, protein, codon, | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| 6.1 6.2 6.3 Draw/Build DNA model DNA replication model Transcription/ Translation on the table | 8.LS.6 Create models to show how the structures of chromatin, chromosomes, chromatids, genes, alleles, and DNA molecules are related and differ. | Carry out an investigation to extract DNA from a strawberry. • Gain an understanding of the structure of DNA -Model the processes of transcription and translation Investigate how DNA codes for traits. • Explore how mutations affect proteins | Data in Lab Notebooks | Science lab supplies from Genes and Molecular Machines http://learn.genetics.utah.edu/ *DNA and Genes *What are proteins *Transcribe and Translate *Mutations *Karyotypes Reading Selections: Same Letters, Different Proteins Genetic Mutations: Good, Bad, or Neither |
| Assessment(s): Concept map Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson 6.5: Genetic Disorder Research Project | | | Unit: Genes and Molecular Machines | |
|--|--|---|---|------------------|
| Essential Question(s): How are genetic disorders inherited? | | | | |
| Key Terms: bacteria, virus, sex-linked, autosomal, karyotype | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Viral infection transmission activity Virus vs Bacteria Venn diagram Genetic Disorder Research Project | 8.LS.11 Investigate how viruses and bacteria affect the human body. | -Differentiate between virus and bacteria. -Research and present information on genetic disorders. | Data in Lab Notebooks | Student computer |
| Assessment(s): Research Paper | | | | |

Updated 8/22

| Lesson 7: Successful Reproduction of Offspring **Fits best in lesson 5 as an intro | | | Unit: Genes and Molecular Machines | |
|---|--|---|---|---|
| Essential Question(s): How do structures allow plants to reproduce successfully? | | | | |
| Key Terms: genetic diversity, variation, genotype, phenotype | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| 7.1 1 period | 8.LS.2 Demonstrate how genetic information is transmitted from parent to offspring through chromosomes via the process of meiosis. | -Investigate the structure and function of flowers and conclude that plants rely on different types of pollinators to help them successfully reproduce. | Data in Lab Notebooks | Science lab supplies from Genes and Molecular Machines Reading Selections: The Wonder of Flowering Plants |
| Assessment(s): Quiz *incorporated into lesson 5 | | | | |
| Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson 8: Variation | | Unit: Genes and Molecular Machines | | |
|---|---|--|-------------------------------|--|
| Essential Question(s): How do differences within a population help a species survive? | | | | |
| Key Terms: genetic diversity, variation, genotype, phenotype | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| 8.1 8.2 8.3 8.4 4-5 periods | 8.LS.3 Create and analyze Punnett squares to calculate the probability of specific traits being passed from parents to offspring using different patterns of inheritance. | - Germinate seeds from Fast Plants. • Observe the plant sprouts for clues about inheritance -Examine the stem color phenotype in Fast Plants and use a Punnett square to predict the genotype of the parent plants | Data in Lab Notebooks | Science lab supplies from Genes and Molecular Machines Reading Selections: Supermodels on Linden Drive |
| Assessment(s): Quiz Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson 9: Selection | | | Unit: Genes and Molecular Machines | |
|---|---|--|---|--|
| Essential Question(s): How do natural and artificial selection change a population over time. | | | | |
| Key Terms: evolution, artificial selection, natural selection, adaptations, coadaptation, gene flow, mutations, speciation | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| 9.1 9.2 Phet-Bunny Lab Finch Lab 8 class periods | 8.LS.8 Explore and predict the evolutionary relationships between species looking at the anatomical differences among modern organisms and fossil organisms. 8.LS.9 Examine traits of individuals within a species that may give them an advantage or disadvantage to survive and reproduce in stable or changing environment. 8.LS.5 Explain how factors affecting natural selection increase or decrease a species' ability to survive and reproduce. | Model the process of natural selection through an activity comparing population changes in three different habitats. • Read about natural selection to better understand the process and become introduced to another form of selection called artificial selection | Data in Lab Notebooks | Science lab supplies from Genes and Molecular Machines Reading Selections: -Darwin and Wallace -Modern Evolutionary Synthesis -Your Best Friends' Genes -Astonishing Animal Adaptations |
| Assessment(s): Quiz Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson 9.5: Taxonomy | | | Unit: Genes and Molecular Machines | |
|---|--|---|---|---------------------|
| Essential Question(s): What characteristics are shared between organisms within the same taxonomic levels? | | | | |
| Key Terms: taxonomy, scientific name, binomial nomenclature | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| -Invertebrate phyla lab -Vertebrate classes lab -4-5 class periods | 8.LS.7 Recognize organisms are classified into taxonomic levels according to shared characteristics. Explain how an organism's scientific name correlates to these shared characteristics. | -Understand taxonomic order of the Animal Kingdom -Examine similar characteristics shared between organisms of same class/phylum. -Write scientific names using binomial nomenclature | Data in Lab Notebooks | Preserved specimens |
| Assessment(s): Concept Map | | | | |

| Lesson 10: Human Manipulation | | Unit: Genes and Molecular Machines | | |
|---|---|--|-------------------------------|--|
| Essential Question(s): what are some ways humans have influenced the inheritance of desired traits in organisms? | | | | |
| Key Terms: Artificial Selection, Genetic engineering, variation, Cloning, gene therapy, Stem cell | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Zebrafish Variants Research 4 periods total | 8.LS.10 Gather and synthesize information about how humans alter organisms genetically through a variety of methods. | -Research different technologies that people have used to influence the inheritance of organisms. Observe the differences between zebrafish and consider how genotype relates to phenotype. Learn about each zebrafish variant and why it exists | Data in Lab Notebooks | Science lab supplies from Genes and Molecular Machines Student sheets 10.1 10.2 |
| Assessment(s): Quiz | | | | |
| Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson: 11 Assessment: Genes and Molecular Machines | | | Unit: Genes and Molecular Machines | |
|--|--|---|---|--|
| Essential Question(s): Students conduct research about a specific technology that humans have used to influence or change the desired trait of an organism. | | | | |
| Key Terms: Refer to key terms listed in previous lessons. | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Performance assessment Design experiment 5-6 periods total | 6-8. LST. 6.2 Use technology to produce and publish writing and present the relationships between information and ideas clearly and efficiently. | -Complete a performance assessment by carrying out an investigation through research and analysis | Data in Lab Notebooks | Science lab supplies from Genes and Molecular Machines Student sheets 11.PA, 10.2 |
| Assessment(s): Written summative assessment Performance assessment Student sheets are found at http://carolinascienceonline.com/#/teacher/resource/37354 | | | | |

| Lesson: 1 Warming Earth's Surface | | | Unit: Weather and Climate Systems | |
|---|---|---|---|--|
| Essential Question(s): How do different surfaces on Earth warm and cool? | | | | |
| Key Terms: Conduction, Convection, Radiation, Climate | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 2.1 Investigation 2.2 3.5 periods total | 8.ESS.2 Create a diagram or carry out a simulation to describe how water is cycled through the earth's crust, atmosphere and oceans. Explain how the water cycle is driven by energy from the sun and the force of gravity. | <ul style="list-style-type: none"> • Predict which areas of Earth heat and cool at different rates. • Carry out an investigation to compare the warming and cooling rates of soil and water. • Collect data about the warming and cooling rates of soil compared to Water. • Graph and analyze data about the warming and cooling rates of soil compared to water. • Relate the findings of the investigation to the heating and cooling of Earth's surfaces. • Learn about the Sun as the major driver of Earth's weather. • Learn about how different Earth scientists conduct their work. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Student texts: "Building Your Knowledge Readings: A Hot Topic" and "Extending Your Knowledge: The Source of Earth's Heat, How Scientists Study Earth, Science Lab supplies from Weather and Climate Change Kit Student Sheet 2.1 Student Sheet 2.2 Lesson Master 2.2A Copies of Student Self-Assessment |
| Assessment(s): Reflection Questions, Concept Map | | | | |

| Lesson: 2 The Water Cycle, Cloud Formation, and Air Masses | | | Unit: Weather and Climate Systems | |
|---|---|--|---|--|
| Essential Question(s): How do water and air move in the atmosphere? | | | | |
| Key Terms: Air Mass, Condensation, Evaporation, Water Cycle, Dew Point | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 3.1 Investigation 3.2 Investigation 3.3 Investigation 3.4 5.5 periods total | 8.ESS.2 Create a diagram or carry out a simulation to describe how water is cycled through the earth's crust, atmosphere and oceans. Explain how the water cycle is driven by energy from the sun and the force of gravity. | <ul style="list-style-type: none"> • Evaluate how the temperature of Earth's surface affects the temperature and movement of the air above it. • Use a model to explore the natural processes that drive the water cycle • Investigate the effect of surface temperature on the movement of air above the surface. • Relate the results of the investigation to the temperature and movement of air above Earth's surface. • Determine how warm air and cool air move. • Learn about different types of air mass | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | <p>Student texts: "Building Your Knowledge: Water Kind of a Big Deal, The Water Cycle: from the Sky to the Land and Back Again" and "Extending Your Knowledge: Air Masses, What Are Clouds?"</p> <p>Science Lab supplies from Weather and Climate Systems Kit</p> <p>Student Sheet 3.2 Student Sheet 3.3 Student Sheet 3.3GS</p> |
| Assessment(s): Reflection Questions, Concept Map, Quiz | | | | |

| Lesson 3: Introduction to Climate | | | Unit: Weather and Climate Systems | |
|---|--|--|---|---|
| Essential Question(s): What is climate and how is it determined? | | | | |
| Key Terms: Koppen Climate, Biome, Ocean Currents | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 9.1 3 class periods | 8.ESS.1 Research global temperatures over the past century. Compare and contrast data in relation to the theory of climate change. | Use data to determine in which climate zone a city is located. Examine the relationship between plants and climate. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Science Lab supplies from Weather and Climate Systems Reading Selections: Climate and Ecosystems What Makes the Climate Different in Different Parts of the World? |
| Assessment(s): Quiz | | | | |

| Lesson 4: Climate Change Research | | | Unit: Weather and Climate Systems | |
|--|--|---|---|--|
| Essential Question(s): What data have scientists collected and analyzed to support theories about climate change? | | | | |
| Key Terms: temperature, weather, satellite | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 10.1 Investigation 10.2 5 class periods | 8.ESS.1 Research global temperatures over the past century. Compare and contrast data in relation to the theory of climate change. | Analyze and interpret a graph of data related to climate change. Create and give an oral presentation of findings to the class | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Science Lab supplies from Weather and Climate Systems Reading Selections: Taking the A-train Prehistoric Climate Change Trapped in the Trees Ice Core Samples |
| Assessment(s): Presentations | | | | |

| Lesson 5: Impact of Climate Change | | | Unit: Weather and Climate Systems | |
|---|--|--|---|--|
| Essential Question(s): How does climate change impact Earth’s systems? | | | | |
| Key Terms: climate modeling, greenhouse effect | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| Investigation 11.1 Investigation 11.2 4 class periods | 8.ESS.3 Research how human consumption of finite natural resources and human activities have had an impact on the environment. | Study federal climate change projections for a region of the United States. Develop climate-change-related policy recommendations for the governor of your state. Observe a method to monitor the effects of increased carbon dioxide on wetlands. | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Science Lab supplies from Weather and Climate Systems Reading Selections: Pieces in Search of a Whole Natural or Human Made? Alternatives to Fossil Fuels. |
| Assessment(s): Quiz | | | | |

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| Assessment | | | Unit: Weather and Climate Systems | |
|---|--|--|---|---|
| Essential Question(s): Where will they go? | | | | |
| Key Terms: see all above | | | | |
| Investigation & Duration | Standards | Objectives | Assessment (formative) | Resources |
| 1 class period | 8.ESS.3 Research how human consumption of finite natural resources and human activities have had an impact on the environment. | Determine impacts of climate change on various species | Data in Lab Notebooks Analyzations, Conclusions, Responses, and Reflections in Lab Notebooks | Reading Selection: Where Will They Go? |
| Assessment(s): 4 discussion questions from reading | | | | |