Big Ideas

The Nature of Science:	The scientific method provides a systematic process to understand our world.
The Design Process:	Applying the scientific method can help us solve real world problems.
Physics:	The Interactions of objects are dictated by the forces of nature.
	Atoms determine chemical properties of matter.
Life:	Traits are inherited from generation to generation.
	The likelihood of survival of a species depends on its inherited traits and the environment in which it lives.
Science, Technology and Engineering:	Problems can be solved by using materials with specific properties and characteristics.

Essential Questions/Lines of Learning	Key Vocabulary
1. Life (Genetics) • How do inherited traits impact generations of species? • Why do organisms have the characteristics that they do? • How are adaptations over time important for the survival of species? Physics 2. Physics (Chemistry) • What interactions occur during a chemical reaction and how do they relate to the nature of matter? • How does the arrangement of particles within an atom determine its characteristics and its interactions with other atoms? 3. Science, Technology, and Engineering • How do particles interact in different forms of matter?	Life Science (genetics): Genetics, heredity, gene, DNA, traits, fertilization, allele, phenotype, genotype, chromosome, offspring, dominant, recessive, homozygous, heterozygous Physical Science (chemistry): Atoms, elements, compounds, molecules, products, physical change, chemical change, physical property, chemical property, reactants, bonding, valence electrons

Core Standards

Content Standards:

Standard 3: (a.)Understand the predictability of characteristics being passed from parents to offspring; (b.)Explain how a particular environment selects for traits that increase the likelihood of survival and reproduction by individuals bearing those traits.

Standard 1: (a.)Describe how atomic structures determine chemical properties and how atoms and molecules interact.

Standard 4: (a.) Identify the appropriate materials to be used to solve a problem based on their specific properties and characteristics.

Process Standards: Students gain scientific knowledge by observing the natural and constructed world, performing and evaluating investigations, and communicating their findings. These principles should guide student work and be integrated into the curriculum along with the content standards on a daily basis.

Core Instructional Activities

Required	Optional
• Environmental Impact and Survivability (example: Toothpick Fish) 8.3.8,8.3.9 • Passing of Genetic Traits (example: Genetic Child Project “Face Lab”) 8.3.3,8.3.5	• Research Genetic Disorders • CSI (with school SRO) • DNA extraction lab

Core Instructional Materials	Core Assessments
Required • *Interactive Science* (Pearson) • *< Science Odyssey, Science Illustrated, Science World >* **Science Notebook**: *Each indicator should include students reading, writing, and investigating through labs, which provide opportunities for the students to explore each topic.*	**Required** • Genetics Unit Test (Pre and Post Test) • Chemistry Unit Test (Pre and Post Test)

Evidence-based Practices	
Consistent implementation of Nature of Science and Design Process Standards	Open and guided inquiry experiences
Consistent implementation of Science Notebook	Hands-on lab activities
Gradual Release of Release	Marzano's six-step vocabulary method
Embedded reading and writing tasks using authentic texts	Use of assessment data to inform instruction

Standard	Instruction and Assessment	Implementation Notes
Process Standards • Form logical conclusions based on collected data to apply to real world problems • Plan and carry out investigation—often over a period of several class lessons—as a class, in small groups or independently. * Minimum of two open inquiry, individually or in small groups • Collect quantitative data with appropriate tools or technologies and use appropriate units to label numerical data. Accurately read length, mass, volume, temperature, time, and calculate density, speed, acceleration, momentum, net force • Incorporate variables that can be changed, measured or controlled. Accurately apply and manipulate the independent, dependent, and controlled variables • Use the principles of accuracy and precision when making measurements. • Test predictions with multiple trials • Analyze data, using appropriate mathematical manipulation as required, and use it to identify patterns. Make inferences based on these patterns. Recognize and analyze patterns and trends • Evaluate possible causes for differing results (i.e., valid data). • Compare the results of an experiment with the prediction. • Communicate findings through oral and written reports by using graphs, charts maps and models. Write accurate conclusions based on collected data ***Design Process Standards*** • Identify a need or problem to be solved. • Brainstorm potential solutions. • Throughout the entire design process, document the design with drawings (including labels) in a portfolio or notebook so that the process can be replicated. • Select a solution to the need or problem. • Select the most appropriate materials to develop a solution that will meet the need. • Create the solution through a prototype.	***Interactive Science*** TE: SE: **Lab**: **Science Notebook:** Line of Learning: *Record actual, unbiased observations rather than assumptions or opinions.* i. Organize data ii. Use appropriate units and labels iii. Record appropriate qualitative and quantitative data iv. Create formal lab report that can be replicated **Common Assessments:** Life Science--Genetics UNIT Test (Pre and Post Test) Physical Science – Chemistry UNIT Test (Pre Test)	

Standard	Instruction and Assessment	Implementation Notes
• Test and evaluate how well the solution meets the goal. • Evaluate and test the design. • Present evidence using mathematical representations like graphs and data tables. • Communicate the solution (including evidence) using mathematical representations (e.g., graphs, data tables), drawings or prototypes. • Redesign to improve the solution based on how well the solution meets the need.		
8.3.1 Explain that reproduction is essential for the continuation of every species and is the mechanism by which all organisms transmit genetic information. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 10 SE: Chapter 7 **Science Notebook**:	• *Reproduction is important for the survival of the species*
8.3.2 Compare and contrast the transmission of genetic information in sexual and asexual reproduction. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 10 SE: Chapter 7 **Science Notebook**:	•
8.3.3 Explain that genetic information is transmitted from parents to offspring mostly by chromosomes. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 12 SE: Chapter 9 **Science Notebook**:	• *Passing of Genetic Traits (example: Genetic Child Project "Face Lab") 8.3.3,8.3.5*
8.3.4 Understand the relationship between deoxyribonucleic acid (DNA), genes, and chromosomes**.** ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 12 SE: Chapter 9 **Science Notebook**:	•

Standard	Instruction and Assessment	Implementation Notes
8.3.5 Identify and describe the difference between inherited traits and physical and behavioral traits that are acquired or learned. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 12 SE: Chapter 9 **Science Notebook**:	• *Passing of Genetic Traits (example: Genetic Child Project "Face Lab") 8.3.3,8.3.5*
8.3.6 Observe anatomical structures of a variety of organisms and describe their similarities and differences. Use the data collected to organize the organisms into groups and predict their relatedness. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 10 SE: Chapter 7 **Science Notebook**:	•
8.3.7 Recognize and explain that small genetic differences between parents and offspring can accumulate in successive generations so that descendants may be different from their ancestors. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 12 SE: Chapter 9 **Science Notebook**:	•
8.3.8 Examine traits of individuals within a population of organisms that may give them an advantage in survival and reproduction in a given environments or when the environment changes. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 11 SE: Chapter 8 **Science Notebook**:	• *Environmental Impact and Survivability (example: Toothpick Fish) 8.3.8,8.3.9*
8.3.9 Describe the effect of environmental changes on populations of organisms when their adaptive characteristics put them at a disadvantage for survival. Describe how extinction of a species can ultimately result. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 11 SE: Chapter 8 **Science Notebook**:	• *Environmental Impact and Survivability (example: Toothpick Fish) 8.3.8,8.3.9*
8.3.10 Recognize and describe how new varieties of organisms have come about from selective breeding. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 11 SE: Chapter 8 **Science Notebook**:	• *Examples include dog breeding, horse breeding, corn*

Standard	Instruction and Assessment	Implementation Notes
8.1.1 Explain that all matter is composed of particular arrangements of atoms of approximately one hundred elements.	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	• *Elemental bonding, molecules, ionic, covalent bonding.*
8.1.2 Understand that elements are organized on the periodic table based on atomic number. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	• *Students should understand that the atomic number represents its placement on the Periodic Table of Elements, and describes its atomic structure.*
8.1.3 Explain how the arrangement of atoms and molecules determines chemical properties of substances. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	•
8.1.4 Describe the structure of an atom and relate the arrangement of electrons to how that atom interacts with other atoms. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	• *The Periodic Table of Elements groups and periods.*
8.1.5 Explain that atoms join together to form molecules and compounds and illustrate with diagrams the relationship between atoms and compounds and/or molecules. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	•
8.1.6 Explain that elements and compounds have characteristic properties such as density, boiling points and melting points that remain unchanged regardless of the sample size.	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	•

Standard	Instruction and Assessment	Implementation Notes
CCSS Literacy in Science:		
8.4.1 Understand how the strength of attractive forces between particles in a material helps to explain many physical properties of the material, such as why different materials exist as gases, liquids or solids at a given temperature. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	• Phases of matter, The Periodic Table of Elements
8.4.2 Rank the strength of attractions between the particles of room-temperature materials. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	• The Periodic of Table of Elements, different groups
8.4.3 Investigate the properties (mechanical, chemical, electrical, thermal, magnetic, and optical) of natural and engineered materials. ***CCSS Literacy in Science:***	***Interactive Science*** TE: Chapter 3 SE: Chapter 10 **Science Notebook**:	•

******<u>Core Standard 1: Physical Science</u> starts at the end of Quarter 3 (after Genetics) and continues to Quarter 4.***