The Arts & Science Center
A Plus for Southeast Arkansas

Newton's Corner exhibit correlation to AR Science Curriculum Frameworks	
Kindergarten	NS.1.K.1 Record observations pictorially, orally, and in writing NS.1.K.2 Ask questions based on observations NS.1.K.3 Conduct scientific investigations as a class and in teams: lab activities and field studies NS.1.K.6 Collect empirical evidence as a class NS.1.K.7 Use age-appropriate equipment and tools in scientific investigations (e.g., balances and hand lenses) NS.1.K.8 Apply appropriate rules of safety related to daily activities PS.5.K.1 List and classify objects according to the single properties of size, color, and shape PS.6.K.1 Demonstrate spatial relationships, including but not limited to over, under, left, and right PS.6.K.2 Demonstrate various ways that objects can move, including but not limited to straight, zig-zag, back and forth, round and round, fast and slow PS.6.K.3 Demonstrate the effects of the force of gravity on objects PS.7.K.4 Demonstrate effects of magnets on each other and other objects PS.7.K.5 List some uses of magnets in everyday objects PS.7.K.6 Investigate magnets of various shapes
1st Grade	NS.1.1.1 Communicate observations orally, in writing, and in graphic organizers: T-charts or pictographs NS.1.1.2 Ask questions based on observations NS.1.1.3 Conduct scientific investigations as a class and in teams: lab activities and field studies NS.1.1.5 Collect measurable empirical evidence as a class and in teams NS.1.1.6 Make predictions as a class and in teams based upon empirical evidence (e.g., predict which object is heavier) NS.1.1.7 Use age appropriate equipment and tools in scientific investigations (e.g., balances, hand lenses, rulers, and thermometers) NS.1.1.8 Apply appropriate rules of safety related to daily activities PS.5.1.1 Compare and contrast objects according to the single properties of size, color, shape, texture, magnetism PS.5.1.2 Identify characteristics of solids and liquids PS.6.1.1 List orally the various ways that objects can move, including but not limited to straight, zig-zag, back and forth, round and round, fast and slow PS.6.1.2 Investigate the relationship between mass and weight (e.g., identical filled and empty containers) PS.7.1.6 Classify materials as magnetic or nonmagnetic PS.7.1.7 Investigate the properties of magnets: attraction, repulsion
2nd Grade	NS.1.2.1 Communicate observations orally, in writing, and in graphic organizers: T-charts, pictographs, Venn diagrams, and bar graphs NS.1.2.2 Develop questions that guide scientific inquiry NS.1.2.3 Conduct scientific investigations individually and in teams: lab activities and field studies NS.1.2.5 Collect measurable empirical evidence in teams and as individuals NS.1.2.6 Make predictions in teams and as individuals based upon empirical evidence NS.1.2.7 Use age appropriate equipment and tools in scientific investigations (e.g., balances, hand lenses, rulers, and thermometers) PS.5.2.1 Classify objects based on two or more properties PS.5.2.2 Investigate the effect of physical phenomena on various materials (e.g., heat absorption by different colored materials) PS.6.2.1 Investigate the relationship between force and motion

3rd Grade	NS.1.3.1 Communicate observations orally, in writing, and in graphic organizers: T-charts, pictographs, Venn diagrams, bar graphs, and frequency tables NS.1.3.2 Develop questions that guide scientific inquiry NS.1.3.3 Conduct scientific investigations individually and in teams: lab activities and field studies NS.1.3.4 Communicate the results of scientific investigations (e.g., age-appropriate graphs, charts, and writings) NS.1.3.5 Estimate and measure length, mass, temperature, and elapsed time using International System of Units (SI) NS.1.3.6 Collect and analyze measurable empirical evidence as a team and/or as individuals NS.1.3.7 Make and explain predictions based on prior knowledge NS.1.3.8 Use simple equipment, age appropriate tools, technology, and mathematics in scientific investigations (e.g., balances, hand lenses, microscopes, rulers, thermometers, calculators, computers) PS.5.3.1 Compare and contrast objects based on two or more properties PS.5.3.3 Determine the mass of solids PS.5.3.4 Compare and contrast solids and liquids PS.7.3.4 Differentiate between magnets and non-magnets
4th Grade	NS.1.4.1 Communicate observations orally, in writing, and in graphic organizers: T-charts, pictographs, Venn diagrams, bar graphs, frequency tables, and line graphs NS.1.4.2 Refine questions that guide scientific inquiry NS.1.4.3 Conduct scientific investigations individually and in teams: lab activities and field studies NS.1.4.5 Communicate the designs, procedures, and results of scientific investigations (e.g., age-appropriate graphs, charts, and writings) NS.1.4.6 Estimate and measure length, *mass*, *temperature*, capacity/volume, and elapsed time using International System of Units (SI) NS.1.4.7 Collect and interpret measurable empirical evidence in teams and as individuals NS.1.4.8 Develop a hypothesis based on prior knowledge and observations NS.1.4.9 Identify variables that affect investigations NS.1.4.10 Identify patterns and trends in data NS.1.4.11 Generate conclusions based on evidence NS.1.4.12 Evaluate the quality and feasibility of an idea or project NS.1.4.13 Use simple equipment, age appropriate tools, technology, and mathematics in scientific investigations (e.g., balances, hand lenses, microscopes, rulers, thermometers, calculators, computers) PS.5.4.1 Demonstrate multiple ways to classify objects PS.5.4.3 Compare and contrast gases to solids and liquids PS.6.4.1 Investigate the relationship between force and direction PS.6.4.2 Investigate the relationship between force and mass

5th Grade	NS.1.5.1 Make accurate observations NS.1.5.2 Identify and define components of experimental design used to produce empirical evidence: Hypothesis, replication, sample size, appropriate use of control, use of standardized variables NS.1.5.4 Interpret scientific data using data tables/charts, bar graphs, circle graphs, line graphs, stem and leaf plots, and Venn diagrams NS.1.5.5 Communicate results and conclusions from scientific inquiry NS.1.5.8 Explain the role of observation in the development of a theory NS.1.5.9 Define and give examples of hypotheses PS.5.5.2 Conduct scientific investigations on physical properties of objects PS.5.5.3 Identify common examples of physical properties: length, mass, area, perimeter, texture, taste, odor, color, and elasticity PS.6.5.1 Classify simple machines PS.6.5.2 Conduct investigations using levers (e.g., toothbrush), pulleys, inclined planes-ramps, wedges, screws, and wheels and axles PS.6.5.3 Relate simple machines to inventions and discoveries PS.6.5.4 Compare and contrast potential energy and kinetic energy as applied to motion PS.6.5.5 Classify real world examples as potential energy or kinetic energy as applied to motion PS.6.5.6 Conduct investigations using potential energy and kinetic energy PS.6.5.7 Investigate careers, scientists, and historical breakthroughs related to simple machines and potential and kinetic energy
6th Grade	NS.1.6.1 Verify accuracy of observations NS.1.6.2 Apply components of experimental design used to produce empirical evidence: hypothesis, replication, sample size, appropriate use of control, and use of standardized variables NS.1.6.5 Communicate results and conclusions from scientific inquiry NS.1.6.7 Distinguish between scientific fact and opinion NS.1.6.8 Explain the role of prediction in the development of a theory PS.6.6.1 Compare and contrast simple machines and compound machines PS.6.6.2 Identify and analyze the simple machines that make up a compound machine PS.6.6.4 Recognize and give examples of different types of forces: gravitational forces, magnetic forces, and friction PS.6.6.7 Describe the effects of force:move a stationary object, speed up, slow down or change the direction of motion, and change the shape of objects PS.6.6.8 Conduct investigations to demonstrate change in direction caused by force PS.6.6.9 Conduct investigations to calculate the change in speed caused by applying forces to an object PS.6.6.10 Investigate careers, scientists, and historical breakthroughs related to compound machines and forces PS.7.6.2 Summarize the application of the law of conservation of energy in real world situations: electrical energy into mechanical energy, electrical energy into heat, chemical energy into mechanical energy, and chemical energy into light PS.7.6.3 Conduct investigations demonstrating how energy can be converted from one form to another

7th Grade	NS.1.7.1 Interpret evidence based on observations NS.1.7.2 Analyze components of experimental design used to produce empirical evidence: hypothesis, replication, sample size, appropriate use of control, and use of standardized variables. NS.1.7.5 Communicate results and conclusions from scientific inquiry NS.1.7.7 Distinguish between questions that can and cannot be answered by science PS.6.7.1 Compare and contrast Newton's three laws of motion PS.6.7.2 Conduct investigations demonstrating Newton's first law of motion PS.6.7.3 Demonstrate Newton's second law of motion PS.6.7.4 Conduct investigations of Newton's third law of motion PS.6.7.5 Explain how Newton's three laws of motion apply to real world situations (e.g., sports, transportation) PS.6.7.6 Investigate careers, scientists, and historical breakthroughs related to laws of motion PS.7.7.3 Conduct investigations to identify types of potential energy and kinetic energy
8th Grade	NS.1.8.1 Justify conclusions based on appropriate and unbiased observations NS.1.8.2 Evaluate the merits of empirical evidence based on experimental design: hypothesis, replication, sample size, appropriate use of control, use of standardized independent and dependent variables. NS.1.8.3 Formulate a testable problem using experimental design NS.1.8.9 Generate questions that can and cannot be answered by science
9th-12th Grade Physical Science	P.6.PS.1 Analyze how force affects motion: one-dimensional (linear) and two-dimensional (projectile and rotational) P.6.PS.2 Explain how motion is relative to a reference point P.6.PS.3 Compare and contrast among speed, velocity and acceleration P.6.PS.6 Compare and contrast Newton's three laws of motion P.6.PS.7 Design and conduct investigations demonstrating Newton's first law of motion P.6.PS.8 Conduct investigations demonstrating Newton's second law of motion P.6.PS.9 Design and conduct investigations demonstrating Newton's third law of motion P.6.PS.11 Relate the Law of Conservation of Momentum to how it affects the movement of objects NS.9.PS.4 Summarize the guidelines of science: explanations are based on observations, evidence, and testing; hypotheses must be testable; understandings and/or conclusions may change with additional empirical data; scientific knowledge must have peer review and verification before acceptance NS.10.PS.1 Develop and explain the appropriate procedure, controls, and variables (dependent and independent) in scientific experimentation NS.10.PS.3 Identify sources of bias that could affect experimental outcome NS.10.PS.6 Communicate experimental results using appropriate reports, figures, and tables NS.12.PS.1 Use appropriate equipment and technology as tools for solving problems (e.g., balances, scales, calculators, probes, glassware, burners, computer software and hardware)
9th-12th Grade Physics	MF.1.P.7 Draw free body diagrams of all forces acting upon an object MF.1.P.9 Apply Newton's first law of motion to show balanced and unbalanced forces MF.1.P.11 Apply Newton's third law of motion to explain action-reaction pairs MF.2.P.6 Describe the path of a projectile as a parabola NS.16.P.3 Summarize the guidelines of science: results are based on observations, evidence, and testing; hypotheses must be testable; understandings and/or conclusions may change as new data are generated; empirical knowledge must have peer review and verification before acceptance NS.17.P.1 Develop the appropriate procedures using controls and variables (dependent and independent) in scientific experimentation NS.17.P.3 Identify sources of bias that could affect experimental outcome NS.17.P.4 Gather and analyze data using appropriate summary statistics (e.g., percent yield, percent error) NS.17.P.5 Formulate valid conclusions without bias NS.19.P.1 Use appropriate equipment and technology as tools for solving problems (e.g., balances, scales, calculators, probes, glassware, burners, computer software and hardware)

Key: NS.1 .x. 1= Nature of Science. Standard 1. Grade level x. 1st Student Learning Expectation.
LS: Life Science. PS: Physical Science. MF: Motion and Forces