Physics 1 Honors (#2003390)
Course Number: 2003390

Physics 1 Honors Course Description	1st Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
SC.912.N.1.1: Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following: (1) **Pose questions about the natural world,** (Articulate the purpose of the investigation and identify the relevant scientific concepts); (2) **Conduct systematic observations,** (Write procedures that are clear and replicable. Identify observables and examine relationships between test (independent) variable and outcome (dependent) variable. Employ appropriate methods for accurate and consistent observations; conduct and record measurements at appropriate levels of precision. Follow safety guidelines); (3) **Examine books and other sources of information to see what is already known**; (4) **Review what is known in light of empirical evidence,** (Examine whether available empirical evidence can be interpreted in terms of existing knowledge and models, and if not, modify or develop new models); (5) **Plan investigations,** (Design and evaluate a scientific investigation); (6) **Use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs),** (Collect data or evidence in an organized way. Properly use instruments, equipment, and materials (e.g., scales, probeware, meter sticks, microscopes, computers) including set-up, calibration, technique, maintenance, and storage); (7) **Pose answers, explanations, or descriptions of events**; (8) **Generate explanations that explicate or describe natural phenomena (inferences)**; (9) **Use appropriate evidence and reasoning to justify these explanations to others**; (10) **Communicate results of scientific investigations**; and (11) **Evaluate the merits of the explanations produced by others.** Common Core State Standards (CCSS) Connections for 6-12 Literacy and Mathematical Practices in Science For Students in Grades 11-12: LAFS.1112.RST.1.1 Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. LAFS.1112.RST.1.3 Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks analyze the specific results based on explanations in the text. LAFS.1112.RST.3.7 Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem. LAFS.1112.WHST.1.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. LAFS.1112.WHST.3.9 Draw evidence from informational texts to support analysis, reflection, and research. MAFS.K12.MP.1: Make sense of problems and persevere in solving them. MAFS.K12.MP.2: Reason abstractly and quantitatively. MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. [Viable arguments include evidence.] MAFS.K12.MP.4: Model with mathematics. MAFS.K12.MP.5: Use appropriate tools strategically. MAFS.K12.MP.6: Attend to precision. MAFS.K12.MP.7: Look for and make use of structure. MAFS.K12.MP.8: Look for and express regularity in repeated reasoning. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**1,2,3,4**	**5,6,7,8**	**10,11,12**	**13,14,15**
SC.912.N.1.2: Describe and explain what characterizes science and its methods. **Remarks/Examples:** Science is characterized by empirical observations, testable questions, formation of hypotheses, and experimentation that results in stable and replicable results, logical reasoning, and coherent theoretical constructs. CCSS Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**1,2,3**	**5,6,8**	**10,11,12**	**13,14,15**

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SC.912.N.1.5: Describe and provide examples of how similar investigations conducted in many parts of the world result in the same outcome. **Remarks/Examples:** Recognize that contributions to science can be made and have been made by people from all over the world. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**2,3**	**5**		
SC.912.N.1.6: Describe how scientific inferences are drawn from scientific observations and provide examples from the content being studied. **Remarks/Examples:** Collect data/evidence and use tables/graphs to draw conclusions and make inferences based on patterns or trends in the data. CCSS Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**2,3,4**	**5**		
SC.912.N.1.7: Recognize the role of creativity in constructing scientific questions, methods and explanations. **Remarks/Examples:** Work through difficult problems using creativity, and critical and analytical thinking in problem solving (e.g. convergent versus divergent thinking and creativity in problem solving). CCSS Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them and MAFS.K12.MP.2: Reason abstractly and quantitatively. *Cognitive Complexity:* Level 1: Recall	**3.4**	**5**		
SC.912.N.2.2: Identify which questions can be answered through science and which questions are outside the boundaries of scientific investigation, such as questions addressed by other ways of knowing, such as art, philosophy, and religion. **Remarks/Examples:** Identify scientific questions that can be disproved by experimentation/testing. Recognize that pseudoscience is a claim, belief, or practice which is presented as scientific, but does not adhere to strict standards of science (e.g. controlled variables, sample size, replicability, empirical and measurable evidence, and the concept of falsification).CCSS Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**9**	
SC.912.N.2.3: Identify examples of pseudoscience (such as astrology, phrenology) in society. **Remarks/Examples:** Determine if the phenomenon (event) can be observed, measured, and tested through scientific experimentation. *Cognitive Complexity:* Level 1: Recall			**9**	
SC.912.N.2.4: Explain that scientific knowledge is both durable and robust and open to change. Scientific knowledge can change because it is often examined and re-examined by new investigations and scientific argumentation. Because of these frequent examinations, scientific knowledge becomes stronger, leading to its durability. **Remarks/Examples:** Recognize that ideas with the most durable explanatory power become established theories, but scientific explanations are continually subjected to change in the face of new evidence. CCSS Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**1**		**9**	

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SC.912.N.2.5: Describe instances in which scientists' varied backgrounds, talents, interests, and goals influence the inferences and thus the explanations that they make about observations of natural phenomena and describe that competing interpretations (explanations) of scientists are a strength of science as they are a source of new, testable ideas that have the potential to add new evidence to support one or another of the explanations. **Remarks/Examples:** Recognize that scientific questions, observations, and conclusions may be influenced by the existing state of scientific knowledge, the social and cultural context of the researcher, and the observer's experiences and expectations. Identify possible bias in qualitative and quantitative data analysis. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**1**			
SC.912.N.3.1: Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. **Remarks/Examples:** Explain that a scientific theory is a well-tested hypothesis supported by a preponderance of empirical evidence. CCSS Connections: MAFS.K12.MP.1: Make sense of problems and persevere in solving them and, MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**4**			
SC.912.N.3.2: Describe the role consensus plays in the historical development of a theory in any one of the disciplines of science. **Remarks/Examples:** Recognize that scientific argument, disagreement, discourse, and discussion create a broader and more accurate understanding of natural processes and events. CCSS Connections: MAFS.K12.MP.3: Construct viable arguments and critique the reasoning of others. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**4**	**5**	**11**	
SC.912.N.3.3: Explain that scientific laws are descriptions of specific relationships under given conditions in nature, but do not offer explanations for those relationships. **Remarks/Examples:** Recognize that a scientific theory provides a broad explanation of many observed phenomena while a scientific law describes how something behaves. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**1**		**11**	
SC.912.N.3.4: Recognize that theories do not become laws, nor do laws become theories; theories are well supported explanations and laws are well supported descriptions. **Remarks/Examples:** Recognize that theories do not become laws, theories explain laws. Recognize that not all scientific laws have accompanying explanatory theories. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**1**		**11**	
SC.912.N.3.5: Describe the function of models in science, and identify the wide range of models used in science. **Remarks/Examples:** Describe how models are used by scientists to explain observations of nature. CCSS Connections: MAFS.K12.MP.4: Model with mathematics. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**1,2**			
SC.912.N.4.1: Explain how scientific knowledge and reasoning provide an empirically-based perspective to inform society's decision making. **Remarks/Examples:** Recognize that no single universal step-by-step scientific method captures the complexity of doing science. A number of shared values and perspectives characterize a scientific approach. MAFS.K12.MP.1: Make sense of problems and persevere in solving them, and MAFS.K12.MP.2: Reason abstractly and quantitatively. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**1**		**11**	

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SC.912.E.5.2: Identify patterns in the organization and distribution of matter in the universe and the forces that determine them. **Remarks/Examples:** Identify patterns that influence the formation, heirarchy, and motions of the various kinds of objects in the solar system and the role of gravity and inertia on these motions (include the Sun, Earth, and Moon, planets, satellites, comets, asteroids, star clusters, galaxies, galaxy clusters). Recognize that the universe contains many billions of galaxies, and each galaxy contains many billions of stars. Recognize that constellations are contrived associations of stars that do not reflect functional relationships in space. CCSS Connections: MAFS.K12.MP.7: Look for and make use of structure. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts			**9**	
SC.912.E.5.6: Develop logical connections through physical principles, including Kepler's and Newton's Laws about the relationships and the effects of Earth, Moon, and Sun on each other. **Remarks/Examples:** Explain that Kepler's laws determine the orbits of objects in the solar system and recognize that Kepler's laws are a direct consequence of Newton's Law of Universal Gravitation and Laws of Motion. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**6**		
SC.912.E.5.8: Connect the concepts of radiation and the electromagnetic spectrum to the use of historical and newly-developed observational tools. **Remarks/Examples:** Describe how frequency is related to the characteristics of electromagnetic radiation and recognize how spectroscopy is used to detect and interpret information from electromagnetic radiation sources. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning				**14,15**
SC.912.P.8.1: Differentiate among the four states of matter. **Remarks/Examples:** Differentiate among the four states of matter (solid, liquid, gas and plasma) in terms of energy, particle motion, and phase transitions. (Note: Currently five states of matter have been identified.) *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**7**		
SC.912.P.8.3: Explore the scientific theory of atoms (also known as atomic theory) by describing changes in the atomic model over time and why those changes were necessitated by experimental evidence. **Remarks/Examples:** Describe the development and historical importance of atomic theory from Dalton (atomic theory), Thomson (the electron), Rutherford (the nucleus and gold experiment), and Bohr (planetary model of atom), and understand how each discovery leads to modern atomic theory. CCSS Connections: MAFS.K12.MP.4: Model with mathematics. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**9**	
SC.912.P.8.4: Explore the scientific theory of atoms (also known as atomic theory) by describing the structure of atoms in terms of protons, neutrons and electrons, and differentiate among these particles in terms of their mass, electrical charges and locations within the atom. **Remarks/Examples:** Explain that electrons, protons and neutrons are parts of the atom and that the nuclei of atoms are composed of protons and neutrons, which experience forces of attraction and repulsion consistent with their charges and masses. CCSS Connections: MAFS.K12.MP.4: Model with mathematics. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**9**	

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SC.912.P.10.1: Differentiate among the various forms of energy and recognize that they can be transformed from one form to others. **Remarks/Examples:** Differentiate between kinetic and potential energy. Recognize that energy cannot be created or destroyed, only transformed. Identify examples of transformation of energy: Heat to light in incandescent electric light bulbs Light to heat in laser drills Electrical to sound in radios Sound to electrical in microphones Electrical to chemical in battery rechargers Chemical to electrical in dry cells Mechanical to electrical in generators [power plants] Nuclear to heat in nuclear reactors Gravitational potential energy of a falling object is converted to kinetic energy then to heat and sound energy when the object hits the ground. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**7**		
SC.912.P.10.2: Explore the Law of Conservation of Energy by differentiating among open, closed, and isolated systems and explain that the total energy in an isolated system is a conserved quantity. **Remarks/Examples:** Use calorimetry to illustrate conservation of energy. Differentiate between the different types of systems and solve problems involving conservation of energy in simple systems (Physics).Explain how conservation of energy is important in chemical reactions with bond formation and bond breaking (Chemistry). *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**7**		
SC.912.P.10.3: Compare and contrast work and power qualitatively and quantitatively. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**7**		
SC.912.P.10.4: Describe heat as the energy transferred by convection, conduction, and radiation, and explain the connection of heat to change in temperature or states of matter. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**7**		
SC.912.P.10.5: Relate temperature to the average molecular kinetic energy. **Remarks/Examples:** Recognize that the internal energy of an object includes the energy of random motion of the object's atoms and molecules, often referred to as thermal energy. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**7**		
SC.912.P.10.6: Create and interpret potential energy diagrams, for example: chemical reactions, orbits around a central body, motion of a pendulum. **Remarks/Examples:** Construct and interpret potential energy diagrams for endothermic and exothermic chemical reactions, and for rising or falling objects. Describe the transformation of energy as a pendulum swings. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**7**		
SC.912.P.10.7: Distinguish between endothermic and exothermic chemical processes. **Remarks/Examples:** Classify chemical reactions and phase changes as exothermic (release thermal energy) or endothermic (absorb thermal energy). *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**7**		
SC.912.P.10.8: Explain entropy's role in determining the efficiency of processes that convert energy to work. **Remarks/Examples:** Recognize that there is a natural tendency for systems to move in a direction of disorder or randomness (entropy). Describe entropy as a quantity that measures the order or disorder of a system and that this quantity is larger for a more disordered system. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**7**		

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SC.912.P.10.10: Compare the magnitude and range of the four fundamental forces (gravitational, electromagnetic, weak nuclear, strong nuclear). **Remarks/Examples:** Recognize and discuss the effect of each force on the structure of matter and the evidence for it. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**4**		**9,10,11**	
SC.912.P.10.13: Relate the configuration of static charges to the electric field, electric force, electric potential, and electric potential energy. **Remarks/Examples:** Using Coulomb's law, determine the force on a stationary charge due to other stationary charges, and explain that this force is many times greater than the gravitational force. Recognize the relationship between forces and their associated potential energies and that the electric field is directly related to the rate of change of the electric potential from point to point in space. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**9,10**	
SC.912.P.10.14: Differentiate among conductors, semiconductors, and insulators. **Remarks/Examples:** Describe band structure, valence electrons, and how the charges flow or rearrange themselves between conductors and insulators. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts			**9,10,11**	
SC.912.P.10.15: Investigate and explain the relationships among current, voltage, resistance, and power. **Remarks/Examples:** Use Ohm's and Kirchhoff's laws to explain the relationships among circuits. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**11**	
SC.912.P.10.16: Explain the relationship between moving charges and magnetic fields, as well as changing magnetic fields and electric fields, and their application to modern technologies. **Remarks/Examples:** Explain that moving electric charges produce magnetic forces and moving magnets produce electric forces. Recognize the Lorentz force is the force on a point charge due to electromagnetic fields and occurs in many devices, including mass spectrometers. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**12**	
SC.912.P.10.17: Explore the theory of electromagnetism by explaining electromagnetic waves in terms of oscillating electric and magnetic fields. **Remarks/Examples:** Recognize that an oscillating charge creates an oscillating electric field which gives rise to electromagnetic waves. Recognize a changing magnetic field makes an electric field, and a changing electric field makes a magnetic field, and these phenomena are expressed mathematically through the Faraday law and the Ampere-Maxwell law. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**12**	**14**
SC.912.P.10.18: Explore the theory of electromagnetism by comparing and contrasting the different parts of the electromagnetic spectrum in terms of wavelength, frequency, and energy, and relate them to phenomena and applications. **Remarks/Examples:** Describe the electromagnetic spectrum (i.e., radio waves, microwaves, infrared, visible light, ultraviolet, X-rays and gamma rays) in terms of frequency, wavelength and energy. Solve problems involving wavelength, frequency, and energy. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning			**12**	**14**

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SC.912.P.10.20: Describe the measurable properties of waves and explain the relationships among them and how these properties change when the wave moves from one medium to another. **Remarks/Examples:** Describe the measurable properties of waves (velocity, frequency, wavelength, amplitude, period, reflection and refraction) and explain the relationships among them. Recognize that the source of all waves is a vibration and waves carry energy from one place to another. Distinguish between transverse and longitudinal waves in mechanical media, such as springs and ropes, and on the earth (seismic waves). Describe sound as a longitudinal wave whose speed depends on the properties of the medium in which it propagates. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning				**13,14,15**
SC.912.P.10.21: Qualitatively describe the shift in frequency in sound or electromagnetic waves due to the relative motion of a source or a receiver. **Remarks/Examples:** Describe the apparent change in frequency of waves due to the motion of a source or a receiver (the Doppler effect). *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts				**13**
SC.912.P.10.22: Construct ray diagrams and use thin lens and mirror equations to locate the images formed by lenses and mirrors. **Remarks/Examples:** Use examples such as converging/diverging lenses and convex/concave mirrors. Use a ray diagram to determine the approximate location and size of the image, and the mirror equation to obtain numerical information about image distance and image size. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning				**15**
SC.912.P.12.1: Distinguish between scalar and vector quantities and assess which should be used to describe an event. **Remarks/Examples:** Distinguish between vector quantities (e.g., displacement, velocity, acceleration, force, and linear momentum) and scalar quantities (e.g., distance, speed, energy, mass, work). MAFS.912.N-VM.1.3 (+) Solve problems involving velocity and other quantities that can be represented by vectors. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**2,3,4**	**5,6,8**		
SC.912.P.12.2: Analyze the motion of an object in terms of its position, velocity, and acceleration (with respect to a frame of reference) as functions of time. **Remarks/Examples:** Solve problems involving distance, velocity, speed, and acceleration. Create and interpret graphs of 1-dimensional motion, such as position versus time, distance versus time, speed versus time, velocity versus time, and acceleration versus time where acceleration is constant. CCSS Connections: MAFS.912.N-VM.3 (+) Solve problems involving velocity and other quantities that can be represented by vectors. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**2,3**	**5,6**		
SC.912.P.12.3: Interpret and apply Newton's three laws of motion. **Remarks/Examples:** Explain that when the net force on an object is zero, no acceleration occurs thus, a moving object continues to move at a constant speed in the same direction, or, if at rest, it remains at rest (Newton's first law). Explain that when a net force is applied to an object its motion will change, or accelerate (according to Newton's second law, F = ma). Predict and explain how when one object exerts a force on a second object, the second object always exerts a force of equal magnitude but of opposite direction and force back on the first: F1 on 2 = - F1 on 1 (Newton's third law). *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	**4**	**5**		

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SC.912.P.12.4: Describe how the gravitational force between two objects depends on their masses and the distance between them. **Remarks/Examples:** Describe Newton's law of universal gravitation in terms of the attraction between two objects, their masses, and the inverse square of the distance between them. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**6**		
SC.912.P.12.5: Apply the law of conservation of linear momentum to interactions, such as collisions between objects. **Remarks/Examples:** (e.g. elastic and completely inelastic collisions). *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**8**		
SC.912.P.12.6: Qualitatively apply the concept of angular momentum. **Remarks/Examples:** Explain that angular momentum is rotational analogy to linear momentum (e.g. Because angular momentum is conserved, a change in the distribution of mass about the axis of rotation will cause a change in the rotational speed [ice skater spinning]). *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning		**8**		
SC.912.P.12.7: Recognize that nothing travels faster than the speed of light in vacuum which is the same for all observers no matter how they or the light source are moving. **Remarks/Examples:** Recognize that regardless of the speed of an observer or source, *in a vacuum* the speed of light is always *c*. *Cognitive Complexity:* Level 1: Recall				**14**
SC.912.P.12.8: Recognize that Newton's Laws are a limiting case of Einstein's Special Theory of Relativity at speeds that are much smaller than the speed of light. **Remarks/Examples:** Recognize that the speed of light in any reference frame is the central postulate of the Special Theory of Relativity. As speeds approach zero, Special Relativity tends towards equivalence with Newton's Laws of Motion. *Cognitive Complexity:* Level 1: Recall	**4**	**5**		
SC.912.P.12.9: Recognize that time, length, and energy depend on the frame of reference. **Remarks/Examples:** The energy *E* and the momentum *p* depend on the frame of reference in which they are measured (e.g. Lorentz contraction). *Cognitive Complexity:* Level 1: Recall	**2**			
SC.912.L.18.12: Discuss the special properties of water that contribute to Earth's suitability as an environment for life: cohesive behavior, ability to moderate temperature, expansion upon freezing, and versatility as a solvent. **Remarks/Examples:** Annually assessed on Biology EOC. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts		**7**		
MAFS.912.N-Q.1.1: Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. **Remarks/Examples:** Algebra 1, Unit 1: Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**X**	**X**	**X**	**X**
MAFS.912.N-Q.1.3: Choose a level of accuracy appropriate to limitations on measurement when reporting quantities. **Remarks/Examples:** Algebra 1, Unit 1: Working with quantities and the relationships between them provides grounding for work with expressions, equations, and functions. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	**X**	**X**	**X**	**X**

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MAFS.912.N-VM.1.1: Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., ***v***, **|*v*|**, **||v||**, ***v***). *Cognitive Complexity:* Level 1: Recall	X	X	X	X
MAFS.912.N-VM.1.2: Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point. *Cognitive Complexity:* Level 1: Recall	X	X	X	X
MAFS.912.N-VM.1.3: Solve problems involving velocity and other quantities that can be represented by vectors. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.A-CED.1.4: Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. *For example, rearrange Ohm's law V = IR to highlight resistance R.* **Remarks/Examples:** Algebra 1, Unit 1: Limit A.CED.4 to formulas which are linear in the variable of interest. Algebra 1, Unit 4: Extend A.CED.4 to formulas involving squared variables. *Cognitive Complexity:* Level 1: Recall	X	X	X	X
MAFS.912.F-IF.2.4: For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.* **Remarks/Examples:** (a) **Algebra 1, Unit 2**: For F.IF.4 and 5, focus on linear and exponential functions; (b) **Algebra 1 Assessment Limits and Clarifications,** i) Tasks have a real-world context. ii) Tasks are limited to linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and exponential functions with domains in the integers. Compare note (ii) with standard F-IF.7. The function types listed here are the same as those listed in the Algebra I column for standards F-IF.6 and F-IF.9; (c) **Algebra 2 Assessment Limits and Clarifications,** i) Tasks have a real-world context , ii) Tasks may involve polynomial, exponential, logarithmic, and trigonometric functions. Compare note (ii) with standard F-IF.7. The function types listed here are the same as those listed in the Algebra II column for standards F-IF.6 and F-IF.9. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.F-IF.3.7: Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. (a) Graph linear and quadratic functions and show intercepts, maxima, and minima; (b) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions; (c) Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior; (d) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior; (e) Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude, and using phase shift. **Remarks/Examples:** Algebra 1, Unit 2: For F.IF.7a, 7e, and 9 focus on linear and exponentials functions. Include comparisons of two functions presented algebraically. For example, compare the growth of two linear functions, or two exponential functions such as $y=3^n$ and $y=100^2$ *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X

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MAFS.912.G-GMD.1.3: Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.G-MG.1.2: Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot). *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.S-ID.1.1: Represent data with plots on the real number line (dot plots, histograms, and box plots). **Remarks/Examples:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.S-ID.1.2: Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. **Remarks/Examples:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.S-ID.1.3: Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). **Remarks/Examples:** In grades 6 – 8, students describe center and spread in a data distribution. Here they choose a summary statistic appropriate to the characteristics of the data distribution, such as the shape of the distribution or the existence of extreme data points. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.S-ID.1.4: Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.S-ID.2.5: Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X

Physics 1 Honors Course Description	1st Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
MAFS.912.S-ID.2.6: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. *Use given functions or choose a function suggested by the context. Emphasize linear, and exponential models.* Informally assess the fit of a function by plotting and analyzing residuals. Fit a linear function for a scatter plot that suggests a linear association. **Remarks/Examples:** Students take a more sophisticated look at using a linear function to model the relationship between two numerical variables. In addition to fitting a line to data, students assess how well the model fits by analyzing residuals. S.ID.6b should be focused on linear models, but may be used to preview quadratic functions in Unit 5 of this course. (a) **Algebra 1 Assessment Limits and Clarifications,** i) Tasks have a real-world context. ii) Exponential functions are limited to those with domains in the integers. (b) **Algebra 2 Assessment Limits and Clarifications,** i) Tasks have a real-world context. ii) Tasks are limited to exponential functions with domains not in the integers and trigonometric functions. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
MAFS.912.S-IC.2.6: Evaluate reports based on data. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.SL.1.1: Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9–10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively. (a) Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. (b) Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed. (c) Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions. (d) Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.SL.1.2: Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.SL.1.3: Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric, identifying any fallacious reasoning or exaggerated or distorted evidence. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.SL.2.4: Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.SL.2.5: Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest. *Cognitive Complexity:* Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X

Physics 1 Honors Course Description	1st Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
LAFS.910.RST.1.1: Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.1.2: Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.1.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.2.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9–10 texts and topics. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.2.5: Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy). *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.2.6: Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.3.7: Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.3.8: Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.3.9: Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.RST.4.10: By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X

Physics 1 Honors Course Description	1st Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
LAFS.910.WHST.1.1: Write arguments focused on *discipline-specific content.* (a) Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence. (b) Develop claim(s) and counterclaims fairly, supplying data and evidence for each while pointing out the strengths and limitations of both claim(s) and counterclaims in a discipline-appropriate form and in a manner that anticipates the audience's knowledge level and concerns. (c) Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. (d) Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. (e) Provide a concluding statement or section that follows from or supports the argument presented. *Cognitive Complexity*: Level 4: Extended Thinking &Complex Reasoning	X	X	X	X
LAFS.910.WHST.1.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. (a) Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. (b) Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. (c) Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. (d) Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. (e) Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. (f) Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic). *Cognitive Complexity*: Level 4: Extended Thinking &Complex Reasoning	X	X	X	X
LAFS.910.WHST.2.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. *Cognitive Complexity*: Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.WHST.2.5: Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience. *Cognitive Complexity*: Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.WHST.2.6: Use technology, including the Internet, to produce, publish, and update individual or shared writing products, taking advantage of technology's capacity to link to other information and to display information flexibly and dynamically. *Cognitive Complexity:* Level 2: Basic Application of Skills & Concepts	X	X	X	X
LAFS.910.WHST.3.7: Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. *Cognitive Complexity*: Level 4: Extended Thinking &Complex Reasoning	X	X	X	X

Physics 1 Honors Course Description	1st Nine Weeks	2nd Nine Weeks	3rd Nine Weeks	4th Nine Weeks
LAFS.910.WHST.3.8: Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation. *Cognitive Complexity*: Level 4: Extended Thinking &Complex Reasoning	X	X	X	X
LAFS.910.WHST.3.9: Draw evidence from informational texts to support analysis, reflection, and research. *Cognitive Complexity*: Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
LAFS.910.WHST.4.10: Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences. *Cognitive Complexity*: Level 3: Strategic Thinking & Complex Reasoning	X	X	X	X
ELD.K12.ELL.SC.1: English language learners communicate information, ideas and concepts necessary for academic success in the content area of Science.	X	X	X	X
ELD.K12.ELL.SI.1: English language learners communicate for social and instructional purposes within the school setting.	X	X	X	X