ASIM Suggested Activities for Meeting Reading Standards for Literacy in Science and Technical Subjects 6-12

Grades 6-8 Students:		Grades 9-10 Students:		Grades 11-12 Students:	
Key Ideas and Details					
1.	CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.				
1.	**[RST6-8.1] Cite specific textual evidence to support analysis of science and technical texts.**	1.	**[RST9-10.1]** Cite specific textual evidence to support analysis of science and technical texts, **attending to the precise details of explanations or descriptions.**	1.	**[RST11-12.1]** 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.**
ASIM		**BIO / PS** **Biology: Disorder Detectives (D12DisDet) – Perform a close read of a patient history attending to the precise details of explanations or descriptions. Combine this information with data from a chromosome spread to diagnose a genetic condition.** **Biology: Tree Carbon (J8TreeCarb) – Read the lab while attending to the precise details of explanations or description for the use of measurement equipment and necessary calculations that must be performed.** **Biology: Understanding Biomes (J3Biomes) - Seven terrestrial biomes with unique biotic and abiotic characteristics are researched by students. This textual evidence is used in a group setting to identify a biome based on key floral and faunal data provided.**		**CHEM / PHYS** **Chemistry: Calcium Carbonate in Eggshells – Read one or more articles about eggshells and the factors that affect the calcium content of the eggshells such as temperature. Answer post-lab questions** citing specific textual evidence **from readings and lab to support claims.** **Chemistry: Marbling Paper with Oil Paints – Read the introduction to Marbling Paper with Oil Paints lab. Note any inconstancies in the introductory reading and the observations and results from the experiment.** **Chemistry: Accuracy and Precision – Read the introduction to the Accuracy and Precision. Identify factors that are inconsistent to density being identified as an intensive property of matter.** **Physics: Friction– Students determine the difference of static and dynamic coefficients of friction empirically by studying objects on an inclined plane. While specific values of friction coefficient can be found empirically, no theory is known to calculate friction coefficient without experimentation.** **Physics: Conservation of Momentum Lab – Students use the conservations of energy extension to calculate kinetic energy before and after a collision. Students determine that in some cases energy is conserved in a collision, but in others not. Without explanation of cause, students use experimental data to determine what types of collisions conserve kinetic energy.** **Physics: Is light a wave or particle? Single Slit Diffraction shows evidence that light is a wave. The Photoelectric Effect PhET shows evidence light is a particle. High school physics does not fully explain why these experiments give evidence that support different conclusions.**		

2.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Determine Central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas.**				
2.	**[RST6-8.2] Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.**	**2.**	**[RST9-10.2]** 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 [distinct from prior knowledge or opinion].	**2.**	**[RST11-12.2]** Determine the central ideas or conclusions of a text; **summarize** complex concepts, processes, or information presented in a text **by paraphrasing them in simpler but still accurate terms.**
ASIM		**BIO / PS** **Biology: HNPCC (D8Cancer) –Students read a family history (text) and translate the text into a pedigree then use this information to determine candidates for further genetic testing.** **Biology: Factors affecting Photosynthesis (K7Factor) – Students collect data that shows how certain variables affect the rate of photosynthesis in a plant then summarize those results to determine the conditions needed for maximum photosynthetic output.** **Biology: Traveling Nitrogen Passport J12Nitro Students trace various pathways that nitrogen follows through the biotic and abiotic environment. They then summarize this pathway in an annotated illustration.**		**CHEM / PHYS** **Chemistry: Strong Acid/Strong Base Titration – When reading safety considerations and/or procedures, identify key safety concerns, summarize precautions and/or paraphrase the procedure.** **Chemistry: Making a Simple Battery – Read the procedure rewriting it in your own words. Draw a diagram of the battery and indicate the flow of electrons in the circuit.** **Chemistry: Esterification – Read the procedure and identify a simple pattern used to name and identify esters.** **Physics: Convex Lens – Students use an image projected through a convex lens to investigate the six cases of object-lens-image orientations.** **Physics: Range vs. Angle - Students use projectile launchers to investigate how the launch angle effects the distance the projectile travels. The resulting relationship between launch angle and range is summarized in a graph.** **Physics: Force tables – Students work vector addition problems in three uniquely different ways. Students use force tables, then solves the force addition both graphically and algebraically. Each method demonstrates how multiple force – multiple dimension problems can be combined resulting in only one force.**

3.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Analyze how and why individuals, events, or ideas develop and interact over the course of a text.**				
3.	**[RST6-8.3] Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.**	**3.**	**[RST9-10.3]** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, **attending to special cases or exceptions defined** in the text.	**3.**	**[RST11-12.3]** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; **analyze the specific results based on explanations** in the text.
ASIM		**BIO / PS** **Biology: Classifying Animals (H8Animal) – Using a dichotomous key students will classify animals noting exceptions in fitting characteristics into a single classification.** **Biology: Measuring Human Differences (B3MeaHum) – Students take measurements using various instruments to assess exceptions between sexes, age groups, and find trends.** **Biology: Owl Pellets (J5OwlPel) – Students examine the prey remains in an owl pellet. Using this information they must extrapolate how many prey items were consumed by the owl. Then using class data they calculate number of prey consumed and biomass to create food and energy pyramids.**			**CHEM / PHYS** **Chemistry: Identification of Solutions – Follow the written procedure and flow chart to analyze results and determine each step in the experiment** **Chemistry: Energy of Foods – Follow the procedure and complete the calculations. Compare results of each food sample with the calories listed on the packaging.** **Chemistry: Synthesis of Aspirin – Follow the procedure and analyze results. Calculate the percent yield to test the results quantitatively and use of Mel-temp to check for purity comparing your results with the published data for the melting point of Aspirin qualitatively.** **Physics: Properties Of Sound – Using a procedural guide, students investigate how various properties of a sound wave (period, frequency, and wavelength) are related mathematically. Students then investigate how two waves of different frequency can interact, creating a beat frequency.** **Physics: Introduction to Graphing - Students measure the diameter and circumference of several round objects. Students then follow procedure to graphically determine the relationship between these measurements by graphing the data and finding a best fit trend line. The relationship is algebraically determined by substitution into the linear equation y = mx + b.** **Physics: Simple Harmonic Motion – Students use a motion sensor to collect position vs. time data for a mass oscillating on a spring. This data is graphed to allow a textually guided graphical analysis of position, velocity, acceleration, and force of an oscillating object.**

Craft and Structure					
4.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.**				
4.	**[RST6-8.4] 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 6-8 texts and topics.**	4.	**[RST9-10.4]** 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** tests and topics.	4.	**[RST11-12.4]** 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 11-12** texts and topics.
ASIM		**BIO / PS** **Biology: Blood Typing (D8Blood) – Identify symbols representing different blood types and medical terminology.** **Biology: Popsicle Stick Genetics (D10PopSt) – Students use coded popsicle sticks to determine the genotype and phenotype of a zygote by using and genetic terminology.** **Biology: Soil Testing (J4Soil)– Analyze samples of soil to determine composition using symbols of elements and chemical tests such as: N, P, K, pH.**		**CHEM / PHYS** **Chemistry: Introduction to Radiation – Alpha (α), Beta (β) and Gamma (γ) symbols and domain specific words.** **Chemistry: Specific Heat – Determine meaning of formulas, variables and symbols using the equation q= mCpΔT.** **Chemistry: Ideal Gas Law – Determine meaning of variables in equations and relate the variables to the ideas gas law (PV = nRT)** **Physics: Speed of Sound – Students use tuning forks to generate resonance in a standing column of air to find and measure various properties of a sound wave. (Resonance, air column, frequency (f or ν), wavelength (λ), etc.)** **Physics: Hooke's Law – Students investigate the relationship between force on an spring and the amount the spring stretches. (rest length, equilibrium position, spring constant, restoring force, tare, displacement, etc.)** **Physics: Concave and Convex Lenses lab – Optical terms and definitions are explored through analysis of light rays passing through various lenses. (Object distance, image distance, focal length, radius of curvature, focal point, etc.)**		

5.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Analyze the structure of texts, including how specific sentences, paragraphs, and larger portions of the text (e.g., a section, chapter, scene, or stanza) relate to each other and the whole.**				
5.	**[RST6-8.5] Analyze the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic.**	**5.**	**[RST9-10.5]** Analyze the structure **of the relationships among concepts in a text, including relationships among key terms (e.g. force, friction, reaction force, energy).**	**5.**	**[RST11-12.5]** Analyze **how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.**
ASIM		**BIO / PS** **Biology - Toilet Paper Strength (B1aTPS) - Use a scientific approach to determine which toilet paper brand has the greatest strength when wet. Students will identify the steps of the scientific method as it relates to the description and layout in the written procedure.** **Biology – Carbon Cycling (J7Carbon) - Students "act out" the carbon cycle, travel among reservoirs, and learn about sources, sinks, and other processes as they proceed through the cycle while reading clues in the text at each station to determine their next move.** **Biology – Enzyme Applications (L3EnzApp) – Students perform a series of experiments to demonstrate the functions of enzymes and their industrial uses.**			**CHEM / PHYS** **Chemistry – Metal, Nonmetal, and Metalloid– Read the lab and explain the purpose of each section (Introduction, Materials, Safety, Precautions, Procedures, Data Table, Calculation Table, Analysis, Conclusion, etc.) and why the information is organized in that format.** **Chemistry – Its in the Cards – Read and identify the information on each card. Use the information to create hierarchies with the cards. Compare the arrangement and your hierarchies to the periodic table.** **Chemistry – Molecular Shape and Polarity – Analyze the structure of the information in the table. Identify the patterns in the shapes and characteristics of the molecules based on the shape.** **Physics – Match the Graph – Perform Extension #2 where students in small groups write a description of a position versus time graph. The written description is given to another group that attempts to move to create a graph to match.** **Physics: Freefall Area - Students analyze graphed position and velocity of an object in freefall. It is shown that distance traveled, velocity, and acceleration can all be found using only the velocity graph.** **Physics: Newton's 2nd Law (both constant force and constant mass variants) – Students collect mass and acceleration data over multiple runs of data collection. Data is organized first in chart format for collection, than in graphical form for analysis**

6.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Assess how point of view or purpose shapes the content and style of a text.**				
6.	**[RST6-8.6] Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text.**	6.	**[RST9-10.6]** 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.**	6.	**[RST11-12.6]** Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, **identifying important issues that remain unresolved.**
ASIM		**BIO / PS** **Biology: Peppered Moth Natural Selection (E6Moth) - Students discuss the purpose of Kettlewell's original moth experiment including the design and it's limitations.** **Biology: Global Carbon Storage in Biomes (J16GlobCarb) – Students gather information from the text provided and examine satellite imagery on a computer to address where carbon is stored in biotic systems at a global scale.** **Biology: Whose Skeleton is in Your Closet? (I12bSkel): Students read text and examine skeletal remains looking for differences to determine the ethnic background of the remains.** **Chemistry: Read a science article that describes a procedure for any main chemistry topic (ex: Chem Matters article on removing arsenic from water) and then analyze why the author included the procedure in the text and how the procedure addresses the question.**			**CHEM / PHYS** **Chemistry: Students peer review each other's lab reports / notebooks to identify important issues that remain unresolved. (Students are the authors.)** **Chemistry: Molecular Weight by Freezing Point Depression - Students calculate the percent error at the end of the lab and identify sources to account for the error.** **Chemistry: Chemicool People – Students will arrange the cards into a periodic table and identify places with missing elements.** **Physics: Friction– Students determine the difference of static and dynamic coefficients of friction empirically by studying objects on an inclined plane. While specific values of friction coefficient can be found empirically, no theory is known to calculate friction coefficient without experimentation.** **Physics: Conservation of Energy – Students compare energy of a cart at the top of a ramp to energy of the rolling cart near the bottom of the ramp. Although energy should be conserved, the final energy is less than the initial energy. The student is asked to hypothesize where the "lost" energy may have gone.** **Physics: Discovering Ohm's Law – Students empirically derive Ohm's Law from a graph of voltage drop across a resistor versus current through it. A measurement of voltage supplied at the source shows that some voltage is not accounted for by the resistor. The student is lead to theorize why these values of voltage differ.**

Integration of Knowledge and Ideas					
7.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Integrate and evaluate content presented in diverse formats and media, including visually and quantitatively, as well as in words.** (See College and Career Readiness Anchor Standards for Writing, "Research to Build and Present Knowledge," on page 103 for additional standards relevant to gathering, assessing, and applying information from print and digital sources.				
7.	**[RST6-8.7] Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).**	7.	**[RST9-10.7] 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.**	7.	**[RST11-12.7]** 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.)**
ASIM		**BIO / PS** **Biology: Food Webs (J9FoodWeb) – Students use magnetic manipulatives as a class to demonstrate food webs and trophic levels.** **Biology: Make a Flower (K11MakFL) – Students watch a video on plant pollination, collect information on pollinators from syndrome chart, use these data to develop and construct a model of a flower. Students write a description of the features they included in their model and why.** **Biology: Photosynthetic Pigments (K2Pigmn) - Students analyze chlorophyll extract using a spectrophotometer to quantify absorbance at various wavelengths of visible light. These data are graphed and students explain in writing what the graph demonstrates.**		**CHEM / PHYS** **Chemistry: Phosphoric Acid Content of Colas - Students will develop a written or oral explanation or a visual representation (graph, chart, picture, etc.) that accurately represents info presented in the titration curve from the lab utilizing a data analysis program.** **Chemistry: Periodic -Trends: Graphs and Straws- Students will use the graphs provided to cut and measure straws to create a model of the periodic trend. Students will then enter the data into data analysis program with probe ware such as a Labquest or GLX and create a graph with the data.** **Chemistry: Degrees Celsius to degrees Fahrenheit- Student will record the temperature changes and graph the data using a data analysis program to calculate the relationship between Celsius and Fahrenheit.** **Physics: Muzzle Velocity – A projectile is launched horizontally. The projectile time of flight and muzzle velocity are measured electronically and compared to calculated values determined from student measured values of launcher height and distance traveled.** **Physics: Properties of Sound (Part 2 – Beat Frequency) – The GLX is used to generate sound waves. Quantitative data (equations), oscilloscope data, and audible data are all compared to enhance student understanding of wave interference properties.** **Physics: The student can more fully investigate circular motion using both the Uniform Horizontal Circular Motion lab and the Ladybug Revolution Phet simulation. Circular motion of planetary orbits (Keplar's Law) can be further studied using 9planets.org website investigation.**	

8.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Delineate and evaluate the argument and specific claims in a text, including the validity of the reasoning as well as the relevance and sufficiency of the evidence.**				
8.	**[RST6-8.8] Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.**	8.	**[RST9-10.8] 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.**	8.	**[RST11-12.8] Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.**
ASIM		**BIO / PS** **Biology: Epidemiology (F1Epidem) – Students will assess how certain diseases can be spread unknowingly though a population by conducting an activity to provide evidence to support this claim.** **Biology: Bead Bug (E3BeadBug) – Colored beads representing mutations are used to demonstrate that populations change over time. Students will support or refute the claim with evidence gathered during the lab.** **Biology: Lichen Lab (G2Lichen) – Students test the claim that lichens can be used as indicators of air pollution.**		**CHEM / PHYS** **Chemistry: Microdensity of Plastics – Students will compare the results of their experiment with textual densities for the same plastic and complete a percent error.** **Chemistry: Half-life of Ba-137 – Students will determine the half-life of Ba-137 using a radiation detector and graphical analysis program and compare the results to published data.** **Chemistry: Measurement Challenge – Students will determine the density of a piece of plastic and write their results on a table on the board. Students will then conduct a peer review of class data to determine the accuracy of their results.** **Physics: Work Energy Theorem - Students use a force sensor and motion sensor to compare the work done on a cart to the change in kinetic energy of the cart as it moves on a horizontal track. Students calculate the percent difference in values to validate the work-energy theorem.** **Physics: Acceleration on an Incline – A motion sensor is used to continuously measure the position of a cart rolling down a ramp. Computer analysis is used to display position, velocity and acceleration graphs of cart motion. Three methods of determining acceleration are compared: mean graphical acceleration, calculated slope of velocity graph, and calculated theoretical value.** **Physics: Heat Transfer – Students use temperature probes, a light source, and painted cans to investigate whether heat transfer rates differ with object color. Students compare data for the different colored cans and observe discrepancies.**	

9.	**CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects** **Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.**				
9.	**[RST6-8.9] Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.**	9.	**[RST9-10.9]** 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.**	9.	**[RST11-12.9] Synthesize information from a range of sources** (e.g., texts, experiments, simulations) **into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.**
ASIM		**BIO / PS** **Biology: Bird Adaptation or Which Beak is Best? (E4Beak) - Students compare beak adaptations for feeding to find support or contradict the relationships between bird beak shape and food sources.** **Biology: Comparing Plant & Animal Cells (C5CompPA) - Students use prepared and slides that they make (onion skin and human cheek cells) to compare and contrast plant and animal cells as supported in the text.** **Biology: Disorder Detectives (D12DisDet) - Students study the technique of karyotyping by matching chromosomes and arranging them to check for human genetic anomalies. Students will also explore more current techniques of FISH (Fluorescent In Situ Hybridization) and array CGH analysis (micro array based Comparative Genomic Hybridization).** **Physical Science: Work and Power - Students use information form the test and personal experience to climb stairs or a ramp to demonstrate that the human body is a machine capable of doing work. Students define work in science terms.**		**CHEM / PHYS** **Chemistry: Chemical Reactions – Students will conduct a series of experiments to show evidence of a chemical reaction (gas production, precipitate, color change, and change in temperature). After students collect data and read about the types of chemical reactions, the students will identify the type of chemical reaction using textual evidence and lab results.** **Chemistry: Color of Chemistry – Students will complete the chemical reactions, noting any color changes that occur and develop solubility rules from the results. Students will compare their results to the known literature about solubility rules (located in a textbook or other source) to determine if the literature supports or contradicts their lab findings.** **Chemistry: Effect of Temperature on the Solubility of a Salt. Read the introduction to the Effect of Temperature on the Solubility of a Salt. Complete the experiment noting any inconsistencies from the lab results and the solubility curve to the conclusions.** **Physics: Conservation of Momentum in 2D. The student graphically generates a momentum vector of a launched marble based on range of flight. The marble is launched again, but this time undergoes a mid-air collision with a second marble. The student determines that the graphical sum of both momentum vectors is the same as the original marble in both x and y dimensions, thus demonstrating conservation of momentum in multiple dimensions.** **Physics: Uniform Horizontal Circular Motion lab, Ladybug Revolution PhET, and 9planets.org. The student will investigate characteristics of rotational motion in UHCM by spinning a rubber stopper. These concepts are reinforced in Ladybug Revolution. Circular motion of planetary orbits (Keplar's Law) can be further studied using 9planets.org website investigation.** **Physics: Force tables – Students work vector addition problems in three uniquely different ways. Students use force tables, then solves the force addition both graphically and algebraically. Each method demonstrates how multiple force – multiple dimension problems can be combined resulting in only one force.**

Range of Reading and Level of Text Complexity					
10.	CCRS Anchor Standard for Grades 6-12: History/Social Studies, Science, and Technical Subjects Read and comprehend complex literary and informational texts independently and proficiently.				
10.	**[RST6-8.10] By the end of Grade 8, read and comprehend science/technical texts in the Grades 6-8 text complexity band independently and proficiently.**	10.	**[RST9-10.10]** By the end of **Grade 10,** read and comprehend science/technical texts in the **Grades 9-10** text complexity band independently and proficiently.	10.	**[RST11-12.10]** By the end of **Grade 12,** read and comprehend science/technical texts in the **Grades 11-CCR** text complexity band independently and proficiently.