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| Honors Class Rubric | | | | |
|  | Scientific Practice | Frequency | Example of student experience with scientific practice | Inclusive Scientific Experience  (may include: scientific inquiry, research, projects) |
| Standard 1 | Asking questions and defining problems | 12 | * What holds an atom together? (protons and electrons; opposite and like charges) * [www.middleschoolchemistry.com](http://www.middleschoolchemistry.com) * Why do things float or sink in water? * Does the density of a substance change with shape and/or size? | Density Inquiry Labs   * Use part or all of these activities to introduce basic concepts of density through guided inquiry |
| Developing and using models | 4 | * Choose element w/atomic # between 1–20, complete a fact sheet, and construct a 3D model. |
| Planning and carrying out investigations | 3 | * Design an experiment to confirm predictions of relative density. * Design an experiment to find effect of substance concentration on rate of diffusion. |
| Analyzing and interpreting data | 12 | * Using density cubes, measure mass, volume and density. Explain what data shows about density. (Try different substances/same size and/or same substance/different sizes) |
| Using mathematics and computational thinking | 5 | * Present density as a proportion: D/1 = M/V * Using a density formula triangle, find the missing value in density problems. * http://media-cache-ec0.pinimg.com/236x/ef/9a/e4/ef9ae4a9924d5ad8e6b9de3169395b7a.jpgCompare Fahrenheit, Celsius and Kelvin scales and convert quantities mathematically. |
| Constructing explanations and designing solutions | 2 | * Use inquiry with a density bottle, allowing students to explanation what is happening. * Students explain why bridges have flexible connections using knowledge of heating and cooling of solids. |
| Engaging in argument from evidence | 2 | * Demonstrate expansion and contraction with bimetal strips. Have students use visual evidence to argue an explanation for the evidence. * Argue why 1 mL = 1 cm3 from measured evidence. |
| Obtaining, evaluating, and communicating results | 12 | * After testing diffusion in hot vs cold water with groups using different substances, students present results and conclusions to class. |

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| Standard 2 | Asking questions and defining problems | 5 | * Is the Earth organized by density or by particle size? Discuss the difference between horizontal and vertical sorting. | Rock Densities and Earth’s Layers   * Find rock densities and infer/compare them to the composition and densities of the layers of the Earth   Making scale models of Earth Layers and Materials.  Layers are a size scale  Materials are a density scale |
| Developing and using models | 6 | * Make a model of the Earth with common household items comparative with current model densities. Explain the limitations and accuracies of the created model. |
| Planning and carrying out investigations | 3 | * Chart the densities of Earth’s atmospheric layers and predict corresponding temperatures. Compare known temperatures to predicted temperatures and speculate reasons for the discrepancies. |
| Analyzing and interpreting data | 6 | * Conduct an experiment to see how much salt it will take for a golf ball to float by adding salt a little at a time. Chart the results identifying the independent and dependent variables. Compare the densities of the plain water and the salt water that finally allows a golf ball to float. |
| Using mathematics and computational thinking | 10 | * Collect common rock samples. Find their densities and determine the average density of the rocks. |
| Constructing explanations and designing solutions | 2 | * Graph the density of varying rock size samples using the same rock. See how volume and mass ratios relate to density. |
| Engaging in argument from evidence | 2 | * Compare current models of the Earth with past models of the Earth evaluating the accuracies and limitations of each model. |
| Obtaining, evaluating, and communicating results | 4 | * Compare theories about the center of the Earth. Determine the credibility of the source and scientific evidence to support each theory. |

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| Standard 3 | Asking questions and defining problems | 8 | * How do organisms get information from their environment? How do organisms respond to their environment? How do cells get information from their environment? How do cells respond to their environment? * Have cells changed over time? * Give examples of systems and describe what happens when one part of the system fails. | Research additional vocabulary, organelles and functions: Eukaryote, prokaryote, chloroplasts, mitochondria, ribosomes, endoplasmic reticulum, Golgi apparatus, nucleolus  Osmosis lab using corn or potato starch and iodine.  Inside a Cell (U of U) |
| Developing and using models | 10 | * Compare and contrast a plant cell, animal cell, and bacterial cell. * Build a 3-dimensional model of either a plant cell or animal cell, discuss limitations of your model. * Build a computer generated model of a cell. Compare computer model limitations to craft model limitations. * Create a model that compares the function of organelles in a cell to the function of parts of another organization (i.e city, hospital, amusement park, school) |
| Planning and carrying out investigations | 3 | * Predict what will happen to plant/ animal cell when salt/ sugar water is added to slide. Watch under microscope. |
| Analyzing and interpreting data |  |  |
| Using mathematics and computational thinking | 2 | * Cells in Perspective/ Cells Size and Scale (U of U): Mathematically compare size of cell to coffee bean, rice, and grain of salt. |
| Constructing explanations and designing solutions | 3 | * What is the difference between a complex organism and a simple organism? * Explain the functions of the main organs and systems. * Explain the connections between the Respiratory, Circulatory and Digestive Systems. |
| Engaging in argument from evidence | 2 | * Research Spontaneous Generation and the Cell Theory. Compare and critique each belief. |
| Obtaining, evaluating, and communicating results | 3 | * What happens in a plant cell during photosynthesis? An animal cell during cellular respiration? * Stem Cells (U of U) |

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| Standard 4 | Asking questions and defining problems | 12 | * What are the benefits of sexual and asexual reproduction compared to its environment? What are the benefits of Artificial vs natural selection? * Why Clone? (U of U) * Sources of Variation (U of U) * The Outcome of Mutation (U of U) * The Whole Genetics and Society Section (U of U) | All materials that say U of U are on the U of U genetics website  <http://learn.genetics.utah.edu/>  The Human Ecosystem (U of U) compares special adaptations of microorganisms that allow them to live on/in human body |
| Developing and using models | 2 | * Understand the connections of the models of DNA, gene and chromosome. How do these determine traits? * Tour of Basics (U of U) * Build a DNA molecule (U of U) * A recipe for traits (U of U) |
| Planning and carrying out investigations | 3 | * Predict what traits or organisms will survive best if there is a change in the environment? Why are humans involved in gene experimentation and manipulation? * Family Health History (U of U) * Gel Electrophoresis (U of U) * What is Gene Therapy? (U of U) * Does Sunscreen protect my DNA? (U of U) |
| Analyzing and interpreting data | 5 | * Analyze how our traits are determined by genetics. What natural cellular processes determine heredity? Why is DNA said to be the inheritance molecule? * Genetics in Utah (U of U) * Artificial vs. Natural Selection (U of U) * DNA Extraction (U of U) |
| Using mathematics and computational thinking | 5 | * Understand Mendel’s contribution to genetics. Use Punnett squares to represent the probability of traits. * What is Heredity? (U of U) * Cockapoo breeding <http://www.mulberryfarm.com/canine-genetics_explanation.htm> (Interpret the meaning of each punnett square in the article) |
| Constructing explanations and designing solutions | 3 | * Study how traits have developed over time? Which of those traits offer an advantage to their survival? * Change over time Section (U of U) * The Outcome of Mutation (U of U) |
| Engaging in argument from evidence | 2 | * Describe the evidence for evolution by natural selection proposed by Charles Darwin. * Should cloning be regulated? * Artificial vs. Natural Selection (U of U) * Recipe for Evolution (U o U) * Stickleback Evolution (U of U) * Legislation on cloning (U of U) * Punnett Squares Claim |
| Obtaining, evaluating, and communicating results | 3 | * What are the consequences of altering genetics? * Genetically Modified Foods (U of U) * Rocket Pocket Mice (U of U) * Visible Inherited Traits (U of U) |

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| Standard 5 | Asking questions and defining problems | 6 | * At what point does something go from living to once living, and then non-living? * What are the characteristics of living things? * Compare and contrast the characteristics of the kingdoms. What are prokaryote and eukaryote? What are heterotrophic an autotrophic? What are unicellular and multicellular? * What happens when a new organism is discovered that doesn’t fit into the current classification system? | 7.5 Clay Creatures Classification  (This is a good end of the year activity that reviews standards 3 – 5).  7.5 Latin Words for Clay Creatures |
| Developing and using models | 1 | * Create taxonomic level models. See the upside-down triangle as an example. Challenge students to create their own. |
| Planning and carrying out investigations | 2 | * Alive or not lab. |
| Analyzing and interpreting data | 3 | * Modern classification uses DNA similarities and embryological evidence. * Move from using keys to creating keys. |
| Using mathematics and computational thinking | 1 | * Compare the amount of biological diversity found in each of the kingdoms. Compare the number of organisms found in each kingdom. |
| Constructing explanations and designing solutions | 2 | * Research why the Kingdom Monera was divided. * Extreme Environments: The Great Salt Lake * Life in Extreme Environments (U of U) |
| Engaging in argument from evidence | 3 | * Look at the number of kingdoms. Why has the number of kingdoms changed? What is the latest proposal for kingdom organization? What evidence is there for that organization and how is it defended? * Take organisms and give evidence for its classification. Defend using observed characteristics of the organism. * Determine classification of an object as living, once-living, and nonliving using observed characteristics. Be able to defend that classification. |
| Obtaining, evaluating, and communicating results | 3 | * How are new organisms named? Learn about binomial nomenclature, the International Zoological Congress, and how newly named organisms are published and shared in the scientific community. * Research recent newly-classified organisms. asunews.asu.edu |