	Davis School District - Honors Science Vertical Alignment - [9th -12th] Grade
Asking Questions and Defining Problems	• Continue to create scientific questions that are testable and measurable • Analyze and critique questions based upon their testability and measurability • Create probing questions to elaborate upon research experiences paying attention to patterns, features and contradictions. • Refine scientific questions based on data collection, research, and predictions. • Evaluate scientific questions and use them to develop research opportunities • Develop questions that attempt to address real world problems and/or needs • Students will continue to create questions that identify clear independent and dependent variables while considering how these variables can be isolated. • Develop FOCUSED research question/problem • Identify relevant variables
Developing and Using Models	• Design testable empirical questions about small process ideas and large scale systems that require models. • Create models to test and analyze parts of large-scale systems or processes that cannot be observed in the classroom. • Construct and continually develop models that explain and describe science concepts or experimental research. • Compare and contrast patterns in models that represent similar science phenomena based on their limitations and precision of information. • Revise models to show the relationships with variables • Use a model to make a prediction about a system or process • Generate data from models for in class investigations • Continue to analyze the structure and function of the parts of the model • Continue to use computer simulations and models to test relationships between variables that's not easily observable but realize that there are limitations to their design
Planning and Carrying Out Investigations	• Student Centered Inquiry experiences with minimal guidance • Make a prediction in the form of a hypothesis with rationale and evidence based upon a model or theory • Identify and manipulate the independent variable, dependent variable, and controls • Plan investigations with detailed procedures individually and collaboratively that effectively isolate appropriate variables • Evaluate appropriate tools that will measure, collect, and organize data. • Gather data in an organized manner with sufficient trials to ensure precision and accuracy • Evaluate sources of data and determine effectiveness to answer a particular science question • Record and report on equipment uncertainty/errors • Describe the cause and effect relationships between the independent and dependent variables
Analyzing and Interpreting Data	• Extrapolate meaning from graphs and tables by recognizing trends or patterns • Use mathematical equations or appropriate terminology to describe trends in data sets • Identify the independent and dependent variables from graphs and data tables • Make predictions based off of a graph or data set • Use digital tools to create data tables, graphs and analyze data • Use patterns to identify the cause and effect relationships between variables in an experiment or classroom experience • Summarize how data relates to defined questions and proposed hypothesis. • Recognize confounding variables and how they may impact data • Students should gather data from online databases to analyze large systems • Identify possible sources of error in a data set and revise in order to collect more valid results • Identify patterns or trends worth investigating further • Analyze the strength of data using mathematical and statistical techniques; including recognizing data conflicts and possible outliers • Consider the limitations of the data (measurement, equipment, environment, human errors)
Using Mathematics and Computational Thinking	• Have comprehensive working knowledge of metric system including prefixes, base units, and derived units and be able to convert between metric units and prefixes • Recognize the importance of using labels and units as a way to show scale and dimension. • Use mathematical representations to support conclusions • Explain findings in ratios and percentages • Use Grade-level appropriate mathematics and basic statistics in analyzing data • Use math terminology in analyzing data • Use algebraic equations to identify scientific relationships • Manipulate variables algebraically to show direct connection and trends • Make complicated unit conversions using dimensional analysis • Understand scientific notation and use it appropriately • Utilize significant figure principles and use them appropriately • Derive equations from graphs and use them to make predictions
Constructing Explanations and Designing Solutions	• Determine whether or not conclusions are supported by data/results (students should use supported/unsupported terminology as opposed to right/wrong). • Determine of predicted cause and effect relationships are supported by experimental methods and collected data • Provide alternative solutions to unsupported conclusions or refuted evidence • Construct and revise an explanation based on a variety of valid sources • Account for unanticipated events or data in conclusions • Identify method changes to minimize errors, limitations, and/or weaknesses
Engaging in Argument from Evidence	• Make a claim and support it with quantitative or qualitative evidence • Compare and critique arguments (three or more) on the same topic • Construct oral and written arguments from researched topics • Compare and contrast multiple models and identify the strengths and weaknesses of each • Differentiate between scientific claims and claims based on belief • Respectfully provide and/or receive critiques of scientific argument • Evaluate scientific claims by including possible societal and ethical impacts
Obtaining, Evaluating, and Communicating Results	• Determine the central ideas and supporting arguments from a variety of scientific texts (including graphs, diagrams, images, etc.) • Communicate scientific information through a variety of formats (graphs, diagrams, images, oral, text, etc.) • Identify possible bias in scientific text • Peer reviewing others scientific performance and conlusions/claims • Use scientific language in communcating results, arguments, and claims • Evaluate sources for accuracy, reliability, and validity • Cite sources when making claims or conclusions