EQ: What are the characteristic properties of waves and how can they be used?

Skill	Working Towards Mastery List	Self-Assessment
W.1 I can identify that sound waves require a medium while light waves do not.	• Sound waves are a matter (mechanical) wave that need a medium, they cannot travel in a vacuum. • Light waves do not need a medium (can travel in space). • Waves transfer energy, not matter.	
W.2 I can state the relationships between pitch, frequency, wavelength, and amplitude.	• As frequency increases, pitch increases. (directly proportional) • As frequency increases, wavelength decreases. (inversely proportional) • As energy increases, amplitude increases. • Changes in frequency do not cause changes in amplitude. • Simple waves have repeating patterns of wavelength, frequency, and amplitude.	
W.3 I can explain that the color of a light wave depends on frequency and the brightness of the light depends on amplitude.	• Light is an electromagnetic wave. • Each color has its own wavelength and frequency. • ROY G BIV - Red has the longest wavelength and lowest frequency. Violet has the shortest wavelength and highest frequency. • As amplitude increases, brightness increases.	
W.4 I can explain that light travels in straight lines except between the surfaces of two transparent mediums where the light bends. The ability to bend depends on the difference in frequency the wave can travel through the medium.	• Light waves travel in straight lines. • When light goes through two transparent objects, it bends, or refracts because light travels at different speeds in different mediums. • The bigger the difference in the speed (frequency) that light can pass between two transparent mediums, the more bending that occurs.	
W.5 I can give examples of when waves are absorbed, reflected, and transmitted in the world.	• Waves can be transmitted, or pass through a medium. • Waves can be reflected, or bounce off a medium. • Waves can be absorbed, or be "taken in" by the medium.	

EQ: How can I engage in the behaviors of a scientist and/or engineer?

Skill	Working Towards Mastery List	Self-Assessment
SEP2. Models I can use models (physical models and diagrams) to explain and predict phenomena.	• Models can be created to explain and predict phenomena. • Models have the ability to change variables to predict how the system will change. • Models can be conceptual like graphs and diagrams, or they can be physical and made out of 3 dimensional objects (like a slinky wave).	
SEP5 Mathematical Models I can express relationships between variables by writing mathematical models (graphs) and interpret those graphs to explain phenomena.	• Graphs are mathematical models. • Graphs can be linear or exponential. • Graphs can be used to show proportional relationships. • Waves can be graphed to show wavelength, frequency, and amplitude. • Wavelength is the difference between one crest to the next crest. • Frequency is the number of wavelengths passing a fixed point in an amount of time (speed). • Amplitude is a measure from a line half way through the wave to the crest or trough.	

SEP6 Claims
 	
I can write a variety of types of claims when explaining phenomena.
	• Take a stance.
	• Also referred to as an assertion.
	• Types of Science Claims:
	  • Relationship Statement: As ___ increases, ____ increases/decreases.
	  • Supported or refuted: The hypothesis that ____ was supported/refuted.
	  • Opinion/explanation statement: Air moves from areas of high to low pressure or The marble would win the kinetic energy race.	

SEP7 Evidence
 	
I can support or refute claims using multiple sources of evidence (without direction).
	• Multiple sources should be cited to prove a claim including:
	  • Text
	  • Data
	  • Multiple sources of evidence are used without being directed to by the teacher. Student uses multiple sources of evidence on his/her own.
	• Data evidence must include:
	  • Use numbers
	  • Compare 2 data points
	  • Units
	  • Strong Vocabulary
	  • Transition that cites the title of the data table	

SEP6 Reasoning I can construct explanations about models, experiments and phenomena by using scientific reasoning that connects my evidence to my claim.	• Reasoning should tie the evidence to the claim in order to explain the phenomena. • Reasoning should explain the science behind why the phenomena occurred. • Reasoning is the intersection between the claim, the evidence, and the phenomena being explained. • Reasoning includes words from the claim, words from the text, and words about the materials in the lab/phenomena.	