Physical Science Unit 2: Energy and Mechanical Waves

Chapter 15, 16, and 17

Graduate Learner Outcome: As a Henry County graduate, I will understand and analyze energy and the characteristics of waves as demonstrated through the integration of scientific practices.

Pretest Score: _____ **Post Test Score:** _____

Unit 2 Goal: Write a goal that you have for this unit.

Standards and Learning Targets:

SPS7. Obtain, evaluate, and communicate information to explain transformations and flow of energy within a system.

1. Construct explanations for energy transformations within a system.
   - I can identify and describe the different types of energy forms including chemical, mechanical, light, sound, thermal, electrical, and nuclear energy.
   - I can identify (track) the types of energy transformation that occur within a system.
   - I can define the Law of Conservation of Energy.
   - I can explain how the Law of Conservation of Energy applies to a system by showing energy is only transferred and not lost.
2. Plan and carry out investigations to describe how molecular motion relates to thermal energy changes in term of conduction, convection, and radiation.
   - I can distinguish between conduction, convection, and radiation and give examples of each.
   - I can define temperature, heat, and thermal energy.
   - I can explain what is required for thermal energy transfer to occur.
   - I can explain how energy is transferred from particle to particle in conduction, convection, and radiation.
3. Analyze and interpret specific heat data to justify the selection of a material for a practical application.
   - I can define specific heat and explain how specific heat relates to heat transfer.
   - I can list the differences between conductors and insulators.
   - I can solve basic problems using the formula for specific heat ($Q = mc\Delta T$).
   - I can identify the units for specific heat.

SPS9. Obtain, evaluate, and communicate information to explain the properties of waves.

a. Analyze and interpret data to identify the relationships among wavelength, frequency, and energy in electromagnetic waves and amplitude and energy in mechanical waves.
   - I can define wavelength, frequency, energy, and amplitude.
   - I can analyze how changes in wavelength, frequency, energy, and amplitude can affect each other.
   - I can analyze diagrams of mechanical waves to determine which has the highest or lowest energy.

b. Ask questions to compare and contrast the characteristics of electromagnetic and mechanical waves.
   - I can identify the following parts of a wave from electromagnetic and mechanical waves: amplitude, frequency, rarefactions, wavelengths, compressions, crest, and trough.
   - I can explain why mechanical waves cannot travel through a vacuum.

c. Develop models based on experimental evidence that illustrate the phenomena of reflection, refraction, interference, and diffraction.
   - I can define refraction, reflection, diffraction, and interference.
   - I can describe the behaviors of reflection, refraction, interference, diffraction, and the Doppler Effect.

d. Analyze and interpret data to explain how different media affect the speed of sound and light waves.
   - I can identify how different types of media affect the speed of sound.

e. Develop and use models to explain the changes in sound waves associated with the Doppler Effect.
   - I can define Doppler Effect.
   - I can describe the apparent frequency changes in the Doppler Effect.

Activities/Quizzes/Resources: (All resources can be found on my school website.)

1. Unit 2 Planning Guide
2. Unit 2 Learning Path
3. Chapter 15 Powerpoint
4. Chapter 15 Outline
5. Section 15.1 Lesson Video
6. Section 15.2 Lesson Video
7. Section 15.3 Lesson Video
8. Getting to Know Energy Video
9. Getting to Know Energy Video Sheet
10. Energy Worksheet
11. Chapter 16 Powerpoint
12. Chapter 16 Outline
13. Section 16.1 Lesson Video
14. Section 16.2 Lesson Video
15. Heat, Temperature, and Energy Video
16. Heat, Temperature, and Energy Video Sheet
17. Heat Worksheet
18. Chapter 17 Powerpoint
19. Chapter 17 Outline
20. Section 17.1 Lesson Video
21. Section 17.2 Lesson Video
22. Section 17.3 Lesson Video
23. Section 17.4 Lesson Video
24. Wave Velocity Worksheet
25. Chapter 15 and 16 Study Guide
26. Chapter 17 Study Guide
27. Review Games
28. Extra Practice Sheets
29. Unit 2 Quiz

Performance Task/Test:

Based on the learning targets from this unit, you will demonstrate your understanding of the transformations and flow of energy within a system and the properties of mechanical waves by completing the following laboratory performance tasks.

- Lab 3 – Energy Lab
- Lab 4 – Slinky Lab

Unit 2 Test (You will complete the post test at the end of this unit to show mastery.

Unit 2 Reflection: Reflect on what you could have done better to master this unit.