Stars Unit

9th grade Physics

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Stage 1-Desired Results

Established Goals:

- Students will be able to classify stars based on temperature using Wcin's Law and the Harvard classification scheme
- Students will be able to classify stars based on the ratios of equivalent widths

Understandings:
Students will understand that …

- White light is a combination of all colors of light
- Different colors of light have different wavelengths
- Technological advances in science can impact understanding of the subject (digital spectrographs vs. photographic plates)
- Emission lines are the access of light
- Absorption lines are the deficit of light
- Why absorption lines occur
- How absorption lines can tell what element the light travelled through

Essential Question:

- What can we learn from looking at the spectrum of light?

Students will know…

- White light is a mixture of different colors
- Different colors of light have different wavelengths
- The electromagnetic spectrum (visible light is only a small portion)
- How to use Wein's Law to calculate temperature of a star
- The basis of the Harvard classification scheme (OBAFGKM)
- Absorption lines tell us what element is present in a star's atmosphere

Students will be able to…

- Calculate the temperature of a star using Wein's Law
- Classify a star using Wien's Law
- Explain why a digital spectroscope can be more useful in stellar classification than a photographic plate
- Explain what causes absorption lines
- Calculate equivalent widths of absorption lines
- Classify a star using equivalent widths ratios

Stage 2-Assessment Evidence

Performance Tasks/Other Evidence:

- Spectroscope Analysis sheet
- Spectroscope Definitions sheet
- What Are Stars? (Please Do Now)
- What Are Stars? (Exit Survey)
- Harvard Classification Notes
- Wien's Law worksheet
- Equivalent Widths worksheet
- Group Problem Solving Activity
- Stars Unit Review
- Stars Unit Exam

Stage 3-Learning Plan

Learning Activities:

- Lesson 1: Spectroscope Activity
- Lesson 2: Spectra Analysis
- Lesson 3: What are Stars?
- Lesson 4: Harvard Classification
- Lesson 5: Wien's Law
- Lesson 6: Absorption Line Activity
- Lesson 7: Equivalent Widths
- Lesson 8: Stars Review and Exam

	MONDAY	TUESDAY	WENESDAY	THURSDAY	FRIDAY
WEEK 1	**Spectroscope Activity** Students will follow directions to build a simple spectroscope. They will then use the spectroscope to look at various sources of light and record what they are seeing. Sheets: Design and instructions on how to build a spectroscope, spectroscope activity data sheet, spectroscope analysis sheet	**Spectroscope Activity** The students will finish observing various light sources, discuss their finding, and begin to analyze what they saw. Sheets: Spectroscope analysis sheet	**Spectra Analysis** The class will discuss and analyze the data taken with the spectroscopes as well as the questions from the spectroscope analysis sheet Sheets: Spectroscope definitions worksheet	**What Are Stars?** Students will learn what stars are, how they form, and what properties can be used to classify them Sheets: Please Do Now (PDN), Exit Survey, Harvard classification reading	**Harvard Classification** Students will learn about the Harvard classification scheme and learn about digital spectrographs Sheets: Harvard classification notes, Harvard classification PowerPoint
WEEK 2	**Wien's Law** Students will be introduced to Wien's Law in this lesson. In order to understand this, they must also learn about blackbody radiation and how to relate blackbody radiation to the spectrum of a star. Sheets: Wien's Law worksheet	**Absorption Line Activity** Students will learn details about what absorption line are and how they happen. This will be accomplished with an activity that demonstrates the basic concepts behind absorption lines. Sheets: Absorption line activity teacher's guide, Absorption lines reading	**Equivalent Widths** This lesson will start by reinforcing what was learned the day before about equivalent widths – what they are and why they are so important. Then we will learn what equivalent widths are and how to calculate them. Sheets: Equivalent widths worksheet	**Stars Review and Exam** At this point, students have learned all of the material they will learn in the Stars unit. This lesson is designed to review all of this material and to help prepare for the unit test, which is attached into this lesson. Sheets: 4 problems sheet for the group problem solving activity, group problem solving guide, stars unit review	**Stars Review and Exam** Students will take the exam. Stars unit exam, Stellar classification