**Guided Notes: Spectroscopy**

 The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ spectrum is the range of all types of electromagnetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_, or different types of \_\_\_\_\_\_\_\_\_\_\_\_\_\_, designated by \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_ light is electromagnetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that the unaided human eye can see.

**Key Terms:**

* Define visible light: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define non-visible light: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define wavelength: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Define frequency: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Key Concepts:**

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* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ light has wavelengths between \_\_\_\_\_\_\_\_\_\_\_\_\_\_ nanometers (nm) and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ nm.
* Sources of visible light include the \_\_\_\_\_\_\_\_\_\_\_\_\_\_, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_, and lightbulbs, such as fluorescent and LED bulbs.
* All of the other forms of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ radiation on the electromagnetic \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that are not visible light are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ light.
* Examples of non-visible light include \_\_\_\_\_\_\_\_\_\_\_\_\_\_ waves, microwaves, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ light, and X-rays.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ light has more energy than \_\_\_\_\_\_\_\_\_\_\_\_\_\_ light and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ between 400 nm and 10 nm.
* The natural source of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ light for Earth is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the science of studying \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ patterns, called \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ spectra show a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ spectrum with \_\_\_\_\_\_\_\_\_\_\_\_\_\_ lines where wavelengths are absorbed by atoms.
* This information is most useful when presented \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* In a graph, \_\_\_\_\_\_\_\_\_\_\_\_\_\_ represent \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ represent \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of certain wavelengths.
* The magnitude of the peaks and dips indicates \_\_\_\_\_\_\_\_\_\_\_\_\_\_ intensity.



* Why do different stars have different lines? This is the question that leads to the classification of stars, The key factor at work is \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The temperature scientists are interested in is \_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperature of the star.
* All the variations in \_\_\_\_\_\_\_\_\_\_\_\_\_\_ lines for different stars are due to the difference in the temperature of the gases located near the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the stars.
* The \_\_\_\_\_\_\_\_\_\_\_\_\_\_ system \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the stars based on their \_\_\_\_\_\_\_\_\_\_\_\_\_\_ temperatures.
* Stars fall in to one of the following \_\_\_\_\_\_\_\_\_\_\_\_\_\_: O, B, A, F, G, K, M.
* These classes go from \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_\_ with O being the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and M, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The main thing to remember about stellar spectra is that they provide astronomers with detail about the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ characteristics of the star being analyzed.
* Spectral analysis reveals the surface \_\_\_\_\_\_\_\_\_\_\_\_\_\_, motion and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of objects in the universe.
* A star's surface \_\_\_\_\_\_\_\_\_\_\_\_\_\_ can be determined from its \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* This is done by using a simple formula for \_\_\_\_\_\_\_\_\_\_\_\_\_\_ radiation and solving it for \_\_\_\_\_\_\_\_\_\_\_\_\_\_.



* Using the formula, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of any star can be determined from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ at which it \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the maximum amount of light.
* The classification system ranks the stars based on their surface \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* When something is moving, there is a shift in any of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ emitted from that \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Think of a train traveling down the tracks while blowing its horn. As it moves \_\_\_\_\_\_\_\_\_\_\_\_\_\_ you, the sound waves are shifted toward the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and you hear a \_\_\_\_\_\_\_\_\_\_\_\_\_\_ pitched horn.
* As it passes and moves \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from you, the sound waves shift toward the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of the spectrum and the pitch gets \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* The same thing that happens with \_\_\_\_\_\_\_\_\_\_\_\_\_\_, also happens with \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Astronomers will compare the spectrum of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the spectrum of an \_\_\_\_\_\_\_\_\_\_\_\_\_\_ that is known to be \_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* If the star's \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is shifted to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (toward the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of the spectrum) then it is moving \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the astronomer.
* If it is shifted to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (toward the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of the spectrum), it is moving \_\_\_\_\_\_\_\_\_\_\_\_\_\_ the astronomer.
* Every element on the periodic table has a unique \_\_\_\_\_\_\_\_\_\_\_\_\_\_ when it is burned. Astronomers compare the known \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of elements to the star's \_\_\_\_\_\_\_\_\_\_\_\_\_\_ in order to determine if particular elements are being \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the star.
* Spectral analysis has shown that \_\_\_\_\_\_\_\_\_\_\_\_\_\_ is the most abundant element in the universe. By observing light \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by the hot glowing \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from distant galaxies, scientists noticed that \_\_\_\_\_\_\_\_\_\_\_\_\_\_ lines for \_\_\_\_\_\_\_\_\_\_\_\_\_\_ shifted to the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ frequency, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ wavelength \_\_\_\_\_\_\_\_\_\_\_\_\_\_ end of the visible spectrum.
* This \_\_\_\_\_\_\_\_\_\_\_\_\_\_ Effect shift indicates that the viewer is moving \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the source, which is the distant galaxy. In fact, all the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ are moving \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from us and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from each other.