



What is the Sun made of?

01 With a classmate, research the three most common elements in our universe.



02 Before reading “Reach for the Stars,” predict whether the statements are “T” true or “F” false. Read the text and check your answers.

- The spectrograph only provides information on composition and temperature of stars.
- Short wavelengths are seen as blue and purple light.
- Each element is represented by different peaks and valleys on a graph.
- The closest star is nanometers away from us.
- Hydrogen only produces shades of blue and violet light.

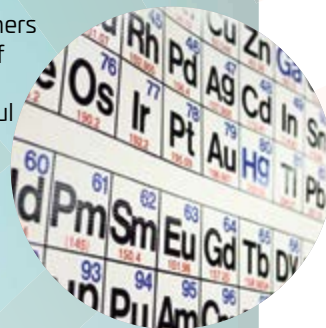
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03 Read the text again. Write the word next to its definition.

- the highest point on a mountain or graph _____
- the combination of elements _____
- unit of measurement, one billionth of a meter long _____
- the lower phase of a horizontal wave _____
- the instrument used to measure the type of light emitted from objects _____
- the distance light can travel in one year, almost 10 trillion kilometers _____

Reach for the Stars

A spectrograph is a tool astronomers use to measure the light given off by distant objects such as stars. Spectroscopy gives us meaningful information on these celestial objects’ **composition**, density, temperature, and speed.



A **spectrograph** calculates these measurements by checking the energy emitted or released in moving electrons, corresponding to specific light colors on the visible spectrum. The more energy emitted or absorbed, the more intense the jump or fall, and the shorter the wavelength of light, corresponding to purple and blue lights. Conversely, the less energy that is emitted or absorbed, the less intense the movement of the electron, and the longer the wavelength of light that is emitted. These wavelengths correspond to red and orange colors on the spectra. Scientists transform the spectra into a graph to calculate the **peaks** and **valleys** in the wavelengths of light.

Since each type of matter has a different composition and placement of electrons, the movement of these electrons is different, thus emitting and absorbing different quantities of energy. The various peaks and valleys shown on a heavenly body’s graphs correspond to distinct elements. Scientists can produce precise measurements of these quantities in **nanometers**, thus determining the composition of celestial bodies in our universe millions of **light-years** away. For example, if a star has a lot of hydrogen, it will have emission lines at 410 nm (violet light), 434 nm (blue light), 486 nm (blue-green light), and 656 nm (red light).

04 With a classmate, discuss the questions below.

- Why do you think it is important for scientists to know about a star’s composition, speed, and density?
- What celestial object would you like to know the data about? Why?



05 Match the sentence halves.

- | | |
|------------------------------------------------------------|-----------------------------------------------------|
| 1. Please turn on the fan | a. out the cards into a perfect arc. |
| 2. The magician fanned | b. the astronomy club meetings for months. |
| 3. Helen has been chairing | c. her and get her what she wants. |
| 4. Gabriel sat down in the chair | d. since it's too hot for the spectrograph machine. |
| 5. Alan has a great sense of humor | e. and is always making people laugh. |
| 6. I know that Shelly is being difficult, but please humor | f. the waiter pulled out for him. |

06 Write the letter of the word that best completes the sentences.

- | | |
|------------------------------------------------------------------------------------|-------------|
| 1. The _____ broke in to my neighbor's house and stole a very expensive telescope. | |
| 2. I used _____ to learn more about the composition of stars. | a. googled |
| 3. The _____ of the telescope's findings on astronomy is not fully understood yet. | b. Google |
| 4. The science lab was _____ last night, and expensive equipment was stolen. | c. burglar |
| 5. I _____ the images sent by the Webb telescope. | d. burgled |
| 6. The rocket _____ the Moon and left permanent marks. | e. impact |
| | f. impacted |

07 Form a small group. Write a script for a video describing what a spectrograph does and what it measures. Include at least three examples of verbing.

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08 With your group, design visual material to support the information provided in your video. Record your videos and share them with the class. Vote on whose was the clearest.

Possible visual material:

- › spectra for different common elements
- › a picture of a spectrograph machine
- › images of the composition of different stars

