

Student Exploration: Star Spectra

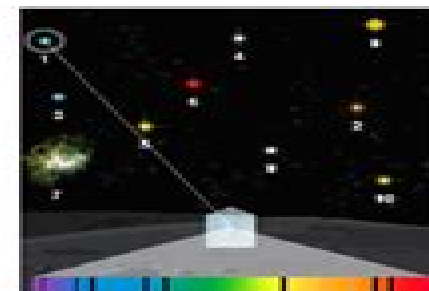
Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. What happens when light goes through a prism? It makes a rainbow.
This band of colors is called a **spectrum**.
2. A rainbow is an example of a spectrum. What is the sequence of colors in a rainbow?
Roygbv

Gizmo Warm-up

The interior of a **star** produces a continuous spectrum of light, like a rainbow. Cooler gases in the outer layers of the star absorb certain wavelengths of light, causing dark lines to appear in the spectrum. The resulting **absorption spectrum** can tell astronomers a great deal about the star.

1. On the Star Spectra Gizmo™, turn on **Show labels**. Select **star 1** to see its absorption spectrum.
How many lines do you see in the spectrum? 10
2. Drag the **Hydrogen** spectrum next to the **Star spectrum** so that the edges line up.
Do some of the lines on the two spectra match up? Yes
3. Drag the **Helium** spectrum next to the **Star spectrum**. Do some lines match? Yes
4. Try out the other available spectra. Do any others have lines that match? No
5. Which elements have contributed to the spectrum of star 1? Hydrogen helium



Note: The elements in a star's spectrum do not necessarily reflect what the star is made of. The absorption spectrum is mostly determined by the surface temperature of the star.

Activity A: Classifying stars

Get the Gizmo ready: Check that **Show labels** is on and **Neutral spectra** is selected.

Question: How are stars classified?

Introduction: Late in the 19th century, Harvard astronomer Edward Pickering wanted to sort and catalog the thousands of star spectra that had been collected by the Harvard Observatory. He hired several women to do the work, paying them 25 cents a day. The most prominent of these women was Annie Jump Cannon, who devised a classification system still used today.

Harvard Classification Scheme			
Class	Color	Prominent spectral lines	Surface Temp. (K)
O	Blue	Ionized helium, hydrogen	> 25,000
B	Blue-white	Neutral helium, hydrogen	11,000 – 25,000
A	White	Hydrogen, ionized sodium, ionized calcium	7,500 – 11,000
F	White	Hydrogen, ionized sodium and calcium; neutral sodium and calcium	6,000 – 7,500
G	Yellow	Neutral sodium and calcium, ionized calcium, ionized iron, ionized magnesium	5,000 – 6,000
K	Orange	Neutral calcium, neutral iron, neutral magnesium	3,500 – 5,000
M	Red	Neutral iron, neutral magnesium, and neutral titanium oxide (not shown)	< 3,500

Star Spectra Gizmo Worksheet Answer

Paul Willard Merrill

A red circular graphic with a gradient, appearing as a semi-circle or a partial circle, located to the right of the author's name.

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