



THE UNIVERSE™

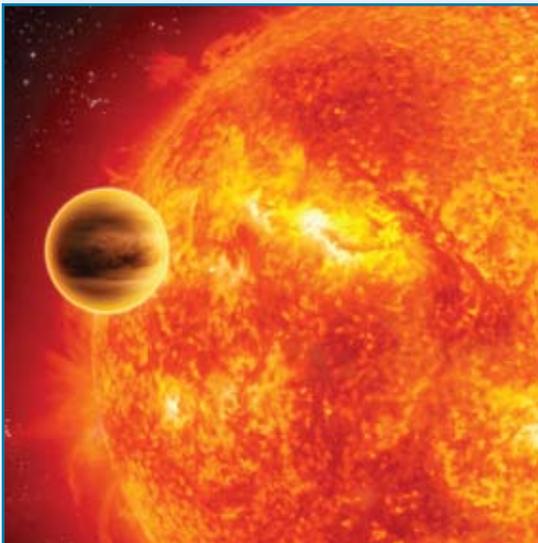
**Kennedy
Space
Center**
VISITOR COMPLEX

H
HISTORY™

THE UNIVERSE™: COSMIC PHENOMENON

The Universe series offers an epic exploration of the universe and its mysteries, giving us new insights into space, from the planets to the stars to the edge of the known. As research about our universe has become more sophisticated, new revelations open up fresh perspectives on our planet and the world beyond. This one-hour episode uncovers the mystifying inner workings of cosmic phenomena many of us know exist but may not fully understand. Auroras, meteor showers, cosmic rays, rainbows, and the process of photosynthesis are some of the many topics explored in this episode, explaining how and why these phenomena develop. Some of the world's most renowned scientists discuss these processes and occurrences, helping viewers grasp celestial happenings and how they affect our lives on Earth.

With colorful images and graphics, *Cosmic Phenomenon* employs state-of-the-art technology to create compelling visuals which help explain these complex topics. Viewers will learn how the Aurora Borealis produces its psychedelic lights, and why auroras can pose dangers to humankind. Why does a rainbow appear very differently to two individuals standing just a few feet apart? How big are stars in relation to Earth, and how is it possible for cosmic rays to alter the DNA structure of human beings? Students will be able to ponder these and other important questions, exploring multiple theories and the questions they raise. This program will also help prompt conversations among students about the future of space and its relevance in our everyday lives.

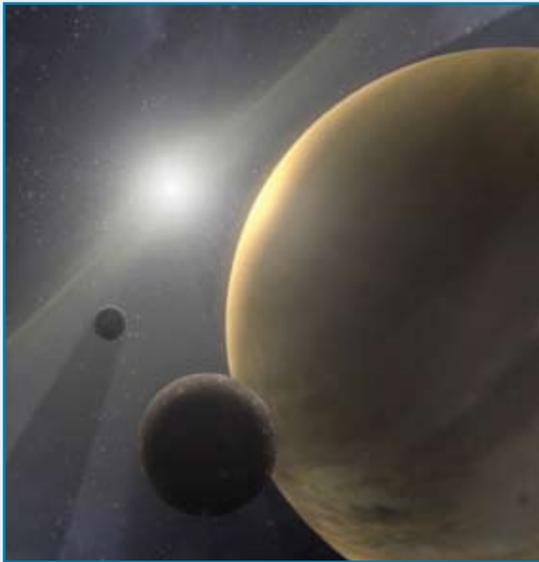


CURRICULUM LINKS:

The Universe: Cosmic Phenomenon is appropriate for high school students. It would be useful for Science, Astronomy, Earth Sciences, and Technology courses. Educators may want to use clips from this program to supplement their lectures on related topics.

INTERACTIVE WEBSITE AVAILABLE:

www.history.com/minisite.do?mini_id=54036



VOCABULARY:

Using the dictionary at www.merriamwebster.com, an Internet resource such as www.History.com, or an encyclopedia, students should define or explain the significance of the following terms:

acronym	photosynthesis
chlorophyll	prism
ionize	radiant
krypton	refracted
luminous	wavelength
ozone	xenon
particles	

DISCUSSION QUESTIONS:

1. What is the Aurora Borealis, and how does it develop? Why do you think humans have been so fascinated by it for so long? What have been some explanations for this phenomenon over time?
2. What is solar wind, and how long does it take to reach the earth's magnetic field? What role does it play in the development of the Aurora Borealis?
3. Can auroras be dangerous to human beings? Discuss.
4. What are meteors, and how do meteor showers develop? How can meteor fragments end up in the Earth's atmosphere?
5. Describe the process of rainbow formation. Why do the colors of the rainbow appear in a certain order? Why does each individual who sees a rainbow view it in a different way?
6. What are sprites and ELVES? What is the difference between these two phenomena?
7. What are the sources of cosmic rays? How can cosmic rays affect DNA? How can cosmic rays affect crew members of transatlantic flights?
8. What are the different kinds of ultraviolet rays, and how does each of them affect the ozone layer? What are the risks of various ultraviolet rays for humans?
9. What is SPF and what does it measure?
10. What is the process of photosynthesis and what are three main reasons it is important?
11. How does the earth's magnetic field change, and how do animals use the magnetic field?
12. Which of the cosmic phenomenon explored in this program did you find most interesting, and why?

EXTENDED ACTIVITIES:

Galaxy Glossary

This documentary introduces several concepts that may be new to students. As they watch, encourage students to keep a list of important terms and phrases discussed in this program. Then, have students share these terms with the larger class or group. Together the students can rank the importance of these terms and then create a glossary of these terms with their definitions. Students may want to further define these terms through their own research. The glossaries can be in PowerPoint format, on posterboard, or in the form of a scrapbook with images and designs based on the topic of this program.

“Leonid” Rediscovered

This documentary briefly discusses the Leonid meteor showers which took place in 1833. Online or at the library, research this event. Then, imagine you were present when these amazing meteor showers took place. Write a newspaper article about the event, describing what occurred and the ways the showers were interpreted by those who saw them. You can be creative in writing these articles but make sure to use historical details and scientific explanations.

Rainbow Connections

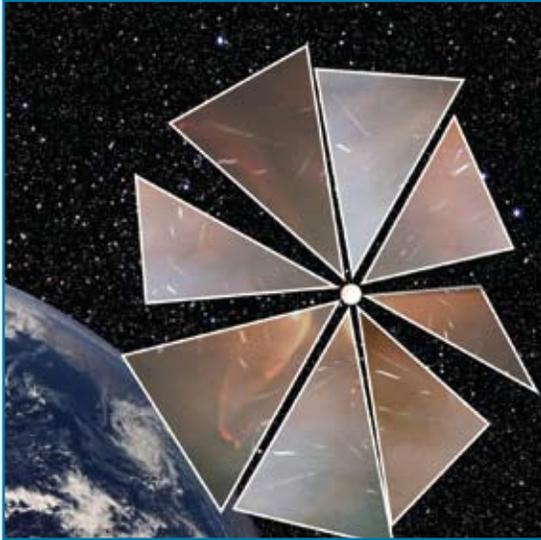
This program describes how rainbows form, why their colors develop in a certain pattern, and how humans see them in different ways. Break up into small groups; each group should create a project which explains how rainbows form. These projects can be in PowerPoint format, on posterboard, or in any other format including cartoons, podcasts, or short videos. Share these projects with the larger class or group.

Sci-Fi Files

This documentary explores many cosmic phenomena including rainbows, ELVES, sprites, cosmic rays, and meteor showers. Pick one of these topics to explore further, and research the topic more thoroughly. Choose ten key features or interesting facts about the topic you have chosen. Then, write up a one-page paper in bullet-point format outlining the most important characteristics or facts you learned. Share your findings with your larger class or group in a short oral presentation in which you discuss 3 of the 10 key characteristics of the phenomenon you chose.

SPF: Block it!

The dangers of overexposure to the sun's ultraviolet rays is carefully examined in this documentary. In order to protect against these dangerous rays, it is helpful to understand the concept of “SPF” and how sunscreen works. Create a short poem, song, or public service announcement explaining the definition of SPF and why it is important to have protection from ultraviolet rays.



WEBSITES:

The Universe series interactive site:

www.history.com/universe

NASA's website on cosmic rays:

<http://helios.gsfc.nasa.gov/cosmic.html>

A helpful site on how rainbows are formed:

www.eo.ucar.edu/rainbows

NASA's site on ultraviolet light and rays:

<http://science.hq.nasa.gov/kids/imagers/ems/uv.html>

BOOKS:

Bryson, George, et al. *Northern Lights: The Science, Myth, and Wonder of the Aurora Borealis* (Sasquatch Books, 2001).

Dickinson, Terence. *The Universe and Beyond* (Firefly Books, 2004).

Gorn, Michael. *NASA: The Complete Illustrated History* (Merrell Books, 2008).

Hakim, Joy. *The Story of Science: Einstein Adds a New Dimension* (Smithsonian Books, 2007).

First Space Encyclopedia (DK Publishing, 2008).