



**GRADES 9-12**

# The Universe: A Walk Through Space & Time

Be transported to the distant corners of the cosmos and witness how the Universe evolved over 13.7 billion years - from the Big Bang to modern day.

## Guide Overview

This guide includes suggestions for how to engage your students and facilitate an age-appropriate learning experience in the **The Universe: A Walk Through Space And Time** exhibit.

## Highlights & Related Questions



- FIND** Tell students to enter the exhibit through the glowing hallway.
- DO** Instruct a student to read aloud to the group the first square yellow panel immediately to their right, titled Take a Walk Through the History of Time.
- ASK** Based on the information you just read, can you recall how old the Universe is? Can you explain what has been happening since the Universe began? **It has been cooling and expanding and has been becoming more organized.**



- FIND** Instruct students to move through the hallway.
- DO** Instruct students to try to step on the green, blue and red particles on the ground. Encourage students to interact with the entire hallway. Have them make observations as they step.
- ASK** What happens when you step on the images? **The lights on the floor move and react to their motion.** What do you think these images represent? **The first display on the floor represents particles in the very early Universe. The center display represents exploding stars, called supernovae. The final display shows the effect of gravity on objects in space.**

- FIND** Have students locate the large five-paneled video screen at the end of the hall.
- DO** Encourage them to watch the movie. Tell them this is a video simulation that gradually zooms out from Chicago to the whole Universe.



**ASK** Periodically, ask them: What do you think this is showing? **Planets, solar system, stars, Milky Way, galaxies, Universe.** How do the objects change as the images move farther away from Earth? What changes can you differentiate between different levels of size and scale? What is the largest level of size, which contains all other levels? **The Universe!**



**FIND** Around the corner from the video screen, have students locate the camera pointed at a picture of the Moon at the Telescopes Are Time Machines station.

**DO** Instruct some students to step in front of the camera in front of the image. Have other students stand behind the camera and make observations of their classmates' image on the screen next to the wall.

**ASK** What do you see? **They see their classmates, but the image is delayed by 1.3 seconds.** Why do you think the image is delayed? **Because that is the amount of time it takes light to travel from the Moon to Earth.** If it takes 1.3 seconds from light to travel from the Moon to Earth, how long do you think it takes for light from the Sun to reach us? **8 minutes.** Another galaxy? **Can be billions of years, depending on location of galaxy.** This means we are seeing objects in space as they were in the past. How does this help us learn about the Universe and how it has changed over time? **Answers can include—we can view the Universe at various times in its development, we can observe galaxies at different stages to understand how they are formed.**



**FIND** Across from the Moon camera, have students locate the You Are Star Stuff station.

**DO** Encourage students to investigate the interactive.

**ASK** What types of elements make up the human body? **Answers include carbon, calcium, iron, oxygen, nitrogen.** Where do they come from? **They are formed in the center of stars through a process called fusion. Heavier elements are formed in supernovae.** Can you name any other elements that exist in the Universe? What makes elements different from one another? **The number of protons and neutrons in the nucleus of the atom.**



**FIND** Have students locate The Expanding Universe station across from the You Are Star Stuff station.

**DO** Encourage students to watch the short video next to the station and to investigate the station.

**ASK** What happens to the spring when the handle is pulled up, increasing the space and length? **The light turns red.** What happens when the space is compressed? **The light turns blue.** Explain what this demonstration represents. **Read the panel to the right of the station.** How can scientists tell how far away a galaxy is from the Milky Way by analyzing its light? **By measuring how much the light has stretched, or shifted to a redder color.**