

CosmoVerse Adventures: Big Bang History

Lesson Plan

Grade/ Grade Band:	Topic: Big Bang History	Lesson # _____ in a series of _____ lessons
<p>Brief Lesson Description: Students will explore the journey of the universe from its fiery infancy to its current state. This lesson introduces the students to the concept of the Cosmic Microwave Background (CMB) and how the expansion of the universe affects light waves. Through discussions and hands-on activity.</p>		
<p>Specific Learning Outcomes: By the end of the lesson, students will be able to:</p> <ol style="list-style-type: none"> (1) Describe major events in the universe's history that led to the formation of stars, galaxies, and planets (2) Explain the significance of the Cosmic Microwave Background (CMB). (3) Understand how the expansion of the universe stretches light waves. (4) Relate the stretching of light waves to the current detection of the CMB in the microwave spectrum. 		
Narrative / Background Information		
<p>Prior Student Knowledge: Students should have a basic understanding of:</p> <ul style="list-style-type: none"> • The concept of light waves and the electromagnetic spectrum. • The Big Bang theory and the idea that the universe is expanding. • Basic atomic structures, particularly hydrogen atoms. 		
<p>Materials needed:</p> <ul style="list-style-type: none"> • Strips of elastic (about 1 foot long) • Felt pen or marker • Ruler or measuring tape • Reference chart of the electromagnetic spectrum • Image of the Cosmic Microwave Background (CMB) 		
LESSON PLAN – 5-E Model		
<p>ENGAGE: Set the stage for the lesson and pique the students' interest Activity: Play the unscrambling egg video. Use images to explain the concepts. Discussion: "What does the video trying to explain?" "What do you see in this image?" "Did you know this image tells a story from the universe's infancy?"</p>		
<p>EXPLORE: Dive into the main content with the students through the story with Dr. George Smoot. Activity: Share/Read out the conversation with Dr. George Smoot. Discussion: "How does the universe 'clearing up' relate to a cloudy day?" "Why can't scientists see beyond 380,000 years after the Big Bang?" "What did the blue and red areas represent on the CMB map?"</p>		
<p>EXPLAIN: Introduce hands-on learning with the Action Lab. Activity: "The Expanding Universe and the Stretching Spectrum" from the provided Action Lab section. Discussion: "What did you observe when you stretched the elastic?" "How does this relate to what happened to light as the universe expanded?" "Can you explain why the fiery light of the universe now appears as microwaves?"</p>		
<p>ELABORATE: Reinforce and deepen understanding. Activity: Reflect on the conversation with Dr. Smoot and discuss the transformation of light waves over time. Discussion: "How did the tiny temperature changes lead to the creation of everything?" "Why is the CMB crucial for our understanding of the universe's history?" "What remains a mystery about the universe's beginning, and why?"</p>		
<p>EVALUATE: Check for understanding. Questions: "Can someone explain in their own words the significance of the 'Surface of Last Scattering'?" "How do the red and blue areas on the CMB map contribute to our understanding of the universe's early state?" "Based on our Action Lab, what did you learn about the stretching of the universe and its impact on light?"</p>		
<p>Homework/Extension: For those eager to dive deeper into this vast expanse, recommend the "Cosmic Library" section (as mentioned in the script) for further reading and exploration.</p>		