



Afterschool Universe

Outline of Sessions

The program consists of 12 sessions and begins with an assessment of participants' existing mental models of the Universe. It then moves into a series of sessions about astronomy basics —size and scale, light and the electromagnetic spectrum, and tools astronomers use (such as telescopes and spectroscopes). After these essentials are covered, the remaining sessions provide exciting hands-on exploration of topics that children (and adults) are curious to investigate, such as stars, galaxies, and more. A visit by a scientist or engineer is built into the program so that participants can ask any questions that may have arisen during the program and also interact with a scientist or engineer. The program ends with participants re-creating a model of the Universe, which allows a measure of perspective changes that occurred as a result of the program.

Session 1: Modelling the Universe

In this first session, participants are provided craft materials and asked to make a model of the Universe as they envision it. This session is an assessment tool as it is repeated at the end of the program to see how students' understanding of the Universe has evolved as a result of the program.

Session 2: Cosmic Survey

In this session, participants are led through an interactive discussion of size and scale of objects. They are provided pictures of objects on Earth and in space, and asked to rank them in order of various properties. The three main properties we discuss are: How big? How far? How old?

Session 3: The Astronomer's Toolbox - Telescopes

This session is intended to teach participants about one of the basic tools astronomers use—a telescope. Participants build a simple telescope, learn what it is used for, and gain an overall understanding of how it works. They begin to learn that it takes a finite amount of time for light to travel from one place to another.

Session 4: Invisible light

Participants are introduced to the electromagnetic spectrum and the notion that our eyes cannot see all the wavelengths of light. This session explores infrared and ultraviolet light as examples of "invisible light." Participants will explore how invisible light can be detected, and also learn about transmitters and shields of light.

Session 5: The Astronomer's Toolbox - Spectroscopes

Participants learn about additional techniques astronomers use to obtain data about distant objects using light. They build a simple spectroscope and look at light from different sources.

Session 6: Stars and Their Lives

This session discusses the fact that our Sun is a star and provides a basic understanding of how stars work. Participants engage in kinesthetic activities reinforced by a follow-up discussion. Participants learn there are different types of stars with life cycles that depend on how big and hot they are.



Session 7: Stars and Their Lives (Part II)

This session is an optional extension for those leaders who would like to go into more depth on some details of how stars work. Participants will learn that stars generate energy by fusion and “cook” most of the elements in the Universe using H and He as the ingredients. They also learn that stars release these elements into the Universe when the most massive stars explode as supernovae at the end of their lives.

Session 8: Our Cosmic Connection to the Elements

Participants learn about elements, the composition of the Universe, and that we are all truly made of “star stuff.”

Session 9: Galaxies

Participants learn that a galaxy is a large collection of stars, gas, and dust and we live in a galaxy called the Milky Way. They create a model of our Milky Way galaxy and learn about the different shapes of galaxies. Finally, they build on the concept of light travel time and learn about their address in the Universe.

Session 10: Black Holes

In this session, participants learn about black holes, the densest objects in the Universe. They explore some basic properties of black holes through a series of hands-on and kinesthetic activities.

Session 11: Visit from a (Space) Scientist or Engineer + Making a Cosmic Quilt

This session presents an opportunity for the students to ask questions that may have built up over the course of the program. It also allows contact with a real scientist or engineer and the opportunity to ask questions about careers in science and engineering. Additionally, students express their understanding of a topic they have studied in this program via an art and writing project.

Session 12: Modelling the Universe – The Sequel

Students repeat the Session 1 exercise to create a model of the Universe, allowing everyone to see how their understanding has changed as a result of this program.

Produced by the Afterschool Universe Team
Astrophysics Science Division, NASA Goddard Space Flight Center

<http://universe.nasa.gov/afterschool/>