



Discussion Guide for

THE UNIVERSE: THE VAST FRONTIER

OBJECTIVES

After viewing this program, students will be able to:

- Explain the "Big Bang" theory and what scientists believe happened immediately after the "Big Bang" occurred.
- Explain the relationship between the Doppler effect and red and blue shifts in the light spectrum of stars.
- Identify the three major types of galaxies and describe the differences between them.
- Describe quasars and the forces that create them.
- Describe the composition of interstellar matter and dust.
- Explain the difference between a bright nebulae and a dark nebulae.

This program is part of the AIMS Interactive Science Essentials Series. This twenty-four part series covers four subject areas- Earth Science, Biology, Physics, and Chemistry. There are six programs in each subject area. The individual programs are divided into randomly accessible sections. A glossary provides written definitions of terms used in the program, and in most cases will run a section of the video where the word is used in context. A script of the narration is accessible, as well as a bulletin board containing a general introduction to the subject. A quiz allows the student to test their knowledge and the results are recorded for

you. In the teacher's section you can view each student's test responses and edit or create your own quiz and test questions.

OVERVIEW

The Universe The Vast Frontier is part two of the Earth Science series. These six programs examine modern day earth science. The program provides colourful 3-D animation of the "Big Bang" and of the birth and death of stars. It also features exciting footage of the VLA radio telescope in New Mexico and optical telescopes on Kit Peak in Arizona along with hundreds of actual images that highlight the structure and history of the universe. After viewing this program, students will be familiar with spiral, irregular, and elliptical galaxies, nebulae, supernovas, quasars, neutron stars, pulsars, black holes, super clusters, the structure of the sun, and star evolution.

TEACHER'S PREPARATION

Before the student uses the program set up the computer so that they can easily reach the mouse and the keyboard. Load the CD-ROM into the computer so that it is ready for the student to begin using. While students are able to work at their own pace.

SUGGESTED DISCUSSION QUESTIONS

1. Discuss the evidence supporting the "Big Bang" theory. What are the strengths and weaknesses of the "Big Bang" theory? Discuss other theories for the creation of the universe.

2. Discuss the different types of galaxies in the universe and the forces that create them.

3. Discuss the role of forces such as gravity and fusion in the shaping of the universe.

4. Do quasars represent the formation of new galaxies at the edge of the universe? Defend your position.

5. Describe the thoughts that go through your mind when you look at the night sky. Do you believe there are other forms of life out there?

6. Describe what causes the glowing of auroras and bright nebulae.

7. Describe various phenomena that occur on the sun and their effects on the Earth.

8. Describe the possible variations in the life cycle of a star. What does the future hold for our own sun?

9. Discuss how neutron stars, supernovas, and black holes are formed. Since black holes aren't visible what evidence makes astronomers believe they exist? some students may benefit from using the program

10. Discuss the history and future of the universe.

VOCABULARY

Big Bang
doppler effect
elliptical galaxy
flares
galaxy
interstellar
irregular galaxy
microwave
Milky Way

nebula
neutron
photosphere
prominence
quasar
radiation
spiral galaxy
stars
sun
supernova
universe

ADDITIONAL BENEFITS

Students will be able to:

- Draw an illustration of the various layers of the sun and surface features such as sunspots and prominences.
- Describe what auroras are and the forces that create them.
- Illustrate and explain the life cycle of a typical star.
- Explain the processes by which supernovas, neutron stars and black holes are created.

PROGRAM DETAILS

LENGTH:

30 minutes

SUBJECT AREAS: EARTH SCIENCE

AUDIENCE LEVELS: JUNIOR-SENIOR HIGH

Agnes 6 - 11

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