

Discovering Alabama

Teacher's Guide

Alabama in Space

Suggested Curriculum Areas

History
Science
Social Studies

Suggested Grade Levels

4–12

Key Concepts

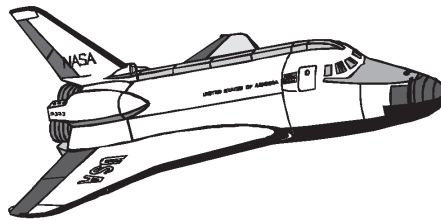
Creation
Cosmos
Biosphere

Key Skills

Reflection
Imagination
Forecasting

Synopsis

When the US space program began, an initial need was to find the right place for building and testing the powerful rockets that would be required. The chosen place turned out to be North Alabama in the Huntsville area. There, scientists found a unique combination of suitable undeveloped land together with easy access for transport of materials via the Tennessee River. The rest is history. This show traces that history,



the natural history, and the human history of Alabama's role in America's legacy of space travel. Produced with special assistance from the National

Aeronautics and Space Administration and including guest interviews by NASA officials, the show also honors the nation's fortieth-year celebration of the first arrival of man on the moon.



THE UNIVERSITY OF
ALABAMA



Discovering Alabama is a production of the Alabama Museum of Natural History in cooperation with Alabama Public Television. For a complete list of titles in the *Discovering Alabama* series, as well as for information about ordering videos and accompanying Teacher's Guides, contact us at either: *Discovering Alabama*, Box 870340, Tuscaloosa, AL 35487-0340; phone: (205) 348-2039; fax: (205) 348-4219; or email: orders@discoveringalabama.org. Also visit our website: www.discoveringalabama.org.

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*The Solon and Martha
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Alabama Department Of
Conservation and Natural Resources
State Lands Division

Before Viewing

1. Have students try to throw a tennis ball the 100-yard distance of a football field. Most attempts will likely fall well short of this distance, thereby providing opportunity to discuss the physical forces that bring the ball down to earth (air resistance and gravity). Next, you might have students take turns throwing the ball straight up into the sky to experience the difficulty of attempting vertical distance.

Now, present the class with a heavy bowling ball and invite discussion about the distance students might achieve in attempting to throw such a weighty mass (predictable student chuckles are to be welcomed here). Review pertinent relationships of mass and gravity, and have students consider the amount of thrust that would be needed to propel into space a mass as heavy as a multiple-ton rocket with manned space capsule.

2. Invite students to imagine being aboard a spaceship propelled beyond Earth and venturing out to explore other worlds. Introduce the video by explaining that science today is indeed probing distant reaches beyond the earth, and continuing to gain knowledge from decades of space exploration for which Alabama has played a key role.

While Viewing

1. Have students list the reasons Alabama was chosen for a leading role in the US space program.

2. Ask students to note scientists' views about the major purposes for continued space exploration today.

Video Mystery Question: The early years of the US space program were considered a "space race." Against whom was the US competing in this race for space? Which competitor was the first to achieve a manned landing and exploration somewhere beyond the earth? (**Answer:** The US government initiated an official program to achieve space travel during the "Cold War" period of tensions with the Soviet Union. The USSR took initial lead in the space race, when on April 12, 1961, a Soviet rocket carrying cosmonaut Yuri Gagarin was the first manned flight to reach space and orbit the Earth. On July 20, 1969, America's Apollo 11 Lunar Module "Eagle" carried astronauts Neil Armstrong and Buzz Aldrin to man's first landing and exploratory walk on the surface of the moon.

After Viewing

1. Place students in small groups ("scientific teams") to review and

discuss information presented in the video. Have each group report any new insights, ideas, or questions resulting from the video.

2. Have the teams consider the historical quest of science to fathom the intricacies of the universe, including the mysteries of gravity, light, time, and how these and other aspects/dimensions might be interrelated. Invite each team to pose a futuristic scenario in which new scientific discoveries enable a greater understanding about the physics of the universe. Allow each team to describe their scenario to the class. Use this opportunity to discuss related musings and discoveries by scientific minds from Isaac Newton to Albert Einstein.

3. Discuss the term "Spaceship Earth," a reference often used by environmental advocates in comparing the Earth to a spaceship (because Earth travels through space as it orbits the sun, and carries a finite supply of air, water, food, and other basic needs). The environmental lesson typically drawn from this comparison is that we human passengers on Earth, like the astronauts on a spaceship, must take care not to waste or contaminate our limited resources.

Certainly this analogy is useful in underscoring such a worthy observation, but teachers should also help students realize the many grand ways that Earth is *not* analogous to the fabricated confines of a manufactured spaceship. Encourage your class to reflect upon the video observation that our remarkable Earth is a rare gem in the cosmos, a profound realm of complex ecological diversity, unique in its organic, life-supporting capacities—all the greater reason for careful environmental stewardship.

Extensions

1. Use other *Discovering Alabama* videos and Teacher Guides, e.g., "Night Hike," "Wetumpka Impact Crater," "Flint River," and "Tracks Across Time," that include intriguing questions and observations regarding mysteries of the universe and the unique life-sustaining wonders of Earth.

2. Invite an astronomer or physicist to visit the class and share perspective on the intricacies of the universe, space travel, and related topics.

3. Have students read the children's novel *Space*, written by *Discovering Alabama* writer and director, Roger Reid. This wonderfully readable book offers an adventurous

mystery story, laced with instructive reflections about science, physics, and astronomy; it takes place in the Huntsville, Alabama, locale of the historically famed US Space and Rocket Center.

Philosophical Reflections

Various observers suggest that humankind must act soon in hopes of escaping unprecedented threats to future survival. One school of thought calls for greater cooperation among nations to achieve collaborative economic development, improved cultural relations, and stronger protection of the environment. According to this view, governments of the world should, for example, enact treaties to banish nuclear weapons and implement joint programs to reduce the threat of climate change.

Another school of thought maintains that, regardless of any such efforts for earthly improvement, life as we know it will eventually meet with total demise, from some future asteroid or planetary collision, if not from the inevitable consequences of overpopulation or catastrophic warfare. Many who hold this view conclude that the only hope for human survival is to develop the scientific capability to permanently leave planet Earth in search of other inhabitable worlds.

Thus the differing viewpoints sometimes disagree over where and how to concentrate the limited funding available to support science. There is debate, for example, over whether to give greater support to intensified study of global ecosystems, or to redouble efforts for space exploration. Often underlying these disagreements are contrasting philosophical perspectives, sometimes involving such matters as the order and design of the universe, the origins and purpose of life, and the proper moral relationship of humankind to the larger realm of Earthly creation.

These weighty topics can prompt conjecture in a number of areas, including our most central religious values and beliefs. For instance, imagine a community of transplanted earthlings adapting to a futuristic existence amidst a strange world in a distant galaxy. In this new and alien landscape, how might these transplanted earthlings reconcile the sacred stories and history that constitute the earthly basis of Christianity, Islam, or Judaism?

Invite the class to offer conjecture about other such future situations that could pose odd dilemmas when considered in connection with present-day values and beliefs.

Nature in Art

Among the array of photographs captured by astronauts are striking images of a gleaming Earth against the vast blackness of space. These include remarkable shots taken on the moon, peering across a stretch of dull gray moonscape and out to the warmly blue aura of Earth, contrasting the barren lifelessness of the moon with the living wonder of our biosphere. And, in recent years, advanced telescopes have obtained stunning images from distant stellar reaches, revealing evidence of many millions of galaxies and other awe-inspiring features of the cosmos. If art can be gauged by its power to stir the soul, these photographs from space certainly qualify as art. In fact, impressive art exhibits have been designed using selected photos taken by astronauts, satellite probes, and powerful optics such as the Hubble telescope. You might wish to have students seek out a number of these images (through a web search, library search, or by contacting NASA at Public Communications Office, NASA Headquarters Suite 5K39, Washington, DC 20546-0001) and arrange such an exhibit for your school or classroom.

Community Connections

1. Conduct a secret study to determine if any members of your community are aliens from outer space – just kidding (although you might know an individual or two that seem suspect). Have the class conduct a survey to sample pertinent views and beliefs of parents, teachers, and/or general members of the community to determine, for example, the percentages who believe that the earth is visited by alien UFOs, that space aliens live amongst us, or that there are societies of intelligent, living beings on other worlds in other galaxies.
2. Visit the Alabama Museum of Natural History and learn about asteroids and meteorites that have visited Earth from far reaches of space. Check with local astronomers or space enthusiasts to learn if your community has been touched by such a visit in the past.

Complementary Aids and Activities

“Playing Lightly on the Earth” from *Project WILD Activity Guide*. Contact:

Alabama Department of Conservation and Natural Resources, 64 North Union Street, Montgomery, AL 36130; phone: (334) 242-3623.

“Earth Manners” from *Project Learning Tree: Environmental Education Pre-K-8 Activity Guide*. Contact: Alabama Forestry Association, 555 Alabama Street, Montgomery, AL 36104.

“Our Blue Planet” from *Alabama’s Environmental Legacy: A Series of Classroom Activities*. Contact: Legacy, Partners in Environmental Education, P.O. Box 3813, Montgomery, AL 36109; phone: (800) 240-5115.

Additional References and Resources

Books

- *Dr. Space: The Life of Wernher von Braun* by Bob Ward, foreword by John Glenn. US Naval Institute Press, 2005.
- *Albert Einstein’s Vision: Remarkable Discoveries That Shaped Modern Science* by Barry Parker, Prometheus Books, 2004.
- *The Story of Science*, a three-book series written by Joy Hakim and published by Smithsonian Books. Titles are *Aristotle Leads the Way* (2004), *Newton at the Center* (2005), and *Einstein Adds a New Dimension* (2007).

Interesting Websites

- NASA: <http://www.nasa.gov/>. Note the cool NASA websites on the home page, such as LIFTOFF for teenagers and adults; for younger students, the NASA KIDS’ CLUB.
- Satellite Finder: Many satellites are visible with the naked eye. To find out when a lot of big satellites are visible, check out this NASA website: <http://science.nasa.gov/realtime/JPass/>.
- The Physics and Astronomy Department of the University of Alabama hosts a series of public viewing nights. For a schedule see: <http://www.astr.ua.edu/Public.html>.
- “Encyclopedia of Alabama”: www.encyclopediaofalabama.org/.
- Madison County History: www.co.madison.al.us/about/history/.

Parting Thoughts

A national assessment was conducted in 2009 to determine which news events ranked highest as most interesting among US society. Findings revealed that of greatest interest were the tabloid lives of famous performers, the hyped heroes of NASCAR, and the contrived drama of American Idol. Sadly, this evidence of the rise in such pop interests is coincidental to studies indicating a considerable decline in intellectual interests, particularly in regard to science, and especially among school children.

Perhaps we can take hope in the new educational doctrine of *techno-salvation*, i.e., the widely promoted belief that the means to enlightenment is through the wonders of technology, including the Internet and its promise of myriad learning opportunities. But even here, these technologies are often the tools for witless distraction, or worse, the proliferation of misinformation, prejudice, and other nonsense.

Still, I suppose we should strive to remain hopeful. Besides, there’s no use in being pessimistic – it probably wouldn’t work anyway (ha). And who knows, maybe one day we will indeed receive total enlightenment, transmitted from some distant world by an advanced civilization that is presently watching us and surely wondering if there is intelligent life on Earth.

Oh yeah, I almost forgot, the Teacher Guide for the Discovering Alabama program “Night Hike” is often applauded by teachers appreciative of science education that embraces philosophical inquiry while also being sensitive to student’s religious inclinations. Of course, you are your own best judge of whether and how to bridge such concerns in your particular school situation, but you might want to consider the “Night Hike” video and Teacher Guide as food for thought and possible teaching ideas.



Happy outings,

Dr. Doug



Discovering Alabama

Activity/Information Sheet

Alabama in Space

**FOR YOUR ENJOYMENT!
A Sampling of Children's
Correspondence with
Professor Albert Einstein**

The following are portions of three letters for which there is record of Prof. Einstein's response. (Excerpts from Dear Professor Einstein: Albert Einstein's Letters to and from Children edited by Alice Calaprice, Prometheus Books, 2002.)

January 3, 1943

Dear Sir,

For quite a while I have admired you. I am just an average twelve year old girl in the 7A at Eliot Junior High School.

I'm a little below average in mathematics. I have to work longer in it than most of my friends. I worry (perhaps too much), although in the end I imagine it will all work out for the best.

Sincerely yours,
Barbara

January 7, 1943

Dear Barbara,

I was very pleased with your kind letter. Do not worry about your difficulties in mathematics; I can assure you that mine are still greater.

Sincerely yours,
Professor Albert Einstein

December 6, 1951

Dear Professor,

We are six children who took an interest in Science. We are in sixth grade. In our class we are having an argument. The class took sides. We six are on one side and 21 on the other side. The argument is whether there would be living things on earth if the sun burnt out or if human beings would die. We believe there would be living things on the earth if the sun burnt out. Will you tell us what you think?

Love and lollipops,
Six Little Scientists
P.S. Linda wrote the letter.

December 12, 1951

Dear Children:

The minority is sometimes right – but not in your case. Without sunlight there is: no wheat, no bread, no grass, no cattle, no meat, no milk, and everything would be frozen. No LIFE.

A. Einstein

10th July, 1946

Dear Sir,

I probably would have written ages ago, only I was not aware that you were still alive...I must have been mixing you up with Sir Isaac Newton or someone.

I am awfully interested in Science.... Every night after Lights Out at school, Pat Wilson and I lean out of our cubicle windows, which are next to each other, and discuss Astronomy....Pat has a telescope and we study those stars that we can see. Now they have all moved over, and we usually have to creep past the prefect's room to other parts of the building to carry on our observations. We have been caught a few times now, though, so it's rather difficult.

I trust you are well, and will continue to make many more great scientific discoveries. I remain,
Yours obediently,
Tyfanny

August 25, 1946

Dear Tyfanny,

Thank you for your letter of July 10th. I have to apologize to you that I am still

among the living. There will be a remedy for this, however.

I hope that yours and your friend's future astronomical investigations will not be discovered anymore by the eyes and ears of your school-government. This is the attitude taken by most good citizens toward their government and I think rightly so.

Yours sincerely,
Albert Einstein

The next are three letters of delightful brevity and innocent humor. Unfortunately, Prof. Einstein's answers are not among historical records.

Dear Sir,

I am a high school student and have a problem. My teacher and I were talking about Satan. Of course you know that when he fell from heaven, he fell for nine days, and nine nights, at 32 feet a second and was increasing his speed every second.

I was told there was a formula to it. I know you don't have time for such little things, but if possible please send me the formula.

Thanks you.

Jerry

Dear Dr. Einstein,

My Father and I are going to build a rocket and go to Mars or Venus. We hope you will go too. We want you to go because we need a good scientist and someone who can guide a rocket good.

Do you care if Mary goes too? She is two years old. She is a very nice girl.

Everybody has to pay for his food because we will go broke if we pay!

I hope you have a nice trip if you go.

Love,
John

Dear Mr. Einstein,

I am a little girl of six.

I saw your picture in the paper. I think you ought to have a haircut, so you can look better.

Cordially yours,
Ann