

## OBJECTIVES

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After completing this lab, the student will be able to:

1. describe the contributions of three different scientists to the science of Cosmology.
2. discuss the world events surrounding each of these scientists.
3. draw any connections which may link these scientists together in some way.

## STUDENT MATERIALS

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pencil  
note pad

## LAB MATERIALS

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The instructor should provide the following:

high speed computers with Internet connections

## STUDENT REQUIREMENTS

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Students may work alone or in teams of not more than three. However, each student is expected to write his own reports, not simply copy from other team members. Turn in all of your reports at the end of your lab period.

## INTRODUCTION

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Scientists do not work in a vacuum (at least not without a space suit). They are influenced by other scientists and world events which surround them. Many times scientists make discoveries because their work has been influenced by other scientists or individuals working on similar problems. Sometimes the wrong person may receive the credit for a

discovery because they expanded and/or popularized someone else's work. Sometimes discoveries are made accidentally by a scientist working on a completely different problem. Regardless of how scientific knowledge is obtained, it does not become generally accepted until society agrees to accept it. Recall Galileo and the problems he had with the Roman Catholic Church. Think of the modern controversy between biologists and theologians over Darwin's Theory of Evolution. Currently, cloning has taken center stage in the life sciences. The study of cosmology has deep scientific and religious significance and is one of the hottest topics in astronomy today. As cosmologists learn more about the creation of the universe, their scientific results will affect our religious and social structure.

Learning about science does not always involve learning about scientific discoveries. Sometimes it means learning about scientists themselves. During this lab you will try to find the discoveries of three scientists who were, or are currently, working on problems in the field of cosmology. You will attempt to draw threads between them to see if they influenced each other in some manner. Finally, you will attempt to relate the work of each scientist to the backdrop of the society in which they worked and how that social connection may have affected their science. Some of these scientists will be rather easy to track down, while others may be difficult. I hope you will find this study of scientists and their lives interesting. As you research each of your scientists look at the social and religious influences both on their practice of science and of their scientific results on society.

## PROCEDURE

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Pick at least three scientists from the list below. You are to use Internet search engines such as Yahoo, Lycos, etc., to find out what contribution(s) each of them has made to the study of cosmology. The best

way to do this is to click on **search** and then enter the astronomer's name in the search box. Another place to start is <http://www.yahoo.co.uk>, and click on **science**, then **astronomy**, then **astronomers**. As you obtain information about each scientist, try to establish the social background each of them was working under. Were there wars or other political events, illnesses, financial constraints, religious beliefs, etc., which in some way affected their scientific philosophy and discoveries? In addition, try to establish some links between the three scientists you have chosen. These connections may be easy, difficult or impossible to establish. Do the best you can. As you find information, jot it down on your note pad so you can use it later to write up your lab report about each scientist. As you study one person's work you may be led to study someone else on the list. Do not feel obligated to stick to your initial selections. If you find that it is difficult to find information about one of the scientists you have selected, then simply pick someone else. Do not spend the entire lab period hunting down information that is hard to obtain. The purpose of this lab is to learn about cosmology by studying scientists working in the field, not to make your search difficult. Answer the questions about each one on the forms provided on the next few pages. When you are finished, staple your reports together and turn them in.

Choose from this list

- Henrietta Leavitt
- Vesto M. Slipher
- Harlow Shapley
- Kip Thorne
- George Lemaitre
- Edwin Hubble
- Milton Humason
- Fred Hoyle
- Arno Penzias & Robert Wilson
- Steven Weinberg
- Stephen Hawking
- Alexander Friedmann
- Albert Einstein
- Jacobus Kapteyn
- William de Sitter

NAME: \_\_\_\_\_

LAB SECTION: \_\_\_\_\_

## COSMOLOGIST REPORT NUMBER 1

SCIENTIST'S NAME: \_\_\_\_\_ BORN/DIED: \_\_\_\_\_

1. Write a short discussion about the life and times of this scientist. Be sure to include world events, religious beliefs, etc., which may have influenced their scientific studies.

2. What was (were) this person's major scientific contribution(s) to the study of Cosmology?

3. What connections, if any, can you make between this person and any work done by some of the other scientists in the original list? This should include how one person's work may have affected the science of the person in this report.

NAME: \_\_\_\_\_

LAB SECTION: \_\_\_\_\_

## COSMOLOGIST REPORT NUMBER 2

SCIENTIST'S NAME: \_\_\_\_\_ BORN/DIED: \_\_\_\_\_

1. Write a short discussion about the life and times of this scientist. Be sure to include world events, religious beliefs, etc., which may have influenced their scientific studies.

2. What was (were) this person's major scientific contribution(s) to the study of Cosmology?

3. What connections, if any, can you make between this person and any work done by some of the other scientists in the original list? This should include how one person's work may have affected the science of the person in this report.

NAME: \_\_\_\_\_

LAB SECTION: \_\_\_\_\_

### **COSMOLOGIST REPORT NUMBER 3**

SCIENTIST'S NAME: \_\_\_\_\_

BORN/DIED: \_\_\_\_\_

1. Write a short discussion about the life and times of this scientist. Be sure to include world events, religious beliefs, etc., which may have influenced their scientific studies.

2. What was (were) this person's major scientific contribution(s) to the study of Cosmology?

3. What connections, if any, can you make between this person and any work done by some of the other scientists in the original list? This should include how one person's work may have affected the science of the person in this report.