Audience
Grades 6-8

Time Recommended
1-2 Hours

AAAS STANDARDS

- 3A/M2: Technology is essential to science for such purposes as access to outer space and other remote locations, sample collection and treatment, measurement, data collection and storage, computation, and communication of information

- 1C/M1: Important contributions to the advancement of science, mathematics, and technology have been made by different kinds of people, in different cultures, at different times.

NSES STANDARDS

Content Standard E (5-8): Science and Technology:

b. Technology is essential to science, because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed. Technology also provides tools for investigations, inquiry, and analysis.

Content Standard F (5-8): Science and Technology in Society:

e. Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.

Content Standard G (5-8): History and Nature of Science:

c. In historical perspective, science has been practiced by different individuals in different cultures.

MATERIALS

- Computers or Computer Lab
- Timeline Student Worksheet (attached)
- Research Support Sheet (attached)
- Drawing Tools
- Tape

Lunar Exploration Timeline:

Learning Objectives:

- Students will be able to discuss past missions and make a visual connection between them.
- Students will understand that individual missions build on each other to contribute to lunar exploration as a whole.

Students will understand the history of the space exploration as a whole and learn about major events in the history of lunar exploration. They will be introduced to previous and current moon missions and explore the accomplishments of each.

Preparation:

Prior to starting this lesson, you may need to reserve time in the computer lab or allow access to computers in the classroom. As an optional pre-lesson activity you could ask students to create a list of events in space history. You may choose to have them research this topic, list events they remember or have heard about, or interview friends/family members about the topics. Review the Student Research Support document to be familiar with the resources you will be leading the students to and helpful strategies for student research.

Procedure:

1. Investigate what your class knows about space exploration history. Students could use notes they took as preparation for this activity. What missions or programs are they familiar with? What space explorers can they name and what do they know about them?

2. Break class into groups of 3-4 students and assign each group a mission or program that contributed to lunar exploration. Give each group a timeline worksheet to fill out with mission program start and end dates, goals, accomplishments, destination, and fun facts. Students should also add imagery of the spacecraft, astronauts, badges or any other significant images by drawing images based on information from the mission sheets. If available, students can also cut and past images onto the mission sheets. Give students at least 30 minutes to complete their own research into that mission or program.

3. When students are finished, they should work together as a class to form a timeline in chronological order. The timeline worksheets can be attached end to end to create the physical timeline on a wall in the classroom. Each group should report on the program/mission they investigated. You should spend approximately 15 minutes reporting out.

4.   For approximately 15 minutes, discuss the following as a class: What have we learned thus far from space exploration? What have we accomplished solely with moon missions? How did the achievements of early missions contribute to the success of later missions? How could we build off of what we have learned from the past missions?

Assessment:

Review each group's timeline worksheets for completeness and accuracy. Student presentations should convey all, important information in a way that is easy for the class to understand. As a class, students should be able to work together to construct the full timeline.

TEACHER SCORING GUIDE

Assignment: Timeline Activity

Student Name(s): _____   Date: _____

Performance Indicator	0	1	2	3	4
Students completed all sections of the worksheet.					
Students' work shows evidence that care was taken when completed					
All information presented is accurate.					
Students convey all the important information in a way that is easy for the class to understand.					
Students have a sense for where their mission fits into the overall timeline.					
Point Total					

Point total from above: _____/ (20 possible)

Grading Scale:

A = 18 - 20 points

B = 16 - 17 points

C = 14 - 15 points

D = 12 - 13 points

F = 0 - 11 points

Grade for this Assignment: _____

SUPPLEMENTAL IMAGES/ MATERIALS/ RESOURCES:

Start Date	End Date	Mission or Program Name			
		Country		**Mission/Program Goals (check if met)**	**Fun Facts**
Mission/Program Images					

Student Research Support

APPROVED SITES AND LUNAR MISSIONS/PROGRAMS:

http://solarsystem.nasa.gov/missions/profile.cfm?Sort=Target&Target=Moon&Era=Present

OVERVIEW OF LUNAR MISSIONS

Past Programs and Missions

- Pioneer Program and missions
- Luna Program and missions
- Ranger Program and mission
- Surveyor Program and missions
- Lunar Orbiter Program and missions
- Explorer Program and missions
- Apollo Program and missions
- Lunar Prospector
- Hiten-Hagamoro
- Kaguya
- Chang'e 1
- Chandrayaan-1
- Clementine
- SMART -1
- LCROSS
- ARTEMIS

Present Programs and Missions

- LRO (Lunar Reconnaissance Orbiter)
- Chang'e 2
- GRAIL

Future Programs and Missions

- LADEE

More detailed information about each of these missions can be found on their specific mission sites (including images). Search for those here: http://www.nasa.gov/missions/index.html

Japan Aerospace Exploration Agency

http://www.jaxa.jp/projects/sat/index_e.html

Selene/Kaguya

http://www.jaxa.jp/projects/sat/selene/index_e.html

Hiten Muses-A

http://www.isas.jaxa.jp/e/enterp/missions/hiten.shtml

European Space Agency

http://www.esa.int/export/esaCP/index.html

SMART -1

http://www.esa.int/export/SPECIALS/SMART-1/index.html

STRATEGIES FOR SUCCESSFUL AND EFFICIENT STUDENT RESEARCH

1. If possible get support from the school librarian or media specialist who may be specifically trained in facilitating this type of student research.

2. Have different students in each group be responsible for a piece of the required information and then they can collaborate to make sure it all comes together cohesively for the presentation.

3. Remind students to look for what's special or unique about their topic and how it might relate to other topics in a meaningful way.

4. Insist that students should not copy word for word what's on the site, but evaluate what information is needed and what information they feel confident communicating to others in their own words.

5. Allow students different options of how to collect the information. Some students like to print out everything and then select the important information others like to select the important information electronically and then print only what's relevant.

6. Remind students to stay on topic. This kind of autonomy can be difficult for some students and they made need multiple reminders of the task at hand.

7. Give students periodic time checks. The students will be more able to assess what they have accomplished and can decide how to best use the remaining time with the computers.

Extension Activities:

Add other historical events to the timeline to create a context for the lunar missions.