



Coca-Cola Space Science Center

Columbus State University

SHOWS, EXHIBITS & ACTIVITIES FOCUSED ON GEORGIA PERFORMANCE STANDARDS

Rendezvous with a Comet Challenger Learning Center Sixth Grade Earth Science

Mission Summary

In the not too distant future, teams of scientists are routinely using small, maneuverable space stations to venture out into Earth's "neighborhood" as part of a long term study of small bodies in the Solar System. Primary targets include comets and asteroids, which scientists believe are the oldest, most primitive bodies in the Solar System and may preserve the earliest record of the material that formed Earth and its planetary neighbors.

During this mission, team member's work as scientists and engineers headed to "*Rendezvous with a Comet*" as part of this continued study of our Solar System. The onboard astronauts, working with their counterparts in Mission Control, are tasked with sending a probe to intercept and collect new data on a well-studied short period comet before heading on for a continued study of the asteroid Ceres, the largest known asteroid at 623 miles in diameter. Small bodies in the Solar System are also highly unpredictable objects and have been known to surprise scientists from time to time, so crew members will also need to be on their toes and be ready to make quick decisions.

Duration of Mission: 90-120 Minutes

Associated Web Sites

www.ccssc.org - Coca-Cola Space Science Center

<http://www.universetoday.com/> - Latest news about astronomy, great pictures.

<http://www.nineplanets.org/> - Good source for research on our Solar System.

<http://hubble.stsci.edu/gallery/> - Look no further for the best that Hubble has to offer!

<http://sse.jpl.nasa.gov/index.cfm> - This site has lesson plans/activities related to latest missions.

<http://www.jpl.nasa.gov/missions/mer/> - Latest news and pictures from the Mars rovers.

<http://www.badastronomy.com/bad/index.html> - Cool site that debunks common misconceptions and other pseudoscientific ideas.

<http://www.solarviews.com/ss.html> - Source for Solar System research and icosahedrons.

<http://www.kidsastronomy.com> - Great site for young astronomers.

<http://www.nasa.gov> - This site has it all.

<http://spacelink.msfc.nasa.gov/> - NASA site for educational resources.

<http://spacescience.nasa.gov/education/educators/links/> - Space Science Education/Public Outreach Sites
<http://www.pbs.org/wgbh/nova/mars/> - Nova website on Mars rovers.
http://www.exploratorium.edu/ronh/solar_system/ - use to make a scale model of solar system

GPS Objectives

Co- Requisite – Characteristics of Science

-----Habits of

Mind- -----

S6CS1 Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.

- a. Understand the importance of—and keep—honest, clear, and accurate records in science.
- b. Understand that hypotheses are valuable if they lead to fruitful investigations, even if the hypotheses turn out not to be completely accurate descriptions.

S6CS2 Students will use standard safety practices for all classroom laboratory and field investigations.

- a. Follow correct procedures for use of scientific apparatus.
- b. Demonstrate appropriate techniques in all laboratory situations.
- c. Follow correct protocol for identifying and reporting safety problems and violations.

S6CS3 Students will use computation and estimation skills necessary for analyzing data and following scientific explanations.

- a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers and decimals.
- b. Use metric input units (such as seconds, meters, or grams per milliliter) of scientific calculations to determine the proper unit for expressing the answer.
- c. Address the relationship between accuracy and precision and the importance of each.
- d. Draw conclusions based on analyzed data.

S6CS4 Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.

- a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.
- b. Estimate the effect of making a change in one part of a system on the system as a whole.
- c. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various quantities.

S6CS5 Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.

- a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts (e.g., El Nino's effect on weather).
- b. Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model's purpose and complexity.

-----The Nature of

Science-----

S6CS8 Students will investigate the characteristics of scientific knowledge and how it is achieved.

Students will apply the following to scientific concepts:

- a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.

S6CS9 Students will investigate the features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:

- a. Scientific investigations are conducted for different reasons. They usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations.
- b. Scientists often collaborate to design research. To prevent bias, scientists conduct independent studies of the same questions.
- c. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator's credibility with other scientists and society.
- d. Scientists use technology and mathematics to enhance the process of scientific inquiry.

Reading Standard Comment

S6CS10 Students will enhance reading in all curriculum areas by:

- a. Reading in All Curriculum Areas
 - Read both informational and fictional texts in a variety of genres and modes of discourse.
 - Relate messages and themes from one subject area to messages and themes in another area.
- c. Building vocabulary knowledge
 - Demonstrate an understanding of contextual vocabulary in various subjects.
 - Use content vocabulary in writing and speaking.
 - Explore understanding of new words found in subject area texts.
- d. Establishing context
 - Explore life experiences related to subject area content.

Co- Requisite- Content

S6E1 Students will explore current scientific views of the universe and how those views evolved.

- c. Compare and contrast the planets in terms of
 - Size relative to the earth
 - Surface and atmospheric features
 - Relative distance from the sun
 - Ability to support life
- e. Explain that gravity is the force that governs the motion in the solar system.
- f. Describe the characteristics of comets, asteroids, and meteors.

S6E3 Students will recognize the significant role of water in earth processes.

- a. Explain that a large portion of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water, and ice.

S6E5 Students will investigate the scientific view of how the earth's surface is formed.

- b. Classify rocks by their process of formation.
- g. Describe soil as consisting of weathered rocks and decomposed organic material.

S6E6 Students will describe various sources of energy and with their uses and conservation.

- a. Explain the role of the sun as the major source of energy and the sun's relationship to wind and water energy.

Mathematics

M6N1 Students will understand the meaning of the four arithmetic operations as related to positive rational numbers and will use these concepts to solve problems.

- d. Add and subtract fractions and mixed numbers with unlike denominators.
- e. Multiply and divide fractions and mixed numbers.
- f. Use fractions, decimals, and percents interchangeably.

Measurement

M6M2 Students will use appropriate units of measure for finding length, perimeter, area, and volume and will express each quantity using the appropriate unit.

- b. Select and use units of appropriate size and type to measure length, perimeter, area, and volume.

Geometry

Data Analysis and Probability

M6D1 Students will pose questions, collect data, represent and analyze the data, and interpret results.

- a. Formulate questions that can be answered by data. Students should collect data by using samples from a larger population (surveys), or by conducting experiments.
- e. Relate the data analysis to the context of the questions posed.

Terms/Symbols

Process Standards

M6P1 Students will solve problems (using appropriate technology).

- b. Solve problems that arise in mathematics and in other contexts.

M6P3 Students will communicate mathematically.

- a. Organize and consolidate their mathematical thinking through communication.
- b. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.
- c. Analyze and evaluate the mathematical thinking and strategies of others.
- d. Use the language of mathematics to express mathematical ideas precisely.

M6P4 Students will make connections among mathematical ideas and to other disciplines.

- a. Recognize and use connections among mathematical ideas.
- c. Recognize and apply mathematics in contexts outside of mathematics.

M6RC1 Students will enhance reading in all curriculum areas by:

- a. Reading in all curriculum Areas
 - Read technical texts related to various subject areas.
- b. Discussing books
 - Relate messages and themes from one subject area to messages and themes in another area.
- c. Building vocabulary knowledge
 - Demonstrate an understanding of contextual vocabulary in various subjects.
 - Use content vocabulary in writing and speaking.
 - Explore understanding of new words found in subject area texts.

d. Establishing context

- Explore life experiences related to subject area content.
- Determine strategies for finding content and contextual meaning for unknown words.

English/Language Arts

ELA6R2 The student understands and acquires new vocabulary and uses it correctly in reading and writing. The student

- a. Determines the meaning of unfamiliar words by using word, sentence, and paragraph clues.
- b. Uses knowledge of Greek and Latin affixes to understand unfamiliar vocabulary.

Reading Across the Curriculum

ELA6RC2 The student participates in discussions related to curricular learning in all subject areas. The student

- b. Responds to a variety of texts in multiple modes of discourse.
- c. Relates messages and themes from one subject area to those in another area.

ELA6RC3 The student acquires new vocabulary in each content area and uses it correctly. The student

- a. Demonstrates an understanding of contextual vocabulary in various subjects.
- b. Uses content vocabulary in writing and speaking.
- c. Explores understanding of new words found in subject area texts.

ELA6RC4 The student establishes a context for information acquired by reading across subject areas. The student

- a. Explores life experiences related to subject area content.
- c. Determines strategies for finding content and contextual meaning for unfamiliar words or concepts.

Writing

ELA6W1 The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and provides a satisfying closure. The student

- b. Writes texts of a length appropriate to address the topic or tell the story.

Listening/Speaking/Viewing

ELA6LSV1 The student participates in student-to-teacher, student-to-student, and group verbal interactions. The student

- a. Initiates new topics in addition to responding to adult-initiated topics.
- b. Asks relevant questions.
- c. Responds to questions with appropriate information.
- d. Confirms understanding by paraphrasing the adult's directions or suggestions.
- g. Offers own opinion forcefully without being domineering.
- h. Responds appropriately to comments and questions.
- i. Volunteers contributions and responds when directly solicited by teacher or discussion leader.
- l. Employs a group decision-making technique such as brainstorming or a problem-solving sequence (e.g., recognizes problem, defines problem, identifies possible solutions, selects optimal solution, implements solution, evaluates solution).

Social Studies

Social Studies Skills

Matrices

MAP AND GLOBE SKILLS

Map and Globe Skills

1. use cardinal directions
6. use map key/legend to acquire information from historical, physical, political, resource, product, and economic maps
8. draw conclusions and make generalizations based on information from maps

Information Processing Skills

1. compare similarities and differences
3. identify issues and/or problems and alternative solutions
11. draw conclusions and make generalizations
12. analyze graphs and diagrams
15. determine adequacy and/or relevancy of information
16. check for consistency of information