



# Challenger Learning Center of Maine Educator Resource Binder

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**Preface:**

The teacher materials provided in this binder offer you, the educator, a level of choice. The guide titled Mission Prep is a stand alone set of activities designed to prepare your students for their visit to the Challenger Learning Center. The guide titled Comet is designed for you to use in your classroom to prepare your students specifically for their mission, "Rendezvous with a Comet". As is, both guides are great educator resources. They are clearly written, sequentially organized, and easy to use. Used together, these guides will help you ensure that your students have an experience that is out of this world.

There is also an additional section of this binder developed by committed, experienced, award-winning Maine educators. Because the Challenger Learning Center of Maine is committed to quality educational experiences, we have developed a set of supplementary lessons and resources designed to more thoroughly meet the Maine Learning Results. To accomplish this we conducted a full standards analysis of both Mission Prep and Comet. Following the analysis, the group concluded that Mission Prep primarily meets MLR standards for grade levels 3-4 and should serve to "brush up" and reinforce necessary skills for successful completion of the mission. The Comet curriculum is directed more towards the grade 5-8 standards, however, the committee felt that with modifications, more of the standards for grades 5-8 could be met. The specific MLR's met by the modified lessons are outlined at the beginning of the lesson, followed by the recommended additions.

Your classroom needs and the requirements of your district will determine to what extent you use this binder. If you would like further information regarding the standards analysis conducted, please contact the Challenger Learning Center of Maine.



## Summary of Maine Learning Results met by “Mission Prep” classroom activities

Following a critical analysis of the activities provided in the “Mission Prep” lesson manual, we have determined that the activities may meet the following Maine Learning Results. Additional learning standards are touched upon, as indicated in the table included, however, we, at the CLC of Maine, feel the “Mission Prep” activities best meet the following standards. Inclusion of the specific learning goals is in progress for each of the standards below.

### Science and Technology

- **A-4 (3-4) Compare and contrast the life cycles, behavior, and structure of different organisms.**
- **F-2 (3-4) Demonstrate an understanding that many things about the earth (e.g. climate) occur in cycles that vary in length and frequency.**
- **J-1 (3-4, 5-8) Make accurate observations using appropriate tools and units of measure.**
- **J-2 (3-4) Conduct scientific investigations: make observations, collect and analyze data, and do experiments.**
- **J-2 (5-8) Design and conduct scientific investigations which include controlled experiments and systematic observations. Collect and analyze data, and draw conclusions fairly.**
- **K-3 (3-4) Draw conclusions about observations.**
- **K-6 (5-8) Support reasoning by using a variety of evidence.**
- **L-1 (3-4) Record results of experiments or activities (e.g., interview, discussions, field work) and summarize and communicate what they have learned.**
- **L-1 (5-8) Discuss scientific and technological ideas and make conjectures and convincing arguments.**
- **L-2 (5-8) Defend problem-solving strategies and solutions.**
- **L-3 (5-8) Evaluate individual and group communication for clarity, and work to improve communication.**
- **L-4 (5-8) Make a 3-dimensional model to represent real objects.**
- **L-6 (5-8) Identify and perform roles necessary to accomplish group tasks.**

### Mathematics

- **E-2 (5-8) Apply geometric properties to represent and solve real-life problems involving regular and irregular shapes.**
- **E-3 (5-8) Use a coordinate system to define and locate position.**
- **F-1 (5-8) Demonstrate the structure and use of systems of measurement.**
- **F-2 (3-4) Select measuring tools and units of measurement that are appropriate for what is being measured.**
- **F-3 (5-8) Demonstrate an understanding of length, area, volume and the corresponding units, square units, and cubic units of measure.**

**English Language Arts:**

- A-1 (5-8) Formulate questions to be answered while reading.
- A-4 (5-8) Use specific strategies (e.g. rereading, consultation) to clear up confusing parts of a text.
- A-10 (5-8) Adjust viewing and listening strategies in order to comprehend materials viewed and heard.
- C-4 (3-4) Make observations about the use of language and graphic symbols encountered in various real-life situations.
- E-2 (5-8) Use planning, drafting, and revising to produce, on demand, a well-developed, organized piece that demonstrates effective language use, voice, and command of mechanics.
- E-3 (5-8) Ask questions and apply personal interpretations in class discussion following speeches and oral presentations.
- F-2 (5-8) Demonstrate command of the conventions necessary to make an informal speech or presentation, effectively.
- G-3 (5-8) Write pieces and deliver oral presentations that use structures appropriate to audience and purpose.
- G-6 (5-8) Write and deliver oral presentations that achieve distinct purposes (e.g. to summarize, to narrate, to inform, to explain).

**Visual and Performing Arts:**

- A-4 (5-8) Use a variety of resources, materials, and techniques to design and execute art works.
- C-4 (5-8) Compare and contrast the effectiveness of selected media, techniques, and processes in communicating ideas.

**Health and Physical Education/ Health Education:**

- A-5 (5-8) Analyze how the environment relates to personal health.

**Social Studies/ Geography:**

- A-2 (5-8) Develop maps, globes, charts, models, and databases to analyze geographical patterns on earth.



## Summary of Maine Learning Results met by “Rendezvous with a Comet” classroom activities

Following a critical analysis of the activities provided in the “Comet” lesson manual, we have determined that the activities will meet the following Maine Learning Results. Additional learning standards are touched upon, as indicated in the table included, however, we, at the CLC of Maine, feel the “Comet” activities best meet the following standards.

**Standards and Learning Goals:****Science**

- G-4 (5-8) Describe Scientists’ exploration of space and objects they have found.  
Students will find out when famous comets were discovered.

This work was made possible by support from the Maine Space Grant Consortium.

- Students describe the unique features of some comets.  
 Students will learn about the scientist who discovered the comet and method used to discover.  
 Find the parts of a comet and label a picture.  
 Students will describe the comet's period.
- **G-5 (5-8) Describe the motions of moons, planets, stars, solar systems and galaxies.**  
 Students will compare the orbits of planets and comets.  
 Students will understand that the motion of these orbiting bodies is different from the motion of stars and galaxies.
  - **J-1 (5-8) Make accurate observations using appropriate tools and units of measure.**  
 Students will investigate the characteristics of a clay ball.  
 Students will examine what happens to a ball of clay that is dropped from different heights.  
 \*Students will make systematic measurements of a clay ball before and after a drop.
  - **J-2 (5-8) Design and conduct scientific investigations which include controlled experiments and systematic observations. Collect and analyze data and draw conclusions fairly.**  
 Needs initial discussion of variable vs. control.  
 Students will select test mediums which they hypothesize will catch the falling clay ball without changing its shape.  
 Students will test hypotheses and record observations.  
 Students will all create a sample of Aerogel-lo that is the same and will test it.  
 Students will observe and measure the depth and width of the particle tracks  
 Students will decide on one variable to change in creating a more effective Aerogel-lo  
 Students will test their new Aerogel-lo, measure and record their observations, and draw some conclusions about their design
  - **K-9 (5-8) Apply analogous reasoning.**  
 Students will create ellipses and use them as models of real orbits.
  - **L-2 (5-8) Defend problem-solving strategies and solutions.**  
 Students will evaluate the test mediums on their ability to meet the criteria for in space demands, devising appropriate tests to substantiate their claims.  
 Students will use results to rank the mediums tested; they will present this to the class using their test summaries to support their reasoning.  
 Students will test their selected collection medium by dropping the clay ball from greater heights to determine if it will continue to perform as expected.
  - **L-4 (5-8) Make a 3-dimensional model to represent real objects.**  
 Students will make a model and identify the parts and components of a real comet.
  - **L-5 (5-8) Access information at remote sites using telecommunication.**  
 Students will conduct a web search of appropriate sites to gather information about comets. Good web sites are provided here, but searches can be used.
  - **L-6 (5-8) Identify and perform roles necessary to accomplish group tasks.**  
 Research team members will perform the jobs of: recorder, computer operator, literary supervisor, and reporter.

#### English Language Arts:

- **D-6 (5-8) Describe new knowledge presented in informational texts and how it can be used.**  
 Students will place new information about comets into categories on an organizational worksheet.  
 Students will identify and record notes from sources of information on note taking worksheet  
 Students will use their notes to provide background information for their narrative write-up
- **D-7 (5-8) Identify common technical terms used in informational texts.**  
 Students will read and explain new comet terms. (period, Oort cloud, eccentric orbit, etc.)  
 Students will keep a log of new terms and use some of them appropriately in their stories.
- **D-8 (5-8) Use various parts of a text to locate information.**

Students will use the internet and will be provided with web sites to use when gathering information.

Teacher will instruct class in the use of web sites and how to locate information using organization of the site. (headings, contents, etc.)

Use informational texts to gather additional information to add to web sites.

- **H-3 (5-8) Create bibliographies.**
  - Use bibliographic sheets to write down citation information as it is found.
  - Use note-taking form to take notes in paraphrased form so that information is kept with bibliographic information.
- **H-6 (5-8) Use magazines, newspapers, dictionaries, journals and other print sources to gather information for research topics.**
  - Students will use many print resources, such as Discover, Scientific American, and astronomy texts to find information on comets.
- **H-7 (5-8) Use search engines and other internet resources to collect information for research topics.**
  - Students will use web sites provided and other links to gather current information on comets.
- **H-10 (5-8) Demonstrate initial understanding of proper attribution.**
  - Possible *only* with additional requirements from teacher and modeling of skill.

## Math

- **E-2 (5-8) Apply geometric properties to represent and solve real-life problems involving regular and irregular shapes.**
  - \*Students will determine a method for making controlled three-dimensional measurements of a sphere.
  - Students will make systematic measurements of the height, width, and depth of a clay ball before and after dropping it from different heights.
  - Students will examine what happens to a ball of clay that is dropped from different heights.
  - \*Students will hypothesize what happens to a ball of clay that is thrown at different speeds.
  - \*Students will relate the effects of impact on particle shape to capturing comet particles.
- **J-1 (5-8) Support reasoning by using models, known facts, properties and relationships.**
  - Students will apply mathematics to determine properties of ellipses.