



## CHALLENGER REACH 2 U PROGRAM

The Challenger Learning Center of Colorado (CLCC) has been awarded one of nine NASA grants from 67 informal education applicants through the NASA Competitive Program for Science Museums and Planetariums. Each of the next four years, the Challenger Reach 2 U program will reach more than 2,500 fourth-grade students from underserved communities throughout southwest Colorado and northwestern New Mexico, including primarily rural, lower socio-economic status, Hispanic and Native American districts. The project includes assessment, teacher training, industry speakers, and live events featuring the distance-delivered e-Mission *Moon, Mars and Beyond* to encourage students to pursue career fields in science, technology, engineering, and mathematics (STEM) subject areas. Traveling mission technology kits will be made available for districts that do not already meet the necessary technology requirements.

An Internet-based educational program, Challenger Reach 2 U will allow students to participate in Challenger-style hands-on, exciting simulated space missions without the need for transportation over long distances. Educators will be provided with the tools and support they need to add creative, career-focused lessons and activities to their classrooms.

Challenger distance-delivered e-Missions are a whole lot more than just using a webcam! They are a highly challenging way to allow students to solve unpredictable problems emulating the real world in a demanding, collaborative manner using science, math, and communication skills. The program themes:

- Closely align to Colorado state standards
- Address numerous essential questions
- Cross the curriculum from science and math to writing and art
- Use data collection and graphical displays to help students make decisions
- Include detailed teacher training and extensive pre- and post-mission lessons for students
- Include customizable, statistically-based pre-, day-of-, and post-mission assessments to document changes in affective attitudes and cognitive skills



## MOON, MARS, AND BEYOND (Distance-Delivered)



Your fourth grade students will benefit from our distance-delivered e-Mission *Moon, Mars, and Beyond*. This mission extends scientific planetary research and ties directly to fourth grade mathematical essential questions. In fourth grade, students are expected to begin to recognize patterns in real-world data understand the importance of those patterns, begin to draw inferences, and communicate the importance of their data-driven conclusions. They are also expected to understand

and apply graphical information, develop estimation skills, and apply basic probability theory to data-driven problems.

*Moon, Mars, and Beyond* is the perfect way to drive home the real-world importance of all of these enduring understandings. On mission day, the students are in Mars Mission Control (their school's classroom or computer lab) anxiously awaiting the arrival of a space ship that is launching from the lunar base. The space ship is on a rescue mission. It has been five days since a research vessel exploring the outer regions of our solar system checked in with the Mars base. They are thought to be lost or having communication problems. The rescue ship just launched from the Moon will hopefully bring the two-astronaut crew back to the Mars station safely. The rescue ship will have to stop at the Mars base to pick up the supplies needed for the rescue of the astronauts and for the trip back to Mars.\*

The students have a lot to do before the rescue ship arrives at the Mars station. They are divided into three teams to work more efficiently on the rescue: navigation, transmission, and cargo. The navigation team is responsible for understanding, plotting, and interpreting coordinates on a grid. The transmission team is responsible for receiving and decoding "garbled" messages from the lost ship. The cargo team must perform complex, multi-step mathematics motivated by graphical data to ensure the rescue ship has the right amounts of oxygen, water, and food to save the lost ship once it is found.

In the pre-mission lessons, all students participate in activities relating to each of these teams, so they all gain the classroom skills required for success during the capstone mission. All students also research the planets and write reports on their mathematical and scientific studies, enhancing the goal of including writing across the curriculum.

During the mission students use problem solving strategies such as team discussions; developing graphs from numerical data and then manipulating and interpreting these plots to draw time-critical conclusions; and using pattern recognition skills—all while under the pressure of solving the unpredictable, real-world problem of locating and saving the lost spaceship. To be successful they will have to communicate orally and in writing, have excellent decoding skills, and use multiple informational inputs to solve a problem. *Moon, Mars, and Beyond* is an excellent way to reinforce the fourth grade curricular goals through collaborative, hands-on, problem-based active learning.

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\* The previously referenced video clip at <http://www.youtube.com/watch?v=bKQEYO8Bcj0> is actually from a *Moon, Mars, and Beyond* mission.



## STATE STANDARDS ALIGNMENT

Descriptions of the *Moon, Mars, and Beyond* program's pre- and post-mission lessons, the mission day activities, and the 2011 – 2012 Colorado state standards they support are summarized in the following table.

| <b><i>Moon, Mars, and Beyond</i> Lessons and Activities</b> |   |  |
|---|---|--|
| <b>Timing</b>   | <b>Mission and Description</b>  | <b>Supported Standards</b>   |
| <b>Pre-Mission</b>  | <b>Application:</b> Students review career information and are guided through individual applications for the mission. Students are asked to collaboratively create a mission patch symbolizing the class, school, and mission. Teachers are encouraged to emphasize "consensus" with the students to instill the concept of give-and-take when making group decisions. | Science:3.1<br>Math:--<br>English:--<br>Social Studies:--<br>Visual Arts:1.2, 3.1, 3.2, 4.1            |
|   | <b>Understanding Distance in Space:</b> Students use worksheets to review vocabulary for distance in space, measurement units and instruments, and create a scale for modeling distances to planets.  | Science:3.1<br>Math:3.1, 4.1<br>English:2.2, 2.3, 3.2, 3.3, 4.1<br>Social Studies:--<br>Visual Arts:-- |
|   | <b>Memorizing the Planets in Order and Size:</b> Students collaboratively create a mnemonic device for remembering the names of the planets in order from the Sun and in order of size  | Science:3.1<br>Math:4.1<br>English:--<br>Social Studies:--<br>Visual Arts:--                           |
|   | <b>Decoding:</b> After a review of using codes to represent words in a message, students practice decoding for the mission task.  | Science:3.1<br>Math:--<br>English:1.1, 2.3<br>Social Studies:--<br>Visual Arts:--                      |
|   | <b>Metrics and Measurements:</b> In order for students to become familiar with maps, they generate a map of their own classroom and identify specific locations on it. They create a scale and symbols on their map to represent important features.  | Science:3.1<br>Math:3.1, 4.1, 4.2<br>English:--<br>Social Studies:--<br>Visual Arts:--                 |
|   | <b>Coordinate Graphs:</b> Students learn the parts of a coordinate graph and how to plot points of an ordered pair. Students also learn the importance of the coordinate graph and ordered pairs in finding locations.  | Science:3.1<br>Math:3.1, 4.1, 4.2<br>English:--<br>Social Studies:--<br>Visual Arts:--                 |
|   | <b>Reading and Listening for Information:</b> Students practice reading and listening skills to improve their ability to recognize and report accurate information during their mission tasks.  | Science:3.1<br>Math:--<br>English:2.2, 2.3<br>Social Studies:--<br>Visual Arts:--                      |
|   | <b>Aircraft Construction Task Cards:</b> Students practice reading directions and using Task Cards to construct paper models of NASA aircrafts. This provides a 3-D look at what they will be "flying" in.  | Science:3.1<br>Math:--<br>English:2.2, 2.3<br>Social Studies:--<br>Visual Arts:--                      |
|   | <b>Cargo Practice:</b> All students practice the skills needed for Cargo Team tasks by calculating the amount of food and water needed by their family for a trip to and from the beach.  | Science:2.3, 3.1<br>Math:1.3, 4.1<br>English:--<br>Social Studies:--<br>Visual Arts:--                 |



## STATE STANDARDS ALIGNMENT (CONTINUED)

| <b><i>Moon, Mars, and Beyond Lessons and Activities (Continued)</i></b> |  |   |
|---|--|---|
| <b>Timing</b>   | <b>Mission and Description</b>   | <b>Supported Standards</b>  |
| <b>Pre-Mission (Cont'd)</b>   | <b>Planetary Trading Cards:</b> Students gather information on the nine planets and construct cards to learn and remember major characteristics and features of each of the planets  | Science:3.1<br>Math:--<br>English:2.2, 2.3, 4.1<br>Social Studies:--<br>Visual Arts:--  |
|   | <b>Planetary Posters:</b> Students use their Planetary Trading Cards to construct a poster to compare and contrast major features of the planets. Students will use this poster during the Moon, Mars and Beyond mission.  | Science:3.1<br>Math:--<br>English:--<br>Social Studies:--<br>Visual Arts:--             |
|   | <b>Outpost Communications Exercise:</b> Students use context clues within letters to determine the location of mission specialists writing status reports. Students use their prior knowledge and their Planetary Trading Cards to figure out the location of the space ship in relevance to a planet. | Science:3.1<br>Math:--<br>English:2.2, 2.3<br>Social Studies:--<br>Visual Arts:--       |
| <b>Mission Day</b>  | <b>Transmissions:</b> Students will be decoding messages and looking for context clues in the letters from the astronauts aboard the missing aircraft. They will be responsible for relaying this information to the communications team to be passed along to navigation.                             | Science:3.1<br>Math:--<br>English:1.1, 2.2, 2.3<br>Social Studies:--<br>Visual Arts:--  |
|   | <b>Navigation:</b> The navigation team will be using a coordinate plane as well as planetary information from their Planetary Trading Cards to locate the missing space craft using clues that the transmission team has decoded.  | Science:3.1<br>Math:3.1, 4.1, 4.2<br>English:1.1<br>Social Studies:--<br>Visual Arts:-- |
|   | <b>Cargo Specialists:</b> Students will be in charge of monitoring supplies on board the space craft including food and water. It is their job to make sure enough goods are rationed to last the entire flight and report if levels are getting low.  | Science:2.3, 3.1<br>Math:1.3, 1.4<br>English:1.1<br>Social Studies:--<br>Visual Arts:-- |
|   | <b>Communication:</b> The communications team is responsible for communicating concisely with other students in order to pass along important information to one another and Mission Control.  | Science:3.1<br>Math:--<br>English:1.1<br>Social Studies:--<br>Visual Arts:--            |
| <b>Post-Mission</b>   | <b>Press Conference:</b> Students are asked to prepare for a press conference to answer questions surrounding their mission. Then parents, teachers, and administrators ask students to reflect on their experience and explain what they learned as a result of their mission.                        | Science:2.3, 3.1<br>Math:--<br>English:1.1<br>Social Studies:--<br>Visual Arts:--       |



## PROFESSIONAL DEVELOPMENT

The teacher who prepares the students must complete a two-hour training session to cover the academic content, technical requirements, and procedures for the live event. This training is done over the phone by appointment at your convenience.

## TECHNICAL REQUIREMENTS

The classroom used on Mission Day will need to have one Internet accessible computer for each Planet Team (up to 5 teams) and one Internet accessible computer for the Communications Team that will also need videoconferencing capability. Please contact CLCC if your school cannot provide this equipment for the mission.

The videoconferencing can be either a standalone unit (such as Polycom) or a computer-based system (PC with webcam and Skype software.) Standalone systems must be connected using IP. Computer-based systems will require Skype to be installed. Skype is available to download for both [Windows](#) and [Macs](#).

Following the teacher training, and one to two weeks prior to the mission, we will conduct a “test connect” between CCESS/CLCC and the computer to be used by the Communications Team during the mission. This will be a 5 minute videoconference to test the audio and video connections that will be used during the mission.

## GRANT REQUIREMENTS

Your school district must be located in southern Colorado or northern New Mexico and your school district population is predominantly a historically underserved, low socio-economic status or Native American. Your class participating in the mission is 4th graders or a 3<sup>rd</sup>-4<sup>th</sup> or 4<sup>th</sup>-5<sup>th</sup> combination class. **Please read and sign the Registration Agreement Form and send it back to CLCC prior to your scheduled Teacher Training date.**



## REGISTRATION

Program and related questions may be directed to our Registrar, Christa Penn, at 719-598-9755 or CPenn@clccs.org. However, actual program requests and registration will be handled through our online system.

To log in, go to <http://registration.ccesse.org> (DO NOT use www).

- If you already have a username and password, log in.
- If you have forgotten your password select *Forgot Password* and follow the instructions. Please contact the Registrar if you have any questions.
- If you have never registered on our online *InVEST* system, select *New User* and input all requested information. Please complete all fields as having this information will allow us to get in touch with you in case an emergency. Your username and password will be provided within two business days. If you have not heard from us within that time, please contact our Registrar, Christa Penn, at 719-598-9755 or CPenn@clccs.org.

### To select a mission program:

- Once you have logged in, you will be directed to the *Available Mission Schedules* page.
- Select the *mission type* (e.g., e-Mission) just above the calendar.
- Select the desired *month* and *year* from the pull-down menus.
- Select the desired time slot (e.g., *morning*, *afternoon*) on the desired day of the calendar page. This will bring up the *Mission Registration Request* page.
- Select your desired mission name (e.g., *Moon*, *Mars and Beyond*).
- Complete the information requested. Please designate in the *Notes* section "NASA grant" and a date for your phone training.
- **Please read the terms and conditions. By checking the required box you acknowledge your agreement with the noted policies.**

**Confirmation:** Your request will reviewed and we will contact you to finalize your confirmation. If you have not heard from us within two business days, please contact our Registrar, Christa Penn, at 719-598-9755 or [CPenn@clccs.org](mailto:CPenn@clccs.org).