



# WANTED

## STUDENT NAVIGATORS & STUDENT SCIENTISTS

### FOR THE RED ROVER GOES TO MARS TRAINING MISSION!

**Future:** A lander touches down upon the surface of Mars—meanwhile, in a simulated Mars Base on Earth, a team of Student Astronauts participate in the operation of robotic elements on Mars! Working with them are Student Scientists defining education experiments to be carried out on Mars. These teams of students then send data from Mars to students all over the world. But, these students will not be the first to participate in a real planetary exploration mission. That opportunity is now!



Rover to go all the way to the Red Planet. Student Scientists on the Training Mission will work with actual data from *Mars Global Surveyor* in orbit around Mars now and control the *Mars Orbiter Camera*

aboard the spacecraft. Student Scientists will pick a landing site for a sample return mission to Mars, and Student Navigators will explore that simulated Martian landing site with a robotic vehicle. Students all over the world will contribute to the construction of the Mars



**Now: The Planetary Society** offers you the chance to become one of the first students to be involved with a real planetary exploration mission. Student Scientists and Student Navigators on The Red Rover Goes to Mars Training Mission will extend our joint educational program with the LEGO Company, Red Rover, Red Rover, and pave the way for Red

terrain. The Planetary Society is conducting The Red Rover Goes to Mars Training Mission with funding from the LEGO Company and other sponsors listed below, and in cooperation with NASA and Jet Propulsion Laboratory, and Malin Space Science Systems.

## The Planetary Society's *Red Rover Goes to Mars Training Mission*

### THE MARS SURVEYOR 2001 MISSION HAS BEEN CANCELLED

The *Mars Surveyor 2001* lander mission was scheduled to launch on April 10, 2001 and land on Mars on January 22, 2002. In addition to the *Marie Curie* rover and the lander robotic arm, the 2001 lander was slated to have instruments that would perform technology experiments crucial to future human missions to Mars. Hardware on the lander was designed to demonstrate rocket propellant production using gases in the Martian atmosphere. Other equipment was for characterizing Martian soil properties and surface radiation. Although the *Mars Surveyor 2001* lander mission was cancelled due to a reorganization of the Mars exploration program, the hardware and experiments will fly on upcoming lander missions. **The Red Rover Goes to Mars Training Mission** takes full advantage of the progress of the *Mars Surveyor 2001* mission before its cancellation as the educational foundation for student participation in an upcoming lander mission.

### THE MARS GLOBAL SURVEYOR MISSION IS GOING ON NOW!

The *Mars Global Surveyor* (MGS) mission launched on November 7, 1996 and began mapping the surface of Mars from orbit on April 1, 1999. MGS has instruments on board designed to return data about Mars' surface features, atmosphere, and magnetic properties. MGS has already completed more than 6,000 orbits around Mars, and it's only halfway through its primary mapping mission. The Surveyor's camera, Mars Orbiter Camera (MOC), is producing the largest volume of data. MOC images include high-resolution pictures that can see Martian rocks as small as 1.4 meters for detailed geological studies, and wide-angle pictures for global monitoring of dust storms, cloud formations, the polar ice caps, and surface features blown by wind. Data from *Mars Global Surveyor* will be used in the comparison of Mars and Earth—two planets which shared similar conditions billions of years ago, but are much different today. MGS data will also be used in planning future missions to Mars. MOC pictures provide important information in the selection of landing sites for future Mars landers.

### STUDENT SCIENTISTS

Over a three month period after their selection, Student Scientists will undergo remote training and use *Viking* Spacecraft and *Mars Global Surveyor* images to choose a candidate landing site for a future sample return mission to Mars. Student Scientists will operate the *Mars Global Surveyor* Mars Orbiter Camera to take a high resolution picture of the landing site, or similar terrain, on the surface of Mars. Sometime between January and March of 2001, Student Scientists will travel to Malin Space Science Systems in the United States, where the operation of the camera during the *Mars Global Surveyor* mission takes place. There they will develop the commands for the camera to send to the spacecraft. Student Scientists will

train Student Navigators on the processes that resulted in their selection of a landing site, thereby integrating spacecraft instrument data with Mars science acquisition. Applicants must therefore demonstrate their knowledge of Mars science and how science goals can be accomplished by instruments, using the instruments and goals of the *Mars Surveyor 2001* lander mission. Students selected as Student Scientists will undergo specialized training over the Internet and by mail. Student Scientists will be supplied with the necessary equipment to participate in the training. Some Student Scientists may serve as media representatives and educational experts on the project. The Planetary Society reserves the right to change all details in the event the *Mars Global Surveyor* mission changes or in the event **The Red Rover Goes to Mars Training Mission** is impacted by changes in NASA's Mars exploration program. No Student Scientist's travel time will exceed 7 days.

### STUDENT SCIENTIST SELECTION ESSAY CONTEST

START DATE OCTOBER 4, 1999 • END DATE JUNE 15, 2000

To enter the student scientist selection contest, write an essay of 1,500 words or less defining the mission of the *Marie Curie* rover and the lander robotic arm on the *Mars Surveyor 2001* mission. What are the science goals in the mission that you define for the rover and robotic arm, and how will the other *Mars Surveyor 2001* lander instruments assist in these mission objectives? Read about Mars and do research. To learn about the instruments on the *Mars Surveyor 2001* lander, get the Science Instrument Notebook Pages from your **Red Rover Goes to Mars** Regional Center or The Planetary Society Web site, which offers numerous references and links where you can learn more.

You must include in your essay a one paragraph answer to the following situation: Mission scientists Jun and Maria disagree about what the robotic arm should do first when the spacecraft lands on Mars. The robotic arm has two functions: 1) to pick up and deploy the *Marie Curie* microrover and 2) to scoop and deliver soil to the soil-dust experiment. Jun feels that if something goes wrong with the arm while scooping Martian soil, it may not be able to deploy the rover. The rover would then be unable to use any of its instruments or travel. Maria feels that the arm must first deliver soil to the soil-dust experiment, because if something goes wrong with the arm when deploying the rover, the arm might not be able to deliver the soil and then there would be no data returned from the critically important soil-dust experiment at all! If you were Project Scientist of the *Mars Surveyor 2001* lander mission, how would you handle this disagreement? Remember that you are settling a problem between two people, not just two points of view.

When writing your essay, you should consider the following questions:

- > Does your essay take into account what must be

## The Planetary Society's Red Rover Goes to Mars Training Mission

- learned about Mars for humans to explore there?
- > Is your essay consistent with what is already known about Mars — for example, the temperature, the dry, dusty, hostile environment?
  - > When you describe what the *Marie Curie* rover and lander robotic arm should do on Mars, do you keep in mind how the *Marie Curie* rover instruments and the lander robotic arm instruments can accomplish the science goals?
  - > How might the other instruments on the lander be used to aid in the mission that you define for the *Marie Curie* rover and the robotic arm? How might they be used to meet the science goals?

### STUDENT SCIENTIST SELECTION CONTEST RULES

- Anyone born on or between January 31, 1984 and January 31, 1991 is eligible to submit an essay.
- You may submit only one entry.
- Sons and daughters and dependents of employees working at The Planetary Society or NASA or Jet Propulsion Laboratory or their contractors or **Red Rover Goes to Mars** corporate sponsors or on the *Mars Surveyor 2001* or *Mars Global Surveyor* mission experiment teams or members of the **Red Rover Goes to Mars** Review Board or the **Red Rover Goes to Mars** Education Advisory Committee are not eligible to enter.
- Persons applying as Student Scientists may also apply as Student Navigators.
- Your essay must arrive at a Regional Center for judging on or before June 15, 2000. (Persons in nations without Regional/National Centers may contact The Planetary Society for special instructions.) However, do not submit your essay before October 4, 1999. You may contact The Planetary Society for the location of your nearest Regional Center after October 1, 1999 by visiting our Web site or by calling or writing The Planetary Society at the phone number/address listed at the end of this announcement. Students may submit their completed essay in any Regional Center in their nation.
- All entries become the property of The Planetary Society, may be published in *The Planetary Report* or on our Web site, and cannot be returned.
- Your essay does not have to be in English but rather in a language accepted by your Regional Center. (Contact your Regional Center to determine the language(s) they will accept. Final judging at The Planetary Society will be on semi-finalist essays translated into English by the National Centers.)
- Each student must include with their essay: 1) Student Entry Form, 2) Parent or Guardian Permission Form, 3) School Permission Form, and 4) Mentor Form. The student must select a mentor to enter. (The student's mentor may also serve as mentor to other student applicants.) The mentor (preferably not related to the student) must be at least 21 years old and must agree to assist the student in interpretation of the contest rules; to assist in issues of research for the essay; to declare the essay is the student's individual work; and to assist the student with training, should the student be selected. Forms may be obtained from your Regional Center or The Planetary Society Web site. Forms that are missing or only partially complete are grounds for disqualification. **\*Prior to selection, finalists will be required to participate in a brief telephone conference with a group of contest judges to discuss the details of their essay. The results of this interview will be used to select the Student Scientists. The student's mentor or a substitute approved by The Planetary Society should be present for the interview. Language translation, or considerations of any special needs the student may have to accomplish the interview, will be facilitated by The Planetary Society, if necessary.**

### JUDGING AND SELECTION OF STUDENT SCIENTISTS

- Regional Centers (for quarter-final judging) and National Centers (for semi-final judging) will select the best essays in each of three age categories: Sophomore Entrants, who will be ages 11-12 as of January 31, 2002; Junior Entrants, who will be ages 13-14 as of January 31, 2002; and Senior Entrants, who will be ages 15-18 as of January 31, 2002. The Planetary Society cannot accept responsibility for essays that do not reach the designated judging centers by the necessary deadlines, or for errors in translation of the contests rules made by the National Centers.
- The Planetary Society will announce the Student Scientists on October 3, 2000.

- All expenses for travel and food and lodging for the Student Scientists will be handled by The Planetary Society according to travel and food and lodging arrangements that will be made by The Planetary Society. Students must provide for personal, health, and any special-needs requirements when traveling and staying away from home. Students requiring a visa to enter the United States must make such arrangements on their own in a timely fashion.

### STUDENT NAVIGATORS

Student Navigators will travel to a to-be-determined location in the United States where a large-scale simulated Mars terrain has been created through the work of the Student Scientists. Student Navigators will explore the unknown surface via teleoperation of a robotic vehicle to complete their objective of selecting an interesting sample to return to Earth. Student Navigators will perform the **Red Rover Goes to Mars Training Mission** during the month of October 2001. Student Navigators must use critical thinking to extract the most important information to increase scientific knowledge. Applicants must therefore demonstrate their knowledge of robotic-explorations skills, which many LEGO products are designed to teach, including the ability to make exploration scenario decisions based upon an understanding of mission science objectives. Student Navigators will undergo specialized training over the Internet and by mail over an eight month period after their selection. Student Navigators will be supplied with the necessary equipment to participate in the training. Some Student Navigators may serve as media representatives and educational experts on the project. The Planetary Society reserves the right to change all details in the event the *Mars Global Surveyor* mission changes or in the event **The Red Rover Goes to Mars Training Mission** is impacted by changes in NASA's Mars Exploration Program. No Student Navigator's travel time will exceed 7 days.

### STUDENT NAVIGATOR JOURNAL CONTEST

START DATE MARCH 2, 2000 • END DATE NOVEMBER 15, 2000

To enter the student navigator selection contest, students must log their experience with a LEGO system in a Journal using the Red Rover Goes to Mars Journal Form (1,500 words or less). Answer all questions on the Journal Form completely. Missing or incomplete answers are grounds for disqualification. There are four LEGO systems that qualify for use in the contest: 1) The Planetary Society's and LEGO's joint educational product **Red Rover, Red Rover** (available to schools and science centers through The Planetary Society or the PITSCO/LEGO Dacta Catalog); 2) LEGO MINDSTORMS Robotics Invention System (available in toy stores); 3) ROBOLAB Team Challenge Set LEGO MINDSTORMS for Schools (available through the PITSCO/LEGO Dacta Catalog); or 4) LEGO DACTA Control Lab (available through the PITSCO/LEGO Dacta Catalog). The amount of time you spend on the LEGO system will not be a deciding factor in the contest, but you need to work with the system long enough

## The Planetary Society's *Red Rover Goes to Mars Training Mission*

to understand the Journal questions.

Many LEGO systems are already available in schools, museums, and science centers, where children can access them. Contact your Regional Center to see if a LEGO system is available near you. Since many of the Journal questions will ask you to decide what commands to give the *Marie Curie* rover on Mars to explore a particular terrain, be sure to read books about Mars and do research in the library or on the Internet. To learn about the instruments and experiments on the *Mars Surveyor 2001* lander, obtain the Science Instrument Notebook Pages from your **Red Rover Goes to Mars** Regional Center or The Planetary Society Web site, which offers numerous references where you can learn more.

### DONATION OF LEGO SYSTEMS

Because of the possibility that students may not have access to any of the four LEGO systems listed above, institutions, clubs, science centers, schools, and other places children gather with adult supervision may be eligible to receive a donated LEGO system. At The Planetary Society there will be a random drawing of letters written by established institutions that wish to be considered to receive a donated LEGO system, during the month of April 2000. The letters drawn will be examined to determine if they meet the qualifications for donation stipulated in the original **Red Rover Goes to Mars** announcement released October 4, 1999. Additional letters may need to be drawn at random, should letters become disqualified, until all the available systems have been donated. Entries faxed or post-marked by March 31, 2000, will be entered in the drawing according to the rules in the original **Red Rover Goes to Mars** announcement released October 4, 1999. All rules for the drawing remain exactly as stated in the original **Red Rover Goes to Mars** announcement released October 4, 1999, prior to the cancellation of the *Mars Surveyor 2001* mission.

### LANDING SITE TERRAIN DRAWING COMPETITION

Students around the world will be given background educational materials via their Regional Centers about the *Mars Global Surveyor* mission and about how landing sites are selected. During the months of January through March 2001, after the Student Scientists choose a landing site, students worldwide will participate in a contest to produce detailed drawings of what that site might look like from the surface. Many students around the world will have their drawings selected and will receive prizes (or will be honored). The composite of the winning drawings will become the blueprint from which the large-scale simulated Mars terrain will be created. This will be the same landscape the Student Navigators will explore using a robotic vehicle. Contest details and background materials may be obtained after January 1, 2001 from your Regional Center or The Planetary Society website (<http://planetary.org>). (Persons without Regional/National Centers may contact The Planetary Society for special instructions.)

### STUDENT NAVIGATOR SELECTION CONTEST RULES

- Anyone born on or between January 31, 1984 and January 31, 1991 is eligible to submit a journal. However, applicants are required to log actual time on one of the qualifying LEGO systems.
- You may submit only one entry.
- Sons and daughters and dependents of employees working at The Planetary Society or NASA or Jet Propulsion Laboratory or their contractors or **Red Rover Goes to Mars** corporate sponsors or on the *Mars Surveyor 2001* or *Mars Global Surveyor* mission experiment teams or members of the **Red Rover Goes to Mars** Review Board or the **Red Rover Goes to Mars** Education Advisory Committee are not eligible to enter.
- Students who have applied to become Student Scientists may also apply to become Student Navigators.
- Your completed Red Rover Goes to Mars Training Mission Journal Form must arrive at a Regional Center in your nation for judging on or before November 15, 2000. (Persons in nations without Regional/National Centers may contact The Planetary Society for special instructions.) Do not submit your completed Journal Form before March 2, 2000. You may contact *The Planetary Society* for the location of your nearest Regional Center to obtain your Journal Form after March 1, 2000, by visiting our website (<http://planetary.org>), or by calling or writing The Planetary Society. Students may submit their completed Journal Form in any Regional Center in their nation.
- All entries become the property of The Planetary Society, may be published in *The Planetary Report* or on our Web site, and cannot be returned.
- Your completed Journal Form does not have to be in English but rather in a language accepted by your Regional Center. (Contact your Regional Center to determine the language(s) they accept. Final judging at The Planetary Society will be on semi-finalist journals translated into English by the National Centers.)
- Each student must include with their completed Journal Form: 1) Student Entry Form, 2) Parent or Guardian Permission Form, 3) School Permission Form, and 4) Mentor Form. The student must select a mentor to enter. (The student's mentor may also serve as mentor to other student applicants.) The mentor (preferably not related to the student) must be at least 21 years old and must agree to: assist the student in interpretation of the contest rules; assist in issues of research for the journal; declare the journal is the student's individual work; and assist the student with training, should the student be selected. Additionally, 5) the line drawing of the Mars Terrain that is part of the Journal Form must also be submitted. Do not write on this line drawing, except to place your name on the back of it. Forms may be obtained from your Regional Center, or The Planetary Society Web site. Forms that are missing or only partially complete and entries that do not conform to instructions concerning the line drawing are grounds for disqualification.
- Prior to selection, finalists will be required to participate in a brief telephone conference with a group of contest judges to discuss the details of their essay. The results of this interview will be used to select the Student Navigators. The student's mentor or a mentor approved by The Planetary Society should be present for the interview. Language translation, or considerations of any special needs the student may have to accomplish the interview, will be facilitated by The Planetary Society, if necessary.

### JUDGING AND SELECTION OF STUDENT NAVIGATORS

- Regional Centers (for quarter-final judging) and National Centers (for semi-final judging) will select the best completed Journal Forms in each of three age categories: Sophomore Entrants, who will be ages 11-12 as of January 31, 2002; Junior Entrants, who will be ages 13-14 as of January 31, 2002; and Senior Entrants, who will be ages 15-18 as of January 31, 2002. The Planetary Society cannot accept responsibility for journals that do not reach the designated judging centers by the necessary deadlines, or for errors in translation of the contest rules made by the National Centers.
- The Planetary Society will announce the Student Navigators on February 2, 2001.
- All expenses for travel and food and lodging for the Student Navigators will be handled by The Planetary Society according to travel and food and lodging arrangements that will be made by The Planetary Society. Students must provide for personal, health, and any special-needs requirements when traveling and staying away from home. Students requiring a visa to enter the United States must make such arrangements on their own in a timely fashion.

**For additional information about Red Rover Goes to Mars, contact:  
The Planetary Society, 65 North Catalina Avenue, Pasadena, CA, 91106,  
(626)793-5100, or visit our Web site at <http://planetary.org>**