

just for fun



This activity is part of Challenger Center's Vista Station™ Program. For more information on how to purchase Vista Station™ to use in your classroom, visit www.challenger.org/store.

Another Series of Challenger Learning EdVentures™ from



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overview

THE ASTRONAUTS COLLECTED SAMPLES FROM AREAS OF THE MOON, BUT WALKING COULD ONLY TAKE THEM SO FAR. THEY BROUGHT A LUNAR ROVER VEHICLE WITH THEM THAT WAS POWERED BY A BATTERY. IN THIS ACTIVITY, STUDENTS MAKE A LUNAR WALKER MOVE WITH ELASTIC ENERGY WHICH IS A KIND OF POTENTIAL ENERGY. ENERGY IS NEVER USED UP, IT'S JUST CONVERTED FROM ONE FORM TO ANOTHER. IN THIS ACTIVITY, STORED ELASTIC ENERGY IS CONVERTED (CHANGED) INTO KINETIC ENERGY. YOU STORE ENERGY BY TWISTING THE RUBBER BAND. WHEN YOU RELEASE THE RUBBER BAND, ELASTIC ENERGY IS CONVERTED TO KINETIC ENERGY, AND THE WALKER MOVES.

OF COURSE, THE "LUNAR ROVER" USED BY THE APOLLO ASTRONAUTS WASN'T POWERED BY A RUBBER BAND. ENERGY STORED IN THE VEHICLE'S BATTERIES WAS CONVERTED INTO KINETIC ENERGY WHEN THE VEHICLE MOVED. LIKE THE LUNAR WALKER, WHEN THE ASTRONAUT'S VEHICLE USED UP ALL THE POTENTIAL ENERGY, IT COULDN'T DRIVE ANY FARTHER. ENGINEERS CAREFULLY PLANNED EACH TRIP SO THAT THE BATTERIES WOULDN'T RUN OUT.

- *THREAD SPOOL*
- *RUBBER BAND ABOUT THE SAME LENGTH AS THE SPOOL*
- *THUMB TACK*
- *METAL WASHER*
- *TOOTHPICK OR SIMILAR OBJECT*

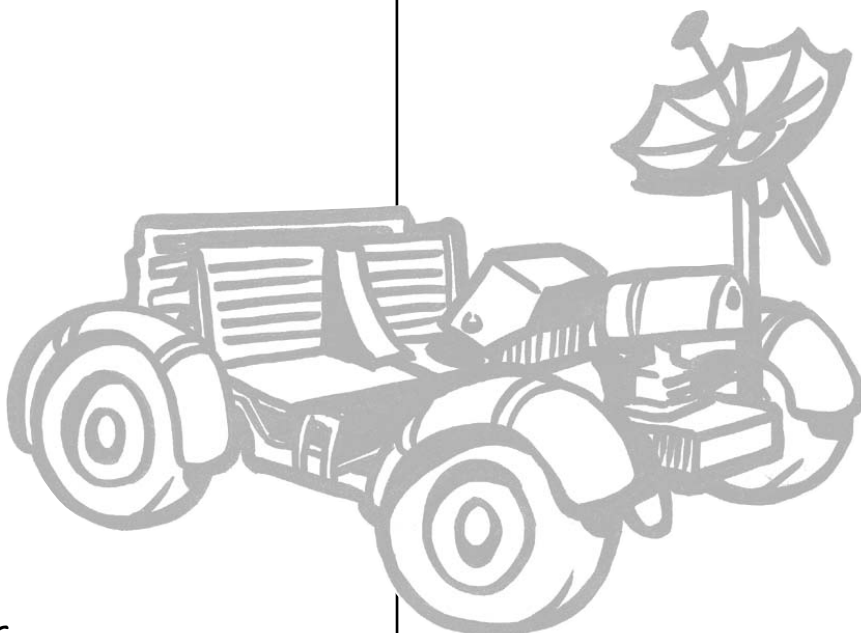
materials

procedures

1. SLIP THE RUBBER BAND THROUGH THE HOLE IN THE THREAD SPOOL SO THAT IT PASSES FROM ONE END OF THE SPOOL TO THE OTHER.
2. ATTACH ONE END OF THE RUBBER BAND TO THE SPOOL WITH THE THUMB TACK.
3. SLIP THE OTHER END OF THE RUBBER BAND THROUGH THE HOLE IN THE METAL WASHER TO MAKE A LOOP IN THE END OF THE RUBBER BAND.

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4. PUT THE TOOTHPICK THROUGH THE LOOP IN THE RUBBER BAND.
5. TURN THE TOOTHPICK TO WIND UP THE RUBBER BAND INSIDE THE SPOOL.
6. PLACE THE SPOOL ON THE TABLE OR FLOOR AND LET YOUR LUNAR WALKER GO! WHAT HAPPENS?
7. TRY A DIFFERENT-SIZE SPOOL AND RUBBER BAND. DOES IT MAKE THE WALKER GO FASTER OR FARTHER?
8. TRY MAKING YOUR LUNAR WALKER MOVE OVER DIFFERENT SURFACES. WILL IT MOVE OVER CARPETING, GRASS, OR SOIL? CAN IT GO UP AND DOWN HILLS?



Challenger Center Programs



The internationally acclaimed **Challenger Learning Center** Network currently consists of state-of-the-art, innovative educational simulators located at 49 sites across 29 states, Canada, and the United Kingdom. Staffed by master teachers, the core of each Center is a two-room simulator consisting of a space station, complete with communications, medical, life, and computer science equipment, and a mission control room patterned after NASA's Johnson Space Center. See www.challenger.org for information.

A joint initiative of Challenger Center for Space Science Education, the Smithsonian Institution, and NASA, *Voyage — A Journey through our Solar System* is a space science exhibition project that includes permanent placement of a scale model solar system on the National Mall in Washington, DC, and at locations all over the world. See www.voyageonline.org for information.



Space DaySM launches new *Design Challenges* created by Challenger Center each school year. The inquiry-based challenges are designed to inspire students in grades 4-8 to create innovative solutions that could aid future exploration of our solar system. See www.spaceday.org for information.

Challenger Center's *Journey through the Universe* program provides under-served communities with diverse national resources, including K-12 curriculum materials, teacher workshops, classroom visits by scientists from all over the country, and Family Science Nights. See www.challenger.org/journey for information.



The **MESSENGER** spacecraft (MErcury Surface, Space ENvironment, GEOchemistry and Ranging) is to be launched in 2004 and go into Mercurian orbit in 2009. Challenger Center is one of the partner organizations charged with MESSENGER education and public outreach activities. See www.messenger.jhuapl.edu for information.

Through the Challenger Center **Speakers Bureau, Voyages Across the Universe**, staff members speak to student audiences of 30-1,000, conduct workshops for 100-300 educators, give keynote and featured presentations at conferences, as well as conduct Family Science Nights at the National Air and Space Museum, and other facilities across the nation, for audiences of 300-1,000 parents, students, and teachers. See www.challenger.org/speakers for information.

For information about other Challenger Center programs, or to purchase our classroom resources, visit www.challenger.org/store.