

just for fun



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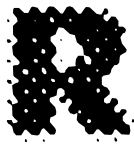
Another Series of Challenger Learning EdVentures™ from



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overview



OVER VEHICLES ENCOUNTER DIFFERENT TERRAIN ON THEIR MISSIONS. ROVERS THAT GO TO OTHER PLANETS OR MOONS MUST BE DESIGNED SO THAT THEY CAN MOVE ALONG THE GROUND EASILY. THE LUNAR ROVER USED TO TRANSPORT ASTRONAUTS ON THE MOON HAD SCREEN-LIKE WHEELS THAT MOVED THROUGH THE FINE MOON DUST. TRACTION IS THE ACT OF DRAWING A BODY ALONG THE GROUND OR WATER. CAR WHEELS HAVE TRACTION SUITABLE FOR THE STREETS AND HIGHWAYS, WHILE TRACTORS HAVE MORE TRACTION TO MOVE ALONG THE FIELDS. ICE SKATES HAVE LESS TRACTION, SO THE SKATER CAN GLIDE SMOOTHLY OVER THE ICE.

IN THIS ACTIVITY, STUDENTS ARE ASSIGNED A SPECIFIC TERRAIN AND THEN MUST CREATE A WHEEL THAT WOULD PROVIDE TRACTION ON THAT SURFACE. IF STUDENTS ARE SEATED IN GROUPS, BE SURE AND GIVE THEM EACH A DIFFERENT TERRAIN THAN OTHER GROUP MEMBERS.

materials

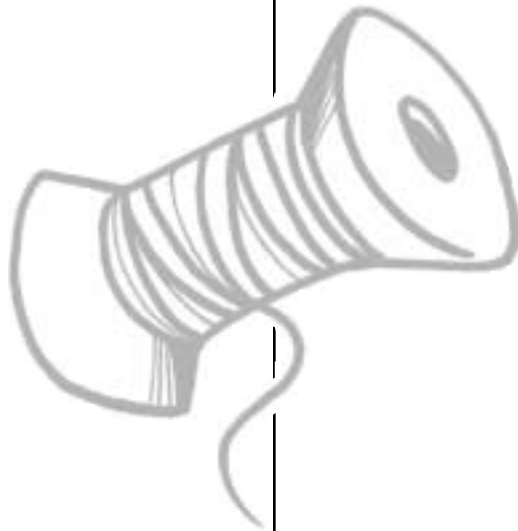
- *THREAD SPOOL (ONE PER STUDENT)*
- *MODELING CLAY*
- *TOOTHPICKS*
- *THREAD*

procedures

1. DEFINE TRACTION AND THINK OF THE MANY TYPES OF TRACTION HERE ON EARTH.
2. DISCUSS THE DIFFERENT TERRAIN FOUND AMONG OUTER PLANETS OR MOONS, I.E., SAND, FINE DUST, CRATERS, ROCKY, ICY, ETC.
3. NUMBER THE STUDENTS 1-4. GIVE THE 1'S A SAND TERRAIN, 2'S A CRATERED TERRAIN, 3'S A ROCKY TERRAIN AND THE 4'S AN ICY TERRAIN.
4. GIVE EACH STUDENT AN EMPTY SPOOL, A PIECE OF THREAD (TO CUT THE CLAY) AND SOME CLAY TO GET STARTED. THEIR MISSION IS TO DESIGN AND CREATE A WHEEL TO HAVE TRACTION ON THE ASSIGNED TERRAIN.
5. FIRST, COVER THE SPOOL'S MIDDLE WITH CLAY. THIS ACTS AS A BASE.

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6. USING CLAY, FORM BITS OF THE WHEEL AND ATTACH THEM TO THE BASE, I.E., SPIKES, LONG RIDGES, ETC. WHEN PIECING TOGETHER CLAY ON CLAY, SCORE LINES ON EACH PIECE WITH A TOOTHPICK.
7. WHEN COMPLETE, BRING ALL STUDENTS WITH THE SAME TERRAIN UP FOR A PRESENTATION OF THEIR WHEELS.



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.