

# Inventors Wanted

This activity is from *Inventors Wanted* Summer Camp. For more information on how your Challenger Learning Center can obtain a copy of this camp curriculum, contact the Challenger Learning Center of Greater Washington at (703) 837-5640.

To find out how to attend a Challenger Learning Center summer camp, contact your local Learning Center. To find a Learning Center near you, visit [www.challenger.org](http://www.challenger.org).





# Solar Tower

## GRADE LEVEL

Summer Camp, rising 5<sup>th</sup> - 7<sup>th</sup> graders.

## DURATION

30 minutes

## SCHEDULED TIME

Friday, 9:00 a.m.

## CONTENT OVERVIEW

Solar towers are one of the proposed methods of generating solar power. These towers are surrounded by focusing mirrors, called heliostats, that reflect sunlight precisely onto the top of the tower. The sunlight heats a liquid that then circulates through the tower to a steam-powered turbine generator, heating water to create steam and power the turbine. One obstacle to this plan is the fact that it is difficult to build a structure that is both very tall and very stable.

## ESSENTIAL QUESTION

How does teamwork aid in the building of a structure?

## OBJECTIVES

Students will be able to:

- ◆ Work as a team to complete a task.
- ◆ Develop a system for building a structure.
- ◆ Build a structure that is tall and withstands structural stress.

## MATERIALS

Per team:

- ◆ 15 spaghetti noodles
- ◆ 2 sticky labels
- ◆ 4 straws
- ◆ 10 toothpicks
- ◆ 1 piece of paper
- ◆ 5 small washers
- ◆ 1 disposable plastic cup
- ◆ 1 piece of tin foil (4" square)
- ◆ 1 empty paper towel tube

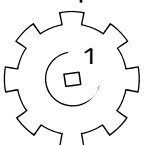
Per Camp:

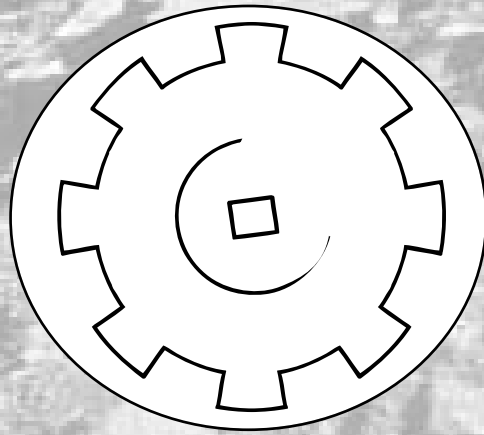
- ◆ 1 stopwatch or watch with second hand.
- ◆ 1 fan
- ◆ 1 meter stick

NOTE: Comparable materials may be substituted, as long as the materials are consistent across all of the groups.

## PREPARATION & MANAGEMENT

1. Lay out a set of supplies for each team.
  
2. Put campers into teams of four or five. This is a good opportunity to put them with different people.
  
3. Read over the task card directions with the team.
  
4. Give each team a set of supplies. Tell them that they may not touch the supplies until their time begins.
  
5. To learn more about solar towers you may want to have the campers go to: [http://rhlx01.rz.fht-esslingen.de/projects/alt\\_energy/sol\\_thermal/powertower.html](http://rhlx01.rz.fht-esslingen.de/projects/alt_energy/sol_thermal/powertower.html)





## Solar Tower Task Card

1. You must build a model tower using only these materials.
2. Your tower must be at least 90 centimeters in height and stand without any extra support.
3. You will have ten minutes to construct your tower, after which your tower will undergo wind trials to test its stability.
4. Points will be awarded based on the structure's height and stability and how well you work together as a team.

Tower stands alone: 10 points

Tower resists room fan wind three feet away: 5 points

Tower resists room fan wind two feet away: 10 points

Tower resists room fan wind one foot away: 15 points

Tower resists room fan wind six inches away: 20 points

For every six inches of height over 90 centimeters, the team will be awarded 5 bonus points.

Teams demonstrating exceptional teamwork will be awarded 10 bonus points.

# 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](http://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](http://www.voyageonline.org) for information.



**Space Day**<sup>SM</sup> 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](http://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](http://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](http://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](http://www.challenger.org/speakers) for information.

For information about other Challenger Center programs, or to purchase our classroom resources, visit [www.challenger.org/store](http://www.challenger.org/store).