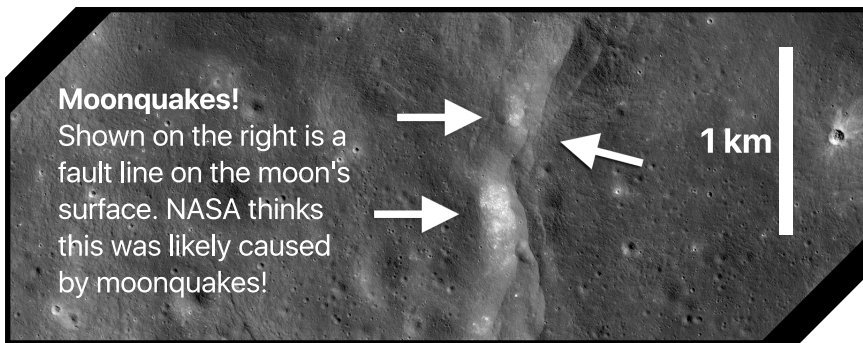


Lunar Habitat Design

NASA is sending astronauts back to the Moon! In 2024, NASA plans to send a crew to land on the moon, and build a lunar outpost for permanent human presence on the Moon in 2028. Lots of engineering and design will go into building this habitat. When the astronauts get there, they may have to deal with moonquakes! Scientific instruments left on the Moon in 1969 and 1972 recorded seismic quakes up to 5.5 in magnitude with some lasting longer than 10 minutes. That's enough force to move heavy furniture around and crack weak walls!



Moonquakes!

Shown on the right is a fault line on the moon's surface. NASA thinks this was likely caused by moonquakes!

MATERIALS

- 8.5 x 11 paper ***
- Colored pencils ***
- Pan of Jello prepared in advance (optional) ***
- Mini-Marshmallows
- Toothpicks
- Ruler
- Moonquakes Article

*** Materials found at home

WE CHALLENGE YOU TO

Design, build, and test your own lunar habitat for astronauts that can withstand moonquakes

AND LEARN ABOUT

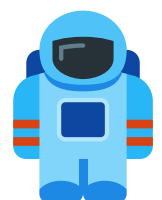
- Civil engineering
- Space and moon environments
- Designing living spaces for humans

FURTHER EXPLORATION

NASA Lunar Habitat Demo | <https://www.youtube.be/uTLKEWcsmQQ>

Field Trip to the Moon | https://www.nasa.gov/pdf/305948main_FTM_LRO_Informal_Guide.pdf

Teach Engineering | https://www.teachengineering.org/activities/view/cub_natdis_lesson03_activity1



DESIGN

- 1) Read the Moonquakes Article from NASA
 - a. The Moonquakes Article is included in the Purdue Space Day Supply Kit. It can also be found online at <https://tinyurl.com/lunar-quake>
- 2) Discuss and list what kinds of activities astronauts might do on the Moon
 - a. What would astronauts do for work?
 - b. What would astronauts do to relax?
 - c. What would astronauts do to stay healthy?
 - d. What would a lunar habitat need for power, oxygen, and waste management?
- 3) Think about, or walk around your house, considering all of the rooms and what is done in each one of them
- 4) Go through your lists and identify the type of room each activity would use
 - a. Add any extra rooms that are needed and are not part of a normal house.
 - b. Can any of these spaces serve two purposes?



BUILD

- 5) Draw your habitat on a sheet of 8.5" x 11" paper
 - a. Draw a large to represent the area of your lunar habitat.
 - b. Use a ruler to help you draw rooms and buildings.
- 6) Use toothpicks and mini-marshmallows to create your lunar habitat
 - a. Remember that your habitat may have to withstand moonquakes!
 - b. Make your lunar habitat at least two toothpick levels high.
 - c. Try making squares and triangles with the marshmallows and toothpicks to make your habitat stronger.



TEST

- 7) Test your structure for stability
 - a. If using a pre-prepared pan of Jello, place your lunar habitat on top of the Jello and gently shake the pan in different directions.
 - b. You can also try placing your structure on a piece of paper on a flat surface. Move the paper back and forth, and side to side.
- 8) Observe how your habitat behaves
 - a. Can it withstand moonquakes?
 - b. Are there weak points you would make stronger?



DISCUSS

- A. Were there any spaces that share activities? Why did you combine those activities?
- B. Were there any rooms that needed water supplied to them? Did you put those rooms close together to minimize the pipes needed?
- C. If the lunar habitat breaks due to a moonquake, what is your backup plan?