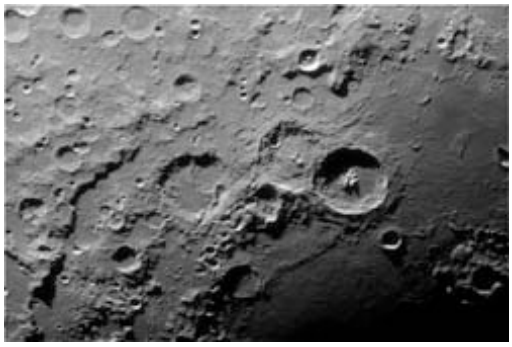
Spotting Craters

Why is the Full Moon a Poor Time to Observe the Moon?

About the Activity

Use a model of the surface of the Moon to show how shadows show more details than direct light. Participants see the difference between a full Moon and a partially dark Moon.



Materials Needed

- Packet of powdered hot cocoa mix
- Aluminum pan
- 5 pounds of flour
- Several small rocks
- Flashlight covered with a paper towel to diffuse the light
- Newspaper, if doing activity inside
- Plastic "moon" ball on a toothpick or skewer stick

Topics Covered

- Why shadows make viewing the Moon more spectacular.
- What do we see when looking at the Moon?

Participants

Use this activity with families, the general public, and school or youth groups ages 7 and up.

Location and Timing

This activity takes about 10-15 minutes and can be used at night or in a classroom that can be darkened. Not recommended for a windy night.

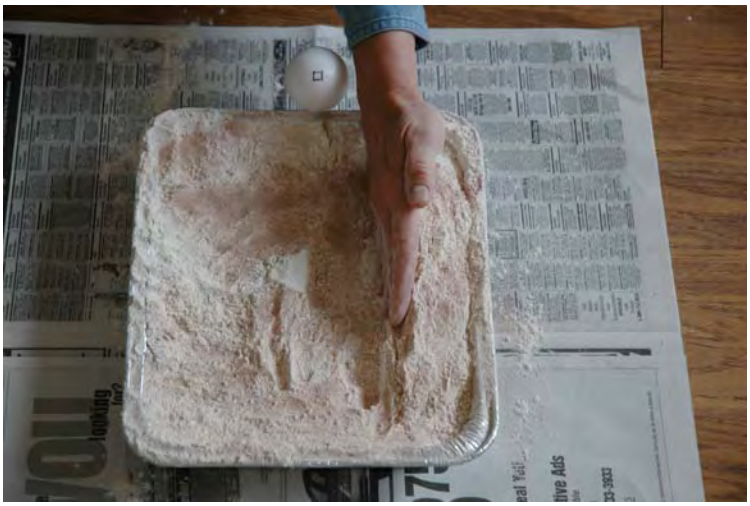
Included in This Activity

Preparation Instructions
Detailed Activity Description
Background Information
Helpful Hints

Preparation Instructions

- Fill aluminum pan almost to the rim with flour. Sprinkle with hot cocoa mix.
- Place the ball representing the Moon on a skewer stick and place it next to or in the pan of flour.
- Make a moonscape by using your hand to make a mountain range on one side of the pan.

Either poke holes in it with your fingers, or for more fun (and more mess!), have participants drop small rocks ("meteoroids") into the flour, simulating the early bombardment of the Moon by meteoroids.



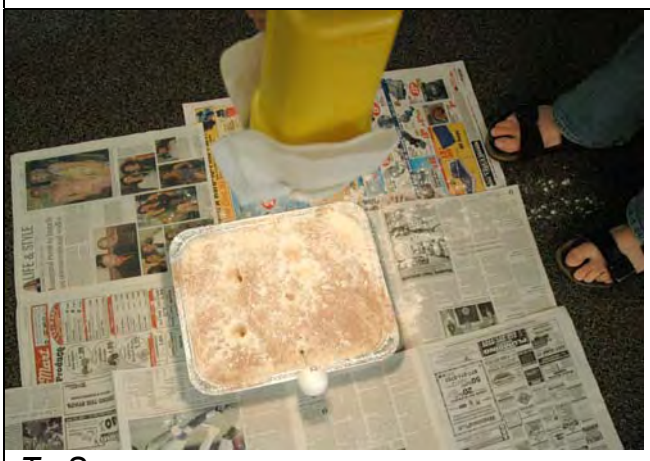
*For an alternative and more permanent model, see **Helpful Hints**

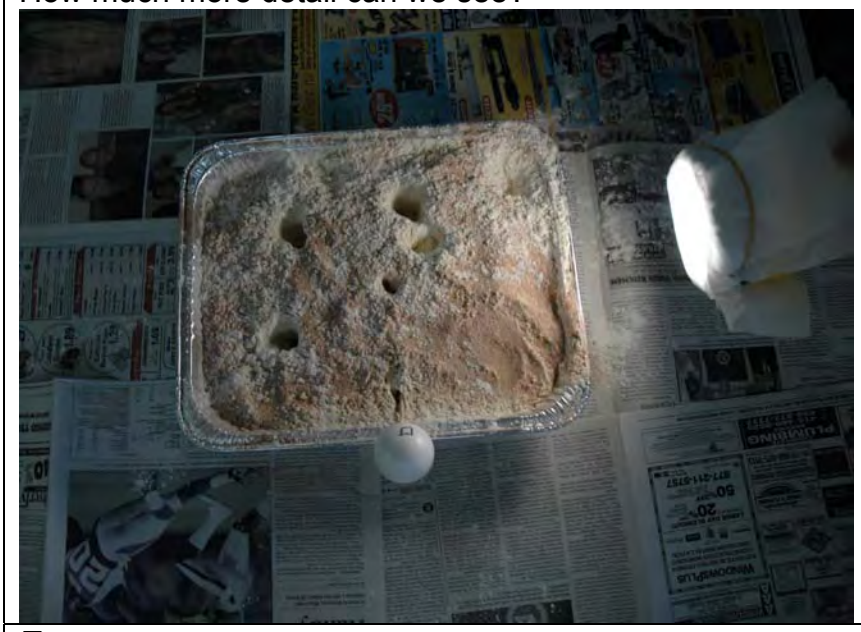
Detailed Activity Description

Spotting Craters: Why is full Moon a poor time to observe the Moon?

Leader's Role	Participants' Role (Anticipated)
Presentation Tips: Many people think the full Moon is the best time to see a lot of detail on the Moon. This presentation addresses that idea.	
To Say: Shadows allow us to see features on the Moon! When you look at the full Moon through the telescope, it is difficult to clearly see the mountains and the craters. From a crescent phase to a few days on either side of full and there is a part of the Moon where craters and mountains can be clearly seen in strong relief. This activity illustrates why. The Moon's surface has mountains and a lot of what?	Craters
To Do: Point to the pan full of flour (or the play dough Moonscape). *To Say:* This represents a small area of the surface of the Moon. (Pointing to ball) Here's the whole Moon and this pan represents the middle area right here magnified (pointing to middle of ball where the small square is).	

Leader's Role	Participants' Role (Anticipated)
(If using the "Pan with Flour") To Say: We have some mountains here, but what's missing from our Moonscape? Right – let's make some! *To Do:* Show rocks (or wrapped bite-size candies). *To Say:* We'll take these rocks, representing meteoroids that bombarded the Moon early on, and drop them to create craters, like this. *To Do:* Hold hand up high above the pan and drop one rock. Pass out rocks to participants. *To Say:* Don't throw them. Just drop them. 	Craters! Drop rocks into flour.

Leader's Role	Participants' Role (Anticipated)
Presentation Tip: Encourage people to just drop their object into the flour. Your participants may want to THROW their objects into the flour. Discourage this. If they miss the pan, they might hit and hurt someone. To reduce the likelihood of injury have all the participants group themselves on one side of the pan. That way, if someone does throw their object at the pan, it will not hit anyone.	
(If using the "Play Dough Moonscape") ***To Say:*** We have a Moonscape here. What do you see? 	Mountains. Craters
 *To Do:* Using a flashlight covered with a paper towel to represent the Sun, have visitors move the Sun over the Moonscape, starting with the Sun high above the Moonscape (as in photo at left). *To Say:* How much of the Moon ball is lit up? Right now, we have a full Moon.	This whole side.

Leader's Role	**Participants' Role (Anticipated)**
To Say: Now move the Sun down toward the edge of the pan (as in photo below). How much of the Moon-ball is lit up? This is called a quarter Moon. How much more detail can we see? 	 Just half of it. A lot!
To say: Where must the Sun be for you see the craters and mountains best? When we look at a full Moon, the Sun is shining overhead from the viewpoint of someone standing in the middle of the Moon. *(Optional: you can stick a toothpick into the ball or into the Moonscape to represent a person)* Would that person have much of a shadow? When we look at a quarter Moon, now does the person have a shadow? So shadows bring out detail on the Moon. Ready to go look at the Moon through the telescopes?	 Near the edge. No. Yes, a long one. Yeah!

Leader's Role	Participants' Role (Anticipated)
Presentation Tip: At the end of the presentation, if you used the Pan with Flour and used wrapped candies instead of rocks, you can either: • (least messy option) pass out a candy from the original bag to each participant or • retrieve the candy from the flour using a potato masher or slotted spoon, Allowing participants to reach into the flour to retrieve their candy will result in flour-covered hands – not a good combination with telescope viewing.	
Optional Quote: "Mountain walls that tower tonight may appear insignificant tomorrow. Small craters that dot floors of larger rings under one illumination may be absent under others. Long clefts, clearly marked at times, vanish with the shifting of light and shadow." Leland S. Copeland in the April 1956 issue of Sky & Telescope.	

Background Information

Moon Phases

For a photo mosaic of the phases of the Moon:
http://www.astro.virginia.edu/class/oconnell/astr130/im/moon-phases-lrg-cidadao-sm.jpg

Moon's Rotation

Does the Moon rotate? Why does the Moon always keep the same face to Earth? What does the other side of the Moon look like?
A discussion of these topics can be found here:
http://www-spof.gsfc.nasa.gov/stargaze/SMoon.htm

Helpful Hints

Alternate method – To make a pre-made moonscape:

1. Use the recipe below to make your own dough (you will need to double or triple the batch).
2. Create a moonscape with the dough in plastic pan or tray (do not use an aluminum pan – the dough can corrode the pan over time). The type of foam tray used in grocery stores to package meat also works well. Wash the tray thoroughly before using.
3. Cover to store.

Make your own Play-Doh-like clay:
http://www.cooks.com/rec/doc/0,1611,147171-236192,00.html:

1 c. flour
1 c. boiling water
2 tbsp. cream of tartar
1/2 c. salt
1 tbsp. oil
Food coloring

Mix and knead together. This dough is not sticky and does not dry out unless left open to the air for several days. Store in a sealed container (plastic tubs are good).

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