

Spotting Craters:

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

Leader's Role	Participants' Role (Anticipated)
<p>MATERIALS:</p> <p><i>“Pan with Flour” Method:</i></p> <p><u>You Supply:</u></p> <ul style="list-style-type: none">▪ A ~1 inch ball or bead. You can use clay or Play Dough to make this. (Draw a small square on the ball with a pen or magic marker)▪ Skewer stick▪ A flashlight covered with a paper towel and secured with a rubber band to represent the Sun. The paper towel is used to diffuse the light.▪ Aluminum pan▪ Several “meteorites”: rocks (you can also supply small balls of clay or even wrapped candy such as bite-size Reese’s, Rolos, or Hershey’s Kisses. Wrapped bite-size Milky Way or Mounds also work).▪ 1/2 packet powdered hot cocoa mix▪ 5 pound bag of flour.▪ Newspaper▪ Broom, dustpan <p><i>“Play Dough Moonscape” Method:</i></p> <p><u>From the ToolKit:</u></p> <ul style="list-style-type: none">▪ A ~1 inch ball or bead. You can use clay or Play Dough to make this. (Draw a small square on the ball with a pen or magic marker)▪ Skewer stick▪ A flashlight covered with a paper towel and secured with a rubber band to represent the Sun. The paper towel is used to diffuse the light.▪ Aluminum pan▪ Play Dough (See instructions and ingredients for making your own at the end of this section. <p>SETTING:</p> <p>Do this at night or in a room where you can turn off all the lights.</p> <p>If using the “Pan with Flour” method, and this is done outside at night, do it downwind from telescopes, especially if there is a breeze. If very windy, do this inside. Otherwise, the flour will blow around when participants brush flour off their hands and clothes.</p>	

Leader's Role

Participants' Role (Anticipated)

To prepare: Prepare EITHER the “*Pan with flour*” or the “*Play Dough Moonscape*”.

Pan with flour: Fill aluminum pan almost to the rim with flour. **Make sure the flour is loose and not packed down.** Run a slotted spoon, or a wire whisk through the flour to loosen it as necessary. Sprinkle the flour with hot cocoa mix.

Place the 1-3/4” ball on a skewer stick and place it next to or in the pan of flour.

Make a Moonscape by using a spoon or 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 or wrapped bite-size candies (“meteorites”) into the flour, simulating the early bombardment of the Moon by meteorites.

Leader's Role	Participants' Role (Anticipated)
<p><i>Presentation Tips:</i> Many people think the full Moon is the best time to see a lot of detail on the Moon. This presentation addresses that idea.</p>	
<p><i>To Say:</i> Shadows allow us to see features on the Moon!</p> <p>When you look at the full Moon through the telescope, it is difficult to clearly see the mountains and the craters.</p> <p>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.</p> <p>This activity illustrates why. The Moon's surface has mountains and a lot of what?</p>	<p>Craters</p>
<p><i>(If using the "Play Dough Moonscape")</i> <i>To Say:</i> We have a Moonscape here. What do you see?</p> 	<p>Mountains. Craters</p>

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

Leader's Role	Participants' Role (Anticipated)
<p><u>To Do:</u> Using the 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 below).</p>  <p><u>To Say:</u> How much of the Moon ball is lit up? Right now, we have a full Moon.</p>	
<p><u>To Say:</u> 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?</p> 	<p>This whole side.</p> <p>Just half of it.</p> <p>A lot!</p>

Leader's Role	Participants' Role (Anticipated)
<p><i>To say:</i> Where must the Sun be for you see the craters and mountains best?</p> <p>When we look at a full Moon, the Sun is shining overhead from the viewpoint of someone standing in the middle of the Moon.</p> <p><i>(Optional: you can stick a toothpick into the ball or into the Moonscape to represent a person)</i></p> <p>Would that person have much of a shadow?</p> <p>When we look at a quarter Moon, now does the person have a shadow?</p> <p>So shadows bring out detail on the Moon.</p> <p>Ready to go look at the Moon through the telescopes?</p>	<p>Near the edge.</p> <p>No.</p> <p>Yes, a long one.</p> <p>Yeah!</p>
<p><i>Presentation Tip:</i> At the end of the presentation, if you used the Pan with Flour and used wrapped candies instead of rocks, you can either:</p> <ul style="list-style-type: none"> • (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, <p>Allowing participants to reach into the flour to retrieve their candy will result in flour-covered hands – not a good combination with telescope viewing.</p>	
<p><i>Optional Quote:</i> “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.</p>	

Play Dough: purchase commercial children's clay or make your own (adapted from <http://www.cooks.com/rec/doc/0,1611,147171-236192,00.html>):

Play Dough Recipe

4 c. flour

4 c. boiling water

1/4 cup cream of tartar (or the contents of the 1.6 oz jar of cream of tartar included in the ToolKit)

2 cups salt

1/4 cup salad oil

Food coloring (optional)

Place all ingredients except hot water in a large bowl and stir. Pour in hot water and mix together with a spoon until well combined. When the dough has cooled, place the dough on a lightly floured surface and knead it to a smooth consistency. 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).