

# Moon Sand

**Overview:** Moon sand is basically clay with a beach twist. If you've ever tried making a sand castle, you know the disappointment of having the structure crumble after hours of work. Moon sand adds the best properties of clay to the sand for a moldable, sandy texture that's easy to work with, and shows you firsthand what a non-Newtonian fluid looks and feels like!

**What to Learn:** After today's lesson, you'll know a bit about non-Newtonian fluids and viscosity and how to play with an experiment to get different results.

## Materials

- cornstarch
- water
- sand
- measuring cups/spoons, depending on how much moon sand is desired
- Popsicle stick or other stirring apparatus
- food dye (optional)

## Experiment

1. Wear your gloves and put your goggles on. No exceptions!
2. In a cup or bowl, mix together one scoop of corn starch and one scoop of sand.
3. In another cup, add  $\frac{1}{2}$  scoop of water and a few drops of food coloring
4. Add the liquids into the solids and stir with a stick or your hands. It may be necessary to add a few drops of water. Mix thoroughly until the mixture feels like clay.
5. Experiment with different amounts of corn starch, clay, or water to make moon sand with different properties!

*Troubleshooting:* The smaller the grain of sand, the easier it is to form intricate shapes. White sand will make better colors when food dye is added to the mixture. Use a large enough bowl and try to keep one hand clean so you can add more (of whatever you need) as you go along. The ideal mixture is approximately 2 cups sand, 2 cups cornstarch, and 1 cup water, give or take a bit. Notice how adding just a small amount of water turns it into a liquid, and adding a tiny bit more cornstarch (or sand) makes it crumble as if it were solid? Take your time to get this mixture *just* right.

## Moon Sand Data Table

Once you have made your moon sand, experiment with adding more of each substance.  
Record your results on the following chart.

Added Material	Observations	More or Less Viscous?
Cornstarch		
Water		
Sand		

## Reading

A non-Newtonian fluid is a substance that changes viscosity, such as ketchup. Ever notice how ketchup sticks to the bottom of the bottle one minute and comes sliding out the next?

Think of *viscosity* as the resistance stuff has to being smeared around. Water is “thin” (low viscosity); honey is “thick” (high viscosity). You are about to make a substance that is both low and high viscosity, depending on what ratio you mix up. Feel free to mix up a larger batch than indicated in the video – we’ve heard from families who have mixed up an entire kiddie pool of this stuff!

Moon sand is basically clay with a beach twist. If you’ve ever tried making a sand castle, you know the disappointment of having the structure crumble after hours of work. Moon sand adds the best properties of clay to the sand for a moldable, sandy texture that’s easy to work with — and it’s dirt cheap to mix up your weight in moon sand.

The students’ task is to find the perfect ratio of the three ingredients to make this weird substance. If they have too much water, they’ll get a substance that is both a liquid and a solid. If there is too much solid, it crumbles.

## Exercises

1. Name a substance that is very viscous.
2. Why is moon sand called a non-Newtonian fluid?
3. What can you add to corn starch to make it more viscous?
4. If you were going to make gravy and needed it to be thicker, what could you add to it?

**Answers to Exercises**

1. Name a substance that is very viscous. (Answers may vary. The correct answer will be something thick like syrup or gravy)
2. Why is moon sand called a non-Newtonian fluid? (its viscosity changes)
3. What can you add to corn starch to make it more viscous? (water)
4. If you were going to make gravy and needed it to be thicker, what could you add to it? (corn starch)