PHASE ONE: BREAK DOWN
SAND STRUCTURES

Mission: How is the strength of a sand tower affected by its ingredients?

Age: 8+
Materials: $18

Time: 1 hour 15 min
(Set-up: 10 min | Activity: 60 min with wait time | Clean-up: 5 min)

What you need:

Materials:
- Permanent marker
- 3 index cards, cut in half
- 1/3 cup water
- 1/3 cup hand sanitizer
- 1/3 cup vegetable oil
- 4 cups of sand
- 100 pennies (one $1 roll)
- Data sheet (found on PDF)

Equipment:
- 1/3-cup liquid measuring cup
- 1-cup dry measuring cup
- 8 disposable 3-ounce paper cups
- 4 paper plates
- 3 paper bowls
- 3 plastic spoons

What to do:

1. With the marker, label four paper cups like this: “Sand,” “Sand + Water,” “Sand + Hand Sanitizer,” “Sand + Vegetable Oil.”

2. Label four paper plates with the same names as the cups, leaving the middle of the plate open.

3. Label three paper bowls as well with: “Water,” “Hand Sanitizer,” and “Vegetable Oil.”

4. Pour 1/3 cup of each liquid into its labeled bowl. Add 1 cup of sand to each bowl. Stir each mixture with a spoon. How do the liquids mix differently?

5. Fill and press each mixture into its labeled paper cup. The cup labeled ‘sand’ should be filled with dry sand. This will be used as a comparison to the other mixtures, or as scientists say, “the control.” Allow the filled cups to set for 45 minutes.

6. Once the cups have set, place the paper plate labeled with the correct mixture face down over each cup. Holding from the top and bottom, flip each one over so the plate is now underneath the cup and place it back on the table. Lift the cup away to reveal the sand structure. What differences do you observe as you remove the cups?

7. Based on your observations so far, can you predict which sand mixture will hold the most weight? Place half of an index card across the top of each remaining sand structure and put an empty paper cup on top. Start adding pennies to the cup and record the number of pennies it takes for each structure to collapse. Were your predictions accurate?

Clean-up:

Wash measuring cups. Throw used paper products and sand mixtures in the trash. Save any extra unused sand, hand sanitizer and vegetable oil for other purposes. And save your pennies!

MISSION: MATERIALS SCIENCE

DATA SHEET

SAND STRUCTURES

MATERIALS	INITIAL OBSERVATIONS	PENNY TEST
Sand		
Sand + Hand Sanitizer		
Sand + Vegetable Oil		
Sand + Water		