Piling it Up!

Suggested Age: 5-7
Time: 15 minutes

If you have ever been to both a beach and a playground, you may have noticed that the sand at each is very different. It looks and feels different. This is because sand has some very unique properties. It can be found in a variety of colors and sizes and is made up of many different materials. The most common sands are found on beaches and are composed primarily of crushed seashells. Play sand is comprised of silica, the same material that can be used to make glass. Construction sand and desert sand have even more different characteristics.

In this activity we will:

- Explore at the irregular shape of sand and compare its stacking properties to that of spherical objects.

Materials

- Funnel with a small aperture
- Container of sand
- Paper plates
- Marbles (91 total)
- Piece of thin cardboard (4 5/8 x 4 5/8 inches)
- Ruler
- Pen or pencil
- Masking tape
- Scissors

Safety

Be sure to work in an area which can be easily swept. Sand is very difficult to get out of carpet, thus, a room with a smooth floor surface or an area that is covered by a carpet protector is an ideal location. Sand is an irritant if it gets into your eyes. Do not touch around or near your eyes while doing this activity and be sure to wash your hands thoroughly at the conclusion.

Preparation

To prepare for this activity, you will need to make a square frame for the marbles to sit in:

1. Using your ruler, draw straight lines 3/8 of an inch in on all four sides of your cardboard.
2. Cut out the little corners. Refer to the picture below as to what it should look like.
3. Fold the sides up along the lines and tape the corners so that it forms a square box.

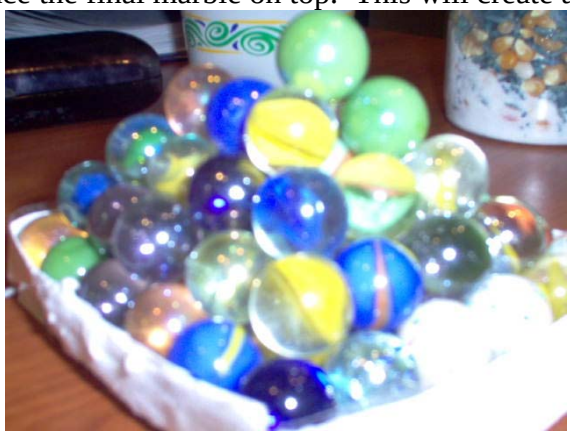
Pre-Activity

Discuss with the children whether they think that sand is round or if it has any specific shape. What is the sand on the beach made out of? Why is it shaped the way that it is? Is the sand in our sandboxes the same as that on the beach? How is it the same? How is it different? Most beach sands (especially in the northeast) are made up of crushed seashells. This gives it a different hue from play sand. Each grain is also typically larger than that of play sand due to the pieces being crushed.

Activity

Any time that you have ever made a sand castle, you have probably used water in order to make the sand stick together. If you don't use water, you notice that the sand just ends up in piles. We will look at why this happens by examining the physical properties of sand. Be careful when using the sand, as it frequently expels a cloud of dust when poured. It may irritate the eyes or throat if it gets in your eyes or you inhale it.

- Open your container of play sand and hold the funnel approximately 5 inches over top of the paper plate.
- Carefully pour the sand through the funnel. What is happening to the sand? What do you observe about the shape?
- Draw what you think a grain of sand would look like if placed under a magnifying glass in the space below.
- Out of this pile of sand, take a few grains to the side of the plate and look at them under the magnifying glass. Draw what you see in the space provided below.
- Slide the plate over to the side and get the cardboard container.
- Cover the bottom of the box with 36 marbles, 6 by 6.
- Continue stacking marbles on top of this layer, first a layer 5x5, then 4x4, 3x3, 2x2, and then place the final marble on top. This will create a pyramid.



- Compare the pyramid which you constructed from marbles and the sand pile which you created with the funnel. How are these alike? How are they different? Why do you think the sand has similar properties to the marbles?
- Is this what you expected to happen? Why or why not?

Extension Activity

1. Instead of using spherical marbles, use small blocks to create a pyramid. Observe which model is more accurate when compared to the sand pyramid. Why?
2. Conduct research on different types of sand (i.e. play sand, beach sand, construction sand, Midwest desert sand, African desert sand, etc.) and compare their colors and sizes. Use this research to find out why different types of sand vary in color and size.

References

http://home.earthlink.net/~arcenwor/pyr_sand.html

http://www.harvard-magazine.com/on-line/070391.html