

# Marshmallow Mashers

*In this activity, students will observe the effect of air pressure on marshmallows, and then can dine on this delicious experiment.*



## Grade Level

- 4th - 8th

## Science Focus

- air molecules
- air pressure

## Time Required

- 20-30 minutes

**Supplies** *Since mini marshmallows are not provided with this kit, this same activity may also be done with the ten pre-filled bottles of styrofoam packing peanuts included with the kit.*

Per Cooperative Group

*Enough supplies for ten cooperative groups of three*

- 1 empty 16 oz. plastic pop bottle, clean and dry
- a container of mini marshmallows to fill up half the bottle
- 1 pump cap (Fizzkeeper or any other brand)
- student activity-sheet Make A Marshmallow Masher

Per Class

- a chart pad (optional)
- markers (optional)

**Important Safety Note** *A lot of pressure can build up in these bottles and the caps can become projectiles. When it's time for students to release air from the bottles, be sure to have them lay their bottle on its side and slowly unscrew the cap on the bottle. You may want to collect the bottles when they are done experimenting so that students aren't pumping in air throughout the entire class period.*

## Doing the Activity

- Tell the class that you have an activity that will help them see the effects of air pressure. Show them the supplies that they will be using for the experiment: a clean and dry plastic pop bottle, a container of mini-marshmallows, the pump cap, and the student activity-sheet, Make A Marshmallow Masher. Explain that they will get to eat the marshmallows when they've finished the whole experiment. Pass out the student activity sheets and have students put their names and the date at the top.
- Ask students what are the two main ingredients in marshmallows. (sugar and air, a sugar foam concoction) Tell them that their first job is to put the marshmallows inside

the bottle. Have student helpers give a bottle and a container of marshmallows to each cooperative group.

- Tell them their next job is to put the special push cap on the bottle, but not to pump it yet. Ask them to squeeze the bottle and describe how it feels. Then ask them what they think will happen if they pump a lot of air molecules into the bottle. Using the space under question number 1, have them draw and/or write what they think will happen.
- Then follow direction number 2 on the Make A Marshmallow Masher student activity sheet and continue this procedure until you've completed the experiment.
- Have the helpers collect the pump caps and bottles while the students munch on the marshmallows.

### **Active Questioning, Explanation, and Discussion**

1. What did this experiment teach you about air pressure? (When you add more air molecules inside the bottle, the air pressure increases and compresses the marshmallows and the air inside them. When you unscrew the cap and the air pressure returns to normal, the marshmallows return to their original size.)
2. Can you think of other things we could put in the bottle that would demonstrate the effects of air pressure? (Foam, shaving cream, packing peanuts, candy Peeps, etc.)
3. What are some things that wouldn't compress inside the bottle? (Open-ended)

### **Other Experiment Extensions**

#### **Experiment Extension 1 – Balloon in a Bottle – (Teacher Demo)**

##### **Supplies**

Per Student

None

Per Class

1 clean and dry pop bottle with a hole in the bottom  
1 balloon - long and skinny  
a permanent marker

##### **Doing the Activity**

- Explain to students that you will be doing a demonstration to show them the effects of air pressure on a balloon in a bottle. Drop the balloon down through the opening of the bottle and stretch the open end of the balloon over the neck of the bottle. Ask students to predict what will happen to the balloon if you try to blow it up. Demonstrate and have a volunteer mark where the balloon reached to in the bottle. Discuss.
- Now ask students what they think will happen if the hole at the bottom of the bottle is covered and you try to blow up the balloon. Demonstrate and mark the reach of the balloon. Discuss why the balloon couldn't be blown up as far. (Once the balloon and the edge of the bottle make a seal, the air pressure below the balloon can't escape because the hole is blocked. This air pressure pushes back on the balloon and doesn't let you blow the balloon up very far.)
- Ask what would happen to the balloon if you lowered the air pressure in the bottom of

the bottle by taking some of the air out. Demonstrate by putting your mouth over the hole in the bottle and inhaling or show the video segment dealing with this from the Everyday Science: Pressure video. The balloon should spread out inside the bottle. Discuss. (By inhaling the air in the lower part of the bottle, a low pressure system is created. The higher pressure air in the balloon pushes further into the bottle and takes up the space.)

### **Experiment Extension 2 – Cloud in a Bottle**

#### **Supplies**

Per Cooperative Group

1 clean, empty plastic pop bottle

a tiny amount of isopropyl alcohol or water for each bottle

1 Fizzkeeper pump cap

Per Class

None

#### **Doing the Activity**

- Discuss what a cloud is with students. (Fog - Water vapor condenses into small droplets of liquid water in colder temperatures.)
- Tell them that they are going to make a cloud in a bottle. They need to put a small amount of isopropyl alcohol or water in their bottles and then add more air molecules by using the pump cap. They may need to set these aside for a time before they observe the cloud formation.
- Have students untwist the caps quickly, but carefully, and observe what they see, and also how the air feels as it comes out of the bottle. How did it feel and why? Discuss how they think this occurred.

Name \_\_\_\_\_ Date \_\_\_\_\_



## Make A Marshmallow Masher

*In this delicious experiment, you will make some discoveries about air pressure and marshmallows.*

You will need:

- 1 empty pop bottle, clean and dry
- A bunch of mini marshmallows
- 1 pump cap

1. Fill your bottle half full with the mini marshmallows. Put the special pump cap on the bottle. Squeeze the bottle. How do it feel? Draw a picture and/or write what you think will happen when you pump air into the bottle.
  
2. Now pump the cap as much as you can. Squeeze the bottle. How does it feel now? What happened to the marshmallows? Draw and/or write about how the marshmallows changed.
  
3. Shake the bottle. How do the marshmallows sound? Why do you think the marshmallows got smaller?
  
4. What do you think will happen when you take the cap off the bottle?
  
5. Watch the marshmallows as you slowly unscrew the cap on the bottle. What happened to them?
  
6. Why do you think this happened?