

What is the Matter?



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Teacher's Guide for Implementation of Task

Prior Knowledge Required of Student:

- Students will need to know how to measure volume.
- Students will need to know how to blow up a balloon.
- Students will need to understand how to explore different materials through using their senses.
- Students must be familiar with making comparing and contrasting charts.
- Students must be familiar with inputting data into Microsoft Excel to create charts.
- Students must be familiar with finding the circumference of an object.

Time Allotment: 10 days (approximately 40 minutes per lesson)

Student Groupings:

Throughout the engagements and explorations, students will be placed into cooperative groups of two or four. Many times through the exploration, students will be called back into a classroom discussion.

Special Education Students: I will make sure to remove excess materials, use audible cues and eye contact with succinct verbal instructions. I will also challenge inaccurate statements and use broad themes to include all cultures. It is also necessary that I am verbally clear and maintain written clarity while I emphasize concepts. It is also important to link concepts to experiences.

Materials/Resources Needed:

- .9 oz clean, empty, plastic soda bottle
- 2 Liter bottle of diet Pepsi
- Access to a freezer
- Adequate outdoor space (limits cleanup)
- Apple juice
- Apron
- Baking soda
- Balloon filled with helium.
- Balloons

- Balloons
- Beaker
- Blocks of wood
- Bowl
- Can of scented spray
- Coins
- Containers with different volume markings
- Cups of frozen water
- Elmer's white glue
- Empty butter container
- Food coloring (assortment of colors-optional)
- Gloves
- Goggles
- Hand sanitizer
- Honey
- Ice cubes
- Kool-aid
- Lab journals
- Masking tape
- Measuring tape
- Orange Juice
- Paper towels
- Paper/plastic cups
- Pencils
- Rocks
- Roll of mint Mentos
- Seashells
- Sharpie
- Spoons
- Square container
- Sta-flo liquid starch
- Stop watches
- Tennis balls
- Variety of solid objects (penny, pencil, bouncy ball)
- Vinegar
- Water

Teacher Preparation Prior to Unit

- Make sure that there are adequate materials for all groups.
- Make Kool-aid
- Prepare trays of ice
- Ensure that all experiments work properly, and understand potential flaws in the experiments.
- Make sure that there is an ability to access a freezer (and there are markings on the ice trays to guarantee that the ice is not used for other reasons).
- Go to the beach to collect seashells.

Implementation of Specific Activities:

- Day 2: Make sure not to inhale or point the can of scented spray into the direction of anyone's face.
- Days 5, 6, and 7: Make sure that the students are not pointing the bottle with the balloon on top of it towards anyone. In the second engagement make sure that the students are a good distance away from the soda bottle when the Mentos are dropped in.
- Days 8 and 9: Ensure that the students are careful with the silly putty and where they are placing it. Food coloring can dye hands, use gloves.
- Day 10: Make sure that students know that there is a possibility for water to be on the floor after the ice cube has melted. Try to prevent slipping.

Language Usage Icon:



Attention Bright Thinkers: Whenever you see this picture, it is important to make sure that what you have written is clear and complete and that you have used correct spelling, grammar, punctuation, and capitalization.

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"Cooks.com – Recipe – Homemade Silly Putty." *Cooks.com – Recipe Search and More*. 17 Mar. 2010.
<http://www.cooks.com/rec/view/0,1611,149185-253199,00.html>.

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http://www.ehow.com/how_2252241_measure-volume.html.

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<http://www.stevespanglerscience.com/experiment/00000109>.

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<http://www.songsforteaching.com/jennyfixmanedutunes/3statesofmatter.htm>.

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What is the Matter?

Student Data and Answer Booklet



Name: _____

Date: _____

Materials Needed:

- .9 oz clean, empty, plastic bottle
- 1 balloon
- 3 tsp of baking soda
- 4 tbsp of vinegar
- Teaspoon
- Tablespoon
- Paper towels (for clean up)
- Clock
- Measuring tape



Engagement: Talk to your fellow lab-lover and then write down your answer.

1. From our previous lessons, what is a gas?

2. What do you think will happen if we mix two different substances together (baking soda and vinegar)?

3. What normally fills a balloon?

4. What do we breathe out?

After watching the video, respond to the following statement.

5. Write down a few observations from the video that we watched on steam.

Exploration: We will be broken into several groups to conduct the following experiment. Please read all instructions carefully before beginning the experiment.

1. Materials Manager (M&M): Please take the empty .9 oz bottle from you exploration kits. Carefully measure out 2 tablespoons of vinegar and pour it into the bottle.
2. M&M: Please, now take the balloon out of your exploration kit.
3. Principal Investigator (PI): Take the mouth of the balloon and spread it open (hint: it is easiest if you use your first two fingers on each hand to spread apart each side). If necessary, allow a fellow lab-lover to assist you in opening the mouth of the balloon.
4. Ask a fellow lab-lover to measure out 1 teaspoon of baking soda and carefully pour the baking soda into the mouth of the balloon.
5. Choose a member of the group to stretch the mouth of the balloon overtop of the mouth of the bottle. (Careful, **do not** hold the balloon vertically overtop of the mouth of the bottle).
6. Make sure that the Recorder and Reporter (R&R) are ready to watch the clock and record the time it takes for the experiment to occur.

7. P.I. please carefully take the balloon and tilt the balloon vertically overtop the bottle, dumping the baking soda into the bottle. As soon as the P.I. vertically lifts the balloon, the R&R needs to start the stopwatch and stop it when the experiment has finished.



The experiment should be set up as pictured in the diagram to the left.

12. M&M → Please carefully remove the balloon from the mouth of the bottle and walk to the back and dump the vinegar into the sink.



What do you see happening inside the bottle?

What is now happening inside the balloon?

How is this happening?

What kind of reaction did you create? Please explain how you know.

8. Please record any more observations of the experiment on the lines provided below.

9. Please draw a picture in the box below of what the experiment looks like.

Trial 1	Trial 2

11. Everyone needs to get the time from the R&R and write the information into the box below. This will be considered trial number one.

	Trial 1	Trial 2
Time		
Circumference		

12. M&M→ Please carefully remove the balloon from the mouth of the bottle and walk to the back and dump the vinegar into the sink.

13. Your group will be conducting a very similar experiment and comparing the two trials. It is necessary that the P.I. pours 2 new tablespoons of vinegar into the bottle.

13. Follow all the instructions from above. However, **instead** of placing 1 teaspoon of baking soda into the balloon, you will be placing 2 teaspoons.

14. Once your group has completed all of the questions and the experiment, please proceed onto the explanation portion of today's lesson.

Explanation:



1. When the vinegar and baking soda mixed, I saw that...

2. What happened to the ballon?

3. Why did this happen?

4. What evidence do you have that this occurred?

5. Even though we cannot always see gas, how do we know it exists?

6. This experiment shows that gases have a definite volume because...

Part of your grade for this experiment will be based on how well you and your group worked together. Take a look at the rubric below to ensure that you are following all the principles of adequate group work.

Collaborative Work Skills : Lab-Lover Evaluation

Teacher Name: **Sarah Grollman**

Student Name: _____

CATEGORY	4	3	2	1
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on-task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Attitude	Never is publicly critical of the project or the work of others. Always has a positive attitude about the task(s).	Rarely is publicly critical of the project or the work of others. Often has a positive attitude about the task(s).	Occasionally is publicly critical of the project or the work of other members of the group. Usually has a positive attitude about the task(s).	Often is publicly critical of the project or the work of other members of the group. Often has a negative attitude about the task(s).
Quality of Work	Provides work of the highest quality.	Provides high quality work.	Provides work that occasionally needs to be checked/redone by other group members to ensure quality.	Provides work that usually needs to be checked/redone by others to ensure quality.
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.

Please look at the following diagram. Choose the diagram that appropriately displays the correct setup for the experiment. Once you have chosen the image, explain why each of the others would not function appropriately for this experiment. Then, explain in depth why the image that was chose would function correctly.







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Student Resource Booklet



Name: _____

Date: _____

