

3-5 Physical Science
3-5 Nature of Science



Southern Nevada Regional Professional Development Program

Properties of Matter - Mass Unit

INTRODUCTION

Children are often confused about matter and mass. This unit explores how to introduce this concept to students using an inquiry-based approach.

WHERE'S THE SCIENCE?

Everything is matter. **Matter** is anything that has mass and takes up space. The more matter an object contains, the greater its **mass**. The mass of an object remains consistent, whether it is in one piece, or broken up into many parts. It still contains the same amount of matter, therefore, the same mass. If an object changes state, it still contains the same amount of matter (particles), therefore the mass remains constant. It does not matter if the volume increases, as in the change from liquid water to ice, the mass will be the same. Mass is measured in **milligrams, grams, and kilograms**.

MATERIALS

(per group)

- Ice
- Clear plastic cups with lids
- Zip lock baggies
- Electronic balance (optional)
- Balance
- Gram pieces

- Clay
- Poster board
- Chart paper
- Markers
- Science notebooks



<http://www.germes-online.com/direct/dbimage/50169206/Balance.jpg>

PROCEDURES

Lesson One

1. Ask the students, “What is mass?” Hold up a stick of clay and ask the students if it has mass. Next hold up a paperclip and ask the students which one has more mass. Explain that the clay has more mass because it has more matter than the paperclip. The measure of how much matter an object has is its mass.
2. Hold up the original piece of clay and break it in half. Show the students the two new pieces that were made. Ask them if these two pieces have more mass than the one original piece. Chart their responses. Challenge them to design an investigation to test their idea.
3. Introduce the balance. Tell them the balance is used to determine the mass of an object. Mass is measured in grams. Show them how to use the balance. Calibrating the balance is essential to get an accurate reading. Discuss the placement of gram pieces and how this can affect the outcome.
4. Allow students an opportunity to explore and become familiar with the balance. Place several small items on a table for the students to find the mass. Suggested items are small rocks, erasers, and washers. Circulate the room and visit groups to ensure students are using the balances correctly.
5. Call the students together and ask them if they have any ideas about how to investigate if the two pieces of clay have the same

mass as the original piece of clay. At this point, students should suggest using the balance to find out.

6. Instruct the students to first find the mass of their single piece of clay. Tell them to record its properties in their science notebooks. They may also want to include a sketch. Then, they must break the clay in half creating two pieces. Observe and record any change made to the clay in the science notebook. Then place both pieces on the balance to determine the mass.
7. Call the students to the carpet area and discuss what happened in their investigation. They should tell you that there was no change in the mass of one piece of clay that was then divided into two pieces. Explain that the clay still contains the same amount of matter; therefore, the mass remains the same. Chart any further questions they may have regarding matter and mass.

Lesson Two

1. Review matter and mass. Ask the students if an object still has the same mass if you break it up into pieces. Refer back to the first lesson. Challenge: What if the object changed states? Would it still have the same mass?
2. Review the three states of matter with the students- solids, liquids, and gases. Show an example of an object in each of the three states of matter. **NOTE:** If they need more instruction, use the “What’s the Matter” unit which focuses on the three states of matter before you start this lesson. This can be found under the Physical Science 3-5 tab.
3. Tell them that they will be investigating using water. Water can easily be changed back and forth to the three different states of matter. This can be done by adding heat, or taking heat away.
4. Show them the materials table. They can use any or all of the provided materials to conduct their investigation (zip lock baggies, clear plastic cups with lids, and ice). Once they view the possible materials, instruct them to get into their groups (2-4 students) to draft a plan. Circulate the room and visit each group to guide them with their plan. They must begin with a claim about their

investigation and an idea to support their claim. They either believe that the ice will have the same mass when it changes states and turns into water or they believe that the mass will change.

5. After the plans have been drafted, they may begin their investigation. Remind them to record all results in their science notebook. They must have evidence to support their claim.

NOTE: The total mass of an object remains the same even if it changes state. The students should find the same mass after their investigation. The most efficient way to conduct this investigation is by placing one small ice cube in a zip lock baggie and finding its mass. Then, melt it with the heat from your hands and turn the ice into water. Find the mass again. Using an electronic balance shows a digital record of the ice and water. Both will give the same reading.



<http://www.ycscale.net/product-balance-led.htm>

6. Once all groups have finished investigating, instruct them to return to their tables with their science notebooks. They will use their data to report their findings in tomorrow's lesson.

7. In closing, ask them to record (in their science notebooks) any further questions they may have after completing this investigation. Were they surprised with their results? Would they like to conduct the investigation again using different materials? Share out whole group.

Lesson Three

1. Review the states of matter and mass investigation from yesterday. Tell the students they will use their data to create a poster to share their findings with the class.
2. Instruct the students to get into their groups and give each group a piece of poster board. Tell them to record any important information on the poster to share with the class. They must provide their claim with evidence to back it up.
3. Once the students have completed their posters, allow plenty of time for them to present these to the class.
4. Ask the students to comment on various procedures or plans that they liked. Was there more than one way to conduct this investigation? If you could now change one thing about your original plan, what would it be?
5. Close the lesson by referring back to the original question, “Would an object still have the same mass even if it changed states?” Discuss and chart their responses. Record any further investigating they would like to do to explore this concept.

Additional Resources

<http://www.bbc.co.uk/schools/ks2bitesize/science/>

Interactive site on the states of matter.

Morrison, I., *Matter Splatter*. Rigby, 2003. ISBN 0-7578-6362-0

Walker, S., *Matter*. Lerner, 2005. ISBN: 0-822-55131-4

Vocabulary

Balance: A tool used for weighing objects; when the balance beam is level the objects on either side are equal in mass.

Evidence: Data used to support claims. Evidence is based on observation and scientific data.

Gram (g): The basic unit of mass in the metric system.

Mass: A quantity of matter.

Matter: Anything that has mass and takes up space.

Melting: To change from solid to liquid. Heat causes solids to melt.

State: A kind or form of matter. The three common states of matter are solid, liquid, and gas.

Safety Reminder

N/A

Nevada State Science Standards

P5A1 Students know matter exists in different states (i.e., solid, liquid, gas) which have distinct physical properties. E/S

P5A2 Students know heating or cooling can change some common materials, such as water, from one state to another. E/S

P5A5 Students know the mass of a material remains constant whether it is together, in parts, or in a different state. E/S

N5A1 Students know scientific progress is made by conducting careful investigations, recording data, and communicating the results in an accurate method. E/S

N5A3 Students know how to draw conclusions from scientific evidence. E/S

N5B3 Students know the benefits of working with a team and sharing findings. E/L