

LESSON PLAN

Subject: 6th Grade Science

Lesson: Pewter Casting: All Things Matter

Standards Addressed: Understand the structure, classification, and physical properties of matter. [6.P.2]

Objectives:

- Reinforce that all things are matter and exist as a solid, liquid or gas.
- Display the effects of heat on the motion of atoms as they change phases.
- Understand that the addition of heat to certain materials can change a solid to a liquid thereby changing the material's shape.

Materials Needed:

- Device for showing "Pewter Casting All Things Matter" video
- Balloons or plastic zip bags (3 per student)
 - One filled with water, one with frozen water, and one with air
- A pin or sharpened pencil
- A container to catch any spilled water
- "All Things Matter" Activity sheet

Outline:

- Prior to the lesson, students should understand:
 - Commonly on earth the three states of matter are solid, liquid and gas
 - Matter is made up of particles too small to be seen
 - That matter undergoes changes through the application of heat
- Direct the students through Activities 1 & 2. Have students observe the physical properties of the water both when it is in the bag and as they pour it into the container. Does the water take up space? Does it have mass? Is it visible? Can it change shape? Encourage the students to use words such as "hard, invisible, wet, splashy", etc.
- Students will complete the charts for Activities 1 & 2 in groups. They will complete Activity 3 individually.
- Direct the students through Activity 4. Use this to discuss how heat causes motion in the atoms of matter and how different types of matter can change forms at different temperatures. Discuss "melting point" and "boiling point."
- Students will complete Activity 4.

Take It Further: You can further investigate changes in matter according to heat by having students place ice in a saucepan and take the temperature of the pan when the ice starts to melt. The melting point of pewter in the video is about 446° F. What about the melting point of sugar? Of chocolate? Of butter?

Cross Curriculum Connection: Have students play act what the molecules in a block of ice might look like as the ice heats up and starts to melt.



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All Things Matter

Grade 6 Science

Student Name: _____

Date: _____

Activity 1:

We saw in the video how pewter can be a solid or a liquid depending on temperature. Now you will be using your powers of observation to perform a demonstration about solid, liquid and gas.



Carefully observe each balloon.

Investigate the contents of the three balloons and write your observations in the chart below.

	What does the balloon look like?	How does the balloon feel when you compress it?	Describe the temperature of the balloon.
Air Balloon			
Water Balloon			
Ice Balloon			



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All Things Matter Activity



Activity 2:

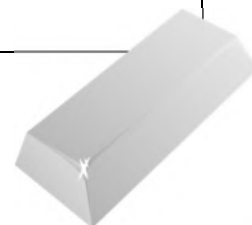
Put each balloon into a container. Predict what you think will happen when you pop the balloon. Write your predictions in the table. Now take the pin and pop one balloon at a time, observing what you see and hear as you do. Write your observations in the table.



	What I think will happen when I pop the balloon	What happened when I popped the balloon?
Air Balloon		
Water Balloon		
Ice Balloon		

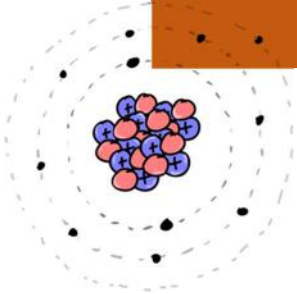
Activity 3:

	Draw a diagram of what the atoms look like in this state of matter
Air	
Water	
Ice	



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All Things Matter Activity



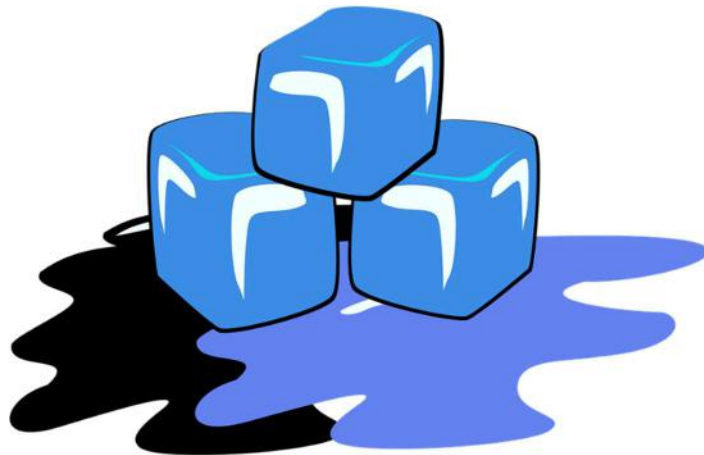
Activity 4:

Use the ice for this activity. Rub the ice with both hands for 1 minute.

What is happening to the ice? _____

What is happening to your hands? _____

Explain the process of heat transfer in this activity.



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All Things Matter

Grade 6 Science

ANSWER KEY

Activity 1:

We saw in the video how pewter can be a solid or a liquid depending on temperature. Now you will be using your powers of observation to perform a demonstration about solid, liquid and gas.



Carefully observe each balloon.

Investigate the contents of the three balloons and write your observations in the chart below.

	What does the balloon look like?	How does the balloon feel when you compress it?	Describe the temperature of the balloon.
Air Balloon	Student should use words like "invisible, empty, full, tight, etc."	Students should use words like "soft, squishy, full, firm, etc."	Students should use words like "room temperature, normal, body temperature, etc."
Water Balloon	Students should use words like "squishy, full, clear, etc."	Students should use words like "squishy, floppy, full, changes shape, etc."	Students should use words like "lukewarm, cool, room temperature, body temperature, etc."
Ice Balloon	Students should use words like "hard, full, cloudy, etc."	Students should use words like "hard, firm, doesn't change shape, etc."	Students should use words like "cold, very cold, freezing, etc."



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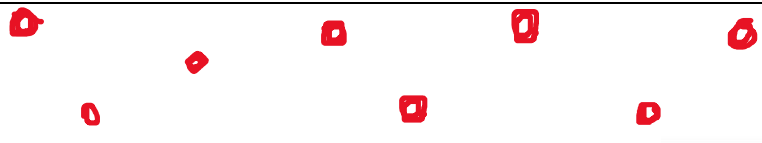
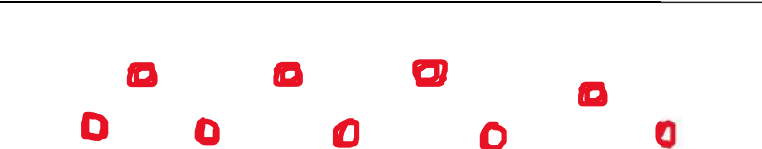

All Things Matter Activity

Activity 2:

Put each balloon into a container. Predict what you think will happen when you pop the balloon. Write your predictions in the table. Now take the pin and pop one balloon at a time, observing what you see and hear as you do. Write your observations in the table.

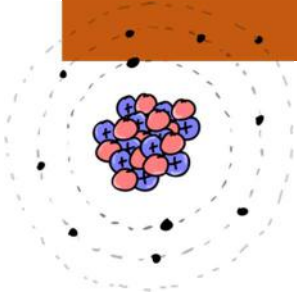
	What I think will happen when I pop the balloon	What happened when I popped the balloon?
 Air Balloon	Student can make their own predictions.	Student should describe the balloon deflating and air escaping into the room. The air cannot be seen taking the shape of the room.
Water Balloon	Student can make their own predictions.	Student should describe the balloon deflating as it loses water. The water can be seen changing shape as it moves from the balloon to take the shape of the container.
Ice Balloon	Student can make their own predictions.	Student should describe the balloon resisting to change shape as the ice itself does not change shape.

Activity 3:

	Draw a diagram of what the atoms look like in this state of matter
Air	
Water	
Ice	

OLD SALEM EXPLORATORIUM

All Things Matter Activity



Activity 4:

Use the ice for this activity. Rub the ice with both hands for 1 minute.

What is happening to the ice? **Student should describe the ice slowly warming and starting to get wet. If they keep going, it may even start to drip water.**

What is happening to your hands? **Student should describe their hands getting colder as they go. And after they are done, their hands may remain cold for several minutes.**

Explain the process of heat transfer in this activity. **The thermal energy of the student's hands transfers heat to the ice, allowing the atoms to vibrate more frequently until both are at an equilibrium. This means that the ice has warmed enough to reach its melting point and change states to a liquid, while the student's hands have cooled down to meet the equilibrium.**

