

Science Curriculum Map Grade: 6

School and Theme: MS217: Green Magnet School for Career Exploration

Teacher Name: Ragini Singhal

Time Frame / Month	September
Unit Title/ Micro-concept	<p>Matter, States of matter, Cause of changes in state of matter</p> <p>Topical understandings are:</p> <ul style="list-style-type: none"><li>-Scientific models (e.g. the particle theory) can be used to help explain observed traits and phenomena.</li><li>-The properties of each type of <b>matter</b> determine how we use them.</li><li>-All <b>matter</b>, regardless of state, appearance and availability needs to be handled safely.</li></ul> <p><b>-Interactions</b> The three states of phases of matter (solid, liquid, gas) are determined by the arrangement, motion, and interaction of molecules.</p> <p><b>-Models</b> The Particle Model of matter is a conceptual tool useful in understanding the properties and behavior of matter that is of too small a scale to observe directly.</p>
Macro concept / connection to theme	Structure & change
Essential	How does knowledge about the composition of matter help us?

<p>Questions</p>	<p>Why should people consider the risks and benefits before the production of new materials and/or the implementation of a new process?</p> <p>How is matter transformed and how does it affect us?</p>
<p>Content</p>	<p>Matter is anything that has mass and takes up space.  Solids, liquids, gases &amp; plasma are different states of matter.  Matter is made of particles called atoms. These atoms are made up of protons, neutrons &amp; electrons. Atoms join together to form molecules. Addition or removal of heat causes matter to change state.</p>
<p>Skills</p>	<p>Make models  Use a computer to make power point presentation  Make display boards  Collect accurate information which they will use to answer questions during presentation</p>
<p>Assessments</p>	<p>You are a water molecule. You are the keynote speaker at a Water Conservation seminar. Introduce yourself and tell your life adventures so that your audience leaves the seminar with an understanding of the parts and structure of a water molecule, an understanding of its physical properties, and the need to conserve water.</p> <p>Product performance and purpose  Explain the structure of the water molecule.  Explain how water exists in three phases, what causes these changes.  Impress upon your audience the need to conserve water.</p> <p>You may use one of the following methods:  Create relevant models and explain them;  Make a PowerPoint presentation that includes all information about your structure, your life, and why you are so important;  Create a display board about your life and present it.</p>

**Unit name:** Matter

**Teacher/School:** Ragini Singhal/ MS 217

**Time Frame:** 24, 45minutes periods

### Stage 1 Desired Result

#### **Standards Based Learning Goals:**

- 3.1a Substances have characteristic properties. Some of these properties include odor, color, phase at room temperature, density, solubility, heat and electrical conductivity, hardness, and boiling and freezing points
- 3.1f A solid has definite shape and volume. Particles resist change in position
- 3.1d Gases have neither a determined shape nor a definite volume. Gases assume the shape and volume of a closed container
- 3.1e A liquid has definite volume, but takes the shape of a container
- 3.1c, The motion of particles helps to explain the phases (states) of matter as well as changes from one phase to another. The phase in which matter exists depends on the attractive forces among its particles
- 3.3c Atoms may join together in well-defined molecules or may be arranged in regular geometric patterns
- 3.3e The atoms of any one element are different from the atoms of other
- 3.3 a All matter is made up of atoms. Atoms are far too small to see with a light microscope
- 3.3b Atoms and molecules are perpetually in motion. The greater the temperature, the greater the motion
- 4.2c, During a phase change, heat energy is absorbed or released. Energy is absorbed when a solid changes to a liquid and when a liquid changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid
- 4.2a, Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature
- 4.2 b heat can be transferred through matter by the collisions of atoms and/or molecules (conduction) or through space (radiation). In liquid or gas, currents will facilitate the transfer of heat (convection)
- 3.1c, The motion of particles helps to explain the phases (states) of matter as well as changes from one phase to another. The phase in which matter exists depends on the attractive forces among its particles

Concepts

<u>Macro-concept: Big idea</u> Structure & change	<u>Micro-concept: content idea</u> What is the structure of matter and how does one form change to another?
<u>Macro concept Understandings</u> Students will understand that... Everything around shares the same basic structure and given the proper environment is capable of change.	<u>Micro concept Understandings</u> Students will understand that... Everything they experience is matter in one form or another. All matter is made of the same basic units. Since the units are universal, given the appropriate energy, these forms can transform from one state to another, even from one kind to another.
<b>Questions</b>	
<u>Universal Essential Questions</u> What part does matter play in our lives?	<u>Content Guiding Questions</u> What is matter? What is matter made up of? What causes matter to change its state? Where is this change of state most commonly found in nature?  Topical questions: How can we use the "properties of <b>matter</b> " to clean things (e.g. water, air, food, clothing, refining chemicals?)  Are there mixtures that cannot be separated?  What are the characteristics of water that make it a most dangerous substance?  Are solutions more helpful or harmful to humans?

## Knowledge and Skills

### Know

Students will know that ...

Matter is anything that has mass, and takes up space.

All matter is made up of protons, neutrons and electrons.

Atoms bond together to make molecules.

There are four states of matter: solids, liquids, gases and plasma that are found in nature.

Addition or removal of thermal energy, can change one form of matter to another.

Evaporation, Condensation, boiling, melting, freezing

Water exists in three forms in nature;

solid: ice, liquid :water, gas: water vapor

3 Methods of heat transfer: Radiation, Conduction, Convection

### Do

Students will be able to ...

Create models of atoms and explain its structure

Make a model of a water molecule

Make a model of, and explain the water cycle

Follow procedures, collect and analyze data while completing a lab.

Use 21<sup>st</sup> century skills by collaborating to create a PowerPoint presentation.

### Performing and Recording Students:

Carry out and modify (as necessary) identified procedures while conducting a fair test

Use equipment safely and accurately

Collect, record and organize relevant qualitative and quantitative data using appropriate units of measurement

Use appropriate vocabulary and scientific terminology

### Analyzing and interpreting

Study observations and identify patterns and trends (making inferences)

Draw a conclusion which supports/refutes the hypothesis based on relevant observations

Identify relevant applications of findings and formulate new questions

Identify sources of experimental error and suggest how the experiment could be carried out in the future

## Unit Planner – A Week at A Glance

**Unit Name: Matter**

**Teacher/School: Ragini Singhal/ MS 217**

## Time Frame: September

<p>WHERE is the student going and what is expected          HOOK with needed skills to experience and explore          Opportunity to REVISE and RETHINK their understanding</p>		<p>Allow students to EVALUATE work and implications          TAILOR work to student needs          Be ORGANIZED to maximize engagement</p>		
Monday	Tuesday	Wednesday	Thursday	Friday
<p><b>Content Focus:</b>          Matter is anything that takes up space and has mass.          All matter is made of atoms (tiny particles) too small to be seen with a light microscope</p> <p><b>Hook:</b>          What is everything around us made up of?</p> <p><b>Daily Assessment:</b>          Students will complete a ...          Involving different kinds          Of matter to prove that all          Matter has mass and take          Up space</p>	<p><b>Content Focus:</b>          An elementary introduction to the structure of the atom.</p> <p>Atoms may join together in well defined molecules or may be arranged in geometric patterns</p> <p><b>Hook:</b>          Why is one substance different from all other substances?</p> <p><b>Daily Assessment:</b>          Students will in groups create and present atoms and molecules using toothpicks and clay/gumdrops</p>	<p><b>Content Focus:</b>          Substances have characteristic properties. Some of these properties include odor, color, phase at room temperature, density, solubility, heat and electrical conductivity, hardness, and boiling and freezing points.</p> <p><b>Hook:</b>          If you are given salt and sugar, how will you find the difference?</p> <p><b>Daily Assessment:</b>          Students observe salt, sugar, paper, metal, wood and describe the physical properties</p> <p>What are the similarities between all these substances?</p>	<p><b>Content Focus:</b>          Continued from previous day</p> <p><b>Hook:</b>          A graduated cylinder filled with tinted oil and water -          Why do the liquids not mix?</p> <p><b>Daily Assessment:</b>          Students will observe and describe the physical properties of:          Water, honey, oil          corn syrup -          What are the similarities between water, honey, oil, and corn syrup?</p>	<p><b>Content Focus:</b>          Continued from previous day</p> <p><b>Hook:</b>          Two balloons: One filled with air and one with helium. Students will predict what will happen when they are released.</p> <p><b>Daily Assessment:</b>          Students will observe air and describe its properties at room temperature.</p> <p>What are the similarities between air and helium?</p>

## Unit Planner – A Week at A Glance

Unit Name: Matter contd.

Teacher/School: Ragini Singhal/ MS 217

Time Frame: September

Monday	Tuesday	Wednesday	Thursday	Friday
<p><b>Content Focus:</b> Particles that make up matter are in constant motion. State of matter depends on the motion of the particles</p> <p><b>Hook:</b> Brainpop movie: States of matter</p> <p><b>Daily Assessment:</b> Summarize the main ideas in the video.</p>	<p><b>Content Focus:</b> Addition or removal of heat causes particles to change motion. During a phase change, heat energy is absorbed or released. Energy is absorbed when a solid changes to a liquid and when a liquid changes to a gas. Energy is released when a gas changes to a liquid and when a liquid changes to a solid.</p> <p><b>Hook:</b> What does it take for the water to boil or the ice to melt?</p> <p><b>Daily Assessment:</b> Diagram phase change</p>	<p><b>Content Focus:</b> Evaporation, condensation, freezing, melting, boiling,</p> <p><b>Hook:</b> Why do drops of water collect on the outside of a glass of ice cold water?</p> <p><b>Daily Assessment:</b> Compare evaporation, condensation, melting, boiling, and freezing.</p>	<p><b>Content Focus:</b> Heat moves in predictable ways, flowing from warmer objects to cooler ones, until both reach the same temperature heat can be transferred through matter by the collisions of atoms and/or molecules (conduction) or through space (radiation). In liquid or gas, currents will facilitate the transfer of heat (convection).</p> <p><b>Hook:</b> Can you touch the metal spoon which has been left in a boiling pot of water? Explain your answer.</p> <p><b>Daily Assessment:</b> Mini-lab: to illustrate the direction of the flow of heat from objects of higher temp. to lower temp.</p>	<p><b>Content Focus:</b> Cont'd - Heat can be transferred through matter by the collisions of atoms and/or molecules (conduction) or through space (radiation). In liquid or gas, currents will facilitate the transfer of heat (convection).</p> <p><b>Hook:</b> How does the sun that is so distant warm the earth?</p> <p><b>Daily Assessment:</b> Differentiate between conduction, convection and radiation.</p>

## **Final Assignment:**

You are a water molecule. You are the keynote speaker at a Water Conservation seminar . Introduce yourself and tell your life adventures so that your audience leaves the seminar with an understanding of the parts and structure of a water molecule, an understanding of its physical properties, and the need to conserve water. Respond to questions at the end of your presentation.

### **Product performance and purpose**

- Explain the structure of the water molecule
- Explain how water exists in three phases, what causes these changes.
- Impress upon your audience the need to conserve water

You may use one of the following methods:

1. Create models and explain them
2. Make a PowerPoint presentation
3. Create a display and present it

## **Resources**

<http://www.middleschoolscience.com/matter.pdf> (one idea from this unit is to call your unit: Matter: The stuff that life is made of...)

<http://www.schools.pinellas.k12.fl.us/educators/tec/Davis2/matter.ppt/sld001.htm> (starter power point)

Here is a great interactive website with a teacher's guide, interactive sites, and great information for students on matter: it is called strange matter and has tons of interesting ideas about matter that are standards based and will hook and hold your students: <http://www.strangematterexhibit.com/teachers.html>

BE SURE TO CHECK OUT THIS UNIT ABOUT MATTER PLANNED IN A UBD TEMPLATE:

<http://www.doe.k12.de.us/programs/ci/files/7%20Properties%20of%20Matter%20Unit%20Template.pdf>

Other sites

[http://64.233.169.104/search?q=cache:EFS7D4VxI4EJ:lrw.wrdsb.on.ca/sci\\_tech/end\\_underST7.pdf+great+enduring+understandings+about+matter&hl=en&ct=clnk&cd=1&gl=us](http://64.233.169.104/search?q=cache:EFS7D4VxI4EJ:lrw.wrdsb.on.ca/sci_tech/end_underST7.pdf+great+enduring+understandings+about+matter&hl=en&ct=clnk&cd=1&gl=us)

Great site with tons of lessons and black-line masters: <http://www.seattlescience.com/sections/modules/properties-of-matter>

Scholarly article on teaching matter in middle schools: [http://findarticles.com/p/articles/mi\\_qa3667/is\\_200301/ai\\_n9220178](http://findarticles.com/p/articles/mi_qa3667/is_200301/ai_n9220178)

[http://www.loudoncounty.org/ourpages/auto/2007/7/16/1184629727318/5th\\_Content\\_Map\\_Structure\\_Matter.pdf](http://www.loudoncounty.org/ourpages/auto/2007/7/16/1184629727318/5th_Content_Map_Structure_Matter.pdf) (great concept of map of matter)

<http://classroom.jc-schools.net/sci-units/matter.htm#7>:

[http://www.harcourtschool.com/activity/states\\_of\\_matter/index.html](http://www.harcourtschool.com/activity/states_of_matter/index.html)

<http://www.runet.edu/~sbisset/grp502.htm>

This is a great site for activity worksheets and performance assessments related to matter:

<http://www.fms.bham.wednet.edu/Staff/boriss/propertiesOfMatterPart1.htm>

Another example of a performance task: <http://scorescience.humboldt.k12.ca.us/fast/teachers/Matter/matter.htm>

This is an interesting site: It is called the Magic of Matter...<http://www.ripley.k12.oh.us/lindnert/MatterWebquest/matter.html>

BRAINPOP WHICH THE STUDENTS LOVE HAS SOME GREAT STUFF ON MATTER AS WELL:

<http://www.brainpop.com/science/matter/statesofmatter/preview.weml>