

# NGSS Unit Planning with UbD

**Teacher Name: 5<sup>th</sup> Grade Team**

**Date: 3-29-16**

**School Site: E. Hale Curran**

**Unit: Structures and Properties of Matter: Module 1- Models of Matter**

## **NGSS Covered:**

5-PS1-1: Develop a model to describe that matter is made of particles too small to be seen.

## **CCSS. ELA Covered**

Literacy.

RI.5.4: Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.

Reading: Informational Text:

RI.5.7: Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.

RI.5.9: Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably.

Writing:

W.5.9: Draw evidence from literary or informational texts to support analysis, reflection, and research.

Speaking and Listening:

SL.5.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.

SL.5.4: Report on a topic or present an opinion, sequencing ideas logically and using appropriate facts and relevant descriptive details to support main ideas or themes, speak clearly at an understandable pace.

## **CCSS Mathematics Covered:**

Measurement and Data:

5.MD.3: Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

5. MD. 4: Measure volumes by counting units, cubes, using cubic cm, cubic in, cubic ft. and improvised units.

**Note: This module will take about 7 to 10 days**

## Understanding by Design NGSS Unit Plan

### Stage 1: Desired Results

#### Understand:

- Matter is anything that has weight and takes up space.
- There are three main types of matter: Solids, liquids, gases.
- Matter can be divided into particles that are too small to be seen.
- Another name for these particles is molecules.
- In each type of matter, particles move differently and are arranged differently.
- In a solid, particles vibrate slowly and are packed tightly together. Solids have their own shape.
- In a liquid, particles move more quickly than a solid, and they flow more freely. Liquids take the shape of their container.
- In a gas, particles move the fastest and spread out to fill any available space.

#### Essential Question(s)

1. How do the States of Matter differ from each other?
2. How can you observe particles of Matter that are too small to be seen?

### Stage 2: Evidence/Assess

#### Know

Students will be able to tell the difference between the states of matter as well as gain insight into the attributes of the different states of matter and how they react when conditions are changed.

#### Vocabulary:

matter; solid; liquid; gas; plasma; atom; molecule; rigid; colloid; absolute zero

#### Do

Several examples of the different types of matter are observed and discussed. Students will be able to draw a diagram that shows particle and particle movement in each state of matter.

## Stage 3: Learning Plan

### How

**Engage: (1 Day)** Have students write the essential questions in their notebooks. Let them discuss the questions at their table groups. Share internet website “Strange Matter” and explain how to navigate the site (use the “zoom inside” section only). Students are to work their way through the site then through a whole class discussion about information from the simulation. Record student responses on chart paper. Scientific Model and Matter need to be defined. <http://www.strangematterexhibit.com>

**Explore: (3 Days)** What is matter? Everything is matter. Have examples that represent the different types of matter. Have students explore the Study Jams site and watch some of the interactive videos on Matter. <http://studyjams.scholastic.com/studyjams/jams/science/index.htm>. They can also view this BrainPop video as explore this site: <https://www.brainpop.com/science/matterandchemistry/statesofmatter/> Write one of the states of matter on top of 4 pieces of chart paper, so that one paper has solids written on it, one has liquids, one gas, and one plasma. If you have a very large class, you may want to make two of each. Hang the chart paper in different places around the classroom. If you use two sets of charts, make sure each set is clustered somewhat close together so there will be no confusion. Divide students into 4 groups (or 8 groups, if you have two sets of charts) and have each group stand in front of one piece of chart paper. Explain that you will set a timer for a short time and each group should record examples of the matter state listed on the chart in front of them--as many examples as they can think of within the time frame. When you give a signal (such as a bell or chime), students should rotate clockwise to the next chart and repeat the activity without duplicating any existing answers. At the final signal, they should bring their current chart to you and return to their seats. You may want to make the initial time periods brief (30 seconds) and make the final time periods longer (60-90 seconds) since students will need to read what's already on the chart and come up with less obvious answers. After the rotation activity, hang the charts at the front of the room and invite discussion. Is there anything that clearly does not belong? Put question marks next to any items that students have disagreement over. Project the [Matter Sorter game](#) for the class to see. Explain the basic premise, and play a round together as a whole class review activity. Students may wish to point to the chart paper that lists the correct answer. You may want to pause the game periodically to talk about the reasoning behind students' answers. Allow students to play the game independently and have them record their scores. After a set amount of time (5-10 minutes should be sufficient), have students navigate to the [Review Quiz](#) and record their scores for the quiz, as well. Bring the class back to a whole group discussion. Were there any surprises in the game? Does the information they learned from the game and movie make them want to change anything listed on the charts? Make edits on the charts as needed. How do students know that a particular example needs to be re-classified?

**Explain: (3-4 days)** Show diagrams and models of states of matter and their particle arrangement and movement. Pose the question to students- How could you lift this book above the desk? Supply baggies and books-ask students to make observations as to what is holding up the book... How could you develop this model (cushion of air) and engineer it into a useable product? Does a balloon gain weight as you fill it? Have students use two methods (blow-up using their lungs and blow-up using a pump) Weigh each method and record to see if there is a difference in the 2 gases. Have students form explanations based on evidence as to why there is a difference. They can document in their notebooks. How does scale and proportion fit into their explanation? They should also look at it through the lens of the crosscutting concept cause and effect and explain in their notebooks what is the cause and the effect of the investigations.

Vocabulary: Model-Observations-Matter-Particles-States of Matter-Phase Change-Solid-Liquid-Gas Teacher Demonstration Screaming Balloons, focus on the

effect of gas on a balloon (filling it)

[https://www.youtube.com/watch?v=aAMW\\_3kWUhE&safe=active](https://www.youtube.com/watch?v=aAMW_3kWUhE&safe=active)

Teacher demonstrates adding air to expand a variety of inflatable objects such as: balloons, basketball, football, beach ball, air mattress, whoopee cushion... Use this site for ideas.

[https://en.wikipedia.org/wiki/List\\_of\\_inflatable\\_manufactured\\_goods](https://en.wikipedia.org/wiki/List_of_inflatable_manufactured_goods)

Put students into teams of three or four. Teams will then design a explanatory model (drawing) that uses a gas to create an object to help people in their everyday life. (Help people learn, swim, live, travel, health, building). They should label all parts and include a diagram showing how the particles are moving and what is causing that movement.

Possible rubric:

<http://www.isbe.net/ils/science/pdf/rubric.pdf>

Use this BBC Website to look at matter in the gas phase, follow the simulation steps and take the quiz at the end. (free site)

[http://www.bbc.co.uk/schools/scienceclips/ages/9\\_10/gases.shtml](http://www.bbc.co.uk/schools/scienceclips/ages/9_10/gases.shtml)

**Elaborate: (1 Day)** When teams are finished with the model of their object have them switch their model with another team. Teams will critique the other team's model using stickies. Preface with students how to critique constructively. Students can add suggestions, questions, and comments to the models. Encourage students to start some of their suggestions with I notice... and/or I wonder...

**Evaluate: (2 Days)** Teams will then switch their models back and review the comments, suggestions, and questions. Give them time to revise their models using some of the suggestions. This is a good time for you to evaluate the models as well and give your feedback. When done, have teams do a stay or stray activity. This is where teams view the other models. One person in each team is designated as the expert and stays with their team model. The other members stray to the other team's models. Give time at each rotation (about 10 minutes or less) for the team expert to explain their model. Allow other teams to ask questions. Use this time to evaluate the team's presentations to see how well they have grasped the concept. When done, teams will go back to their groups and the members who strayed can explain the other models to the expert who stayed. Have teams revisit the essential questions and discuss what they originally wrote and how they can change their responses. Have students write out their reasoning using evidence from their investigation. They can use the CER form.

<b>Stage 4: Transfer</b>
<b>Knowledge Transfer</b> <b>Crosscutting Concepts:</b>  Cause and Effect:  1. Cause and effect relationships are routinely identified, tested, and used to explain change.  Scale, Proportion, and Quantity  1 Natural objects exist from the very small to the immensely large.  2. Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.  Students should be encouraged to find other examples of cause and effect in some of their other investigations as well as scale, proportion and quantity. Challenge them to find examples in other subjects like ELA or math.

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