

B.Ed. LESSON PLAN

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<p>Lesson Title: States of Matter Grade Level: 5</p>	<p>Unit of Study: UNDERSTANDING MATTER AND ENERGY PROPERTIES OF AND CHANGES IN MATTER Subject: Science</p>
<p>Lesson Overview: Students will learn how matter can go through a physical change by changing from one state to another. They will learn this change is reversible and involves the release or absorption of heat. Students will also be able to identify the correct scientific names of these changes (melting, freezing, sublimation, deposition, evaporation and condensation)</p>	

Part 1: Lesson Goals and Assessment

Ontario Curriculum Overall Expectations:

- 2. conduct investigations that explore the properties of matter and changes in matter;
- 3. demonstrate an understanding of the properties of matter, changes of state, and physical and chemical change.

Ontario Curriculum Specific Expectations:

- 3.1 identify matter as everything that has mass and occupies space
- 3.2 explain changes of state in matter (*e.g., evaporation, condensation, solidification or freezing, fusion or melting, sublimation*), and give examples of each (*e.g., water from wet clothes evaporates; steam from a boiling kettle condenses on a cold window; water in ponds and lakes solidifies or freezes in winter; a frozen treat melts on a warm summer day; a moth ball sublimates in the closet*)
- 3.3 describe physical changes in matter as changes that are reversible (*e.g., a melted ice cube can be refrozen; a bottle of frozen water can be thawed to a liquid state again; water vapour that has condensed on a cold window can evaporate into a vaporous state again; water from a puddle that has evaporated will fall to the ground as rain*)
- 3.6 explain how changes of state involve the release of heat (*e.g., when water freezes it releases heat*) or the absorption of heat (*e.g., when an ice cube melts, it absorbs heat*)

Big Ideas/ Enduring Understandings:

Students will understand: Everything is made of matter; what physical change is (substance remains the same but is in a different state); during physical change substances release or absorb heat; the correct scientific names of the changes (melting, freezing, sublimation, deposition, evaporation and condensation).

Essential/Key Critical Questions:

What is a physical change of matter? (Changes that are reversible)
 How does the change occur? What needs to happen to the substance? (Releases or absorbs heat).
 What are the different changes in state that matter goes through? What are these processes called?

Student Learning Goal

We are learning that matter can go through a physical change, changing from one state to another. This physical change is reversible and does not create a new substance. Heat is either released or absorbed. Solid to liquid = melting; liquid to solid = solidification or freezing; liquid to gas = evaporation; solid to gas = sublimation; gas to liquid = condensation; gas to solid = deposition

Student Success Criteria:

Students will be able to successfully name and label different types of changes in states of matter (solid to liquid, gas to liquid, etc.) and provide an example of each one. Students will be able to successfully understand the science behind the changes of state with regards to heat – that heat is either released or absorbed during the change of states.

Necessary Prior Knowledge, Skills, and/or Previous Lesson:

Students must recall that there are three states of matter: Solid, liquid and gas and the properties of each one.

Instructional Strategies:

- Observations
- Group discussion
- Collaborative work
- Inquiry-based learning

Teacher Assessment:

Students will be able to successfully complete the worksheet provided in the action/during portion of the lesson. They will also be able to successfully complete their homework.

Part 2: Lesson Preparation

New Vocabulary: physical change, absorption, freezing, melting, evaporation, condensation, sublimation, deposition

Learning Environment/Safety Concerns and Precautions: Water, ice and hot water will be kept with and used by the teacher only. Students will observe the substances from their desk.



Materials/Resources/Classroom Arrangement/Necessary Preparation: Required: Thermos with ice; access to water; one transparent cup; one mug; thermos with hot water. Students must be able to see the front of the class.

References/Credits:

<http://mckayhamilton.weebly.com/grade-5---properties-of-and-changes-in-matter.html>
 Images from worksheets taken from 2011 Encyclopaedia Britannica and broadwaycomputer.us

Part 3: Lesson Design (3-Part Lesson)

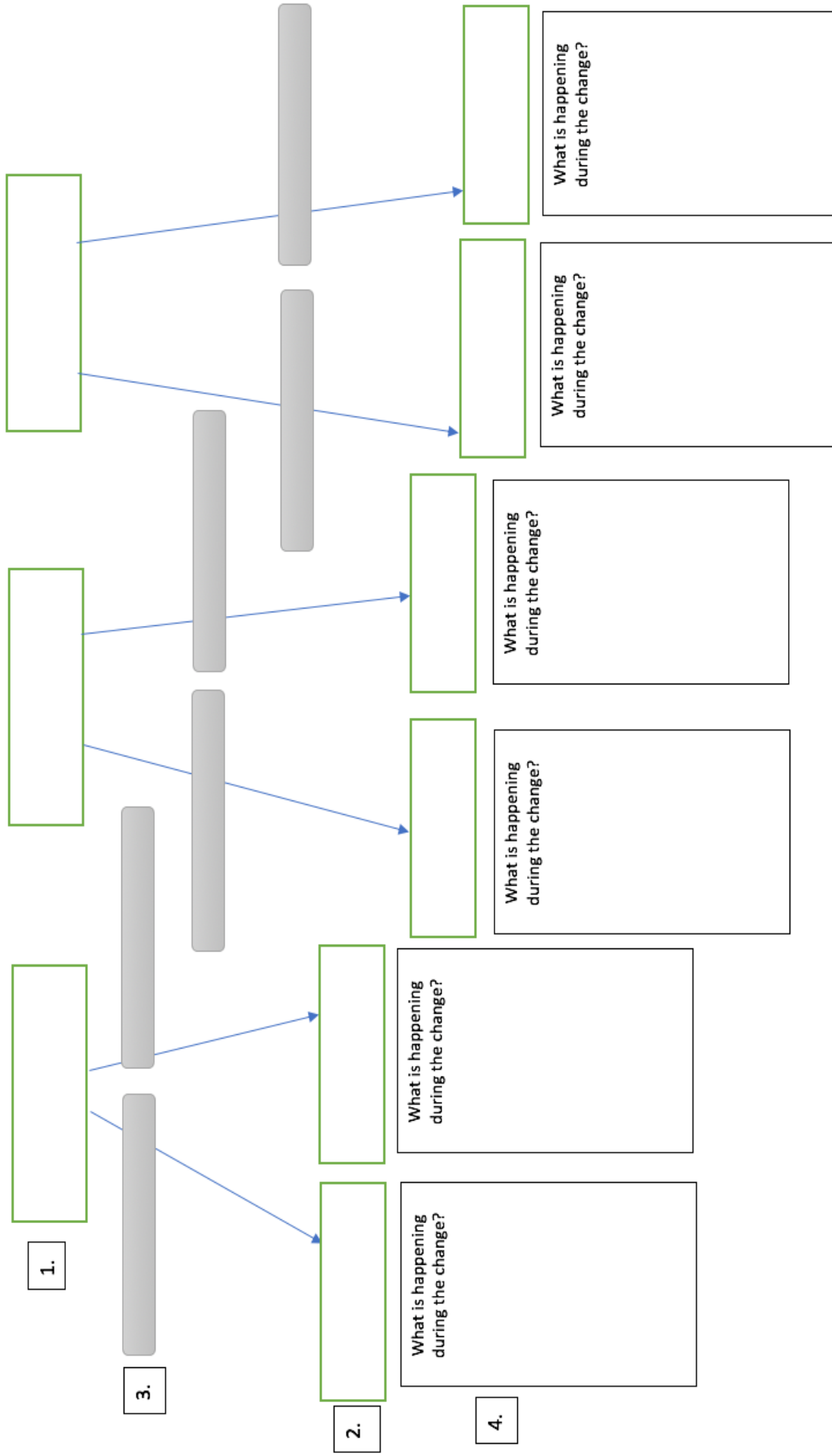
	Differentiated Instruction Modifications Accommodations Ongoing Teacher Assessment Indigenous Perspectives
Length of Period: 10 min	
<p>Minds On (Before): Estimated Time: 10 min Show students a glass of water, a glass of ice and a mug of steaming hot water. Ask the following:</p> <ul style="list-style-type: none"> - What are some observations you can make about the three cups/mugs? - Looking at the substance, what is similar? What is different? - How do you know the ice is a solid? How do you know the water is a liquid? How do you know the steam is a gas? - Is the substance different in the three different cups/mugs? <p>Introduce today’s topic: We will be investigating changes in states in matter. We will be thinking about questions like how does water turn into ice? What is really happening during that process? What is that called?</p>	

<p>Action (During): Estimated Time: 20 min</p> <p>- Hand out one flow chart per table group. As a table group fill in the following chart on a piece of paper (write the instructions on the board):</p> <ol style="list-style-type: none"> 1. In the first three large boxes fill out the three states of matter. 2. In the next row of large boxes (not the grey ones), write down what these three states of matter can change into. For example, what state can a solid change into? 3. In the grey boxes along the arrows, write the name of the process. What is it called when the change of state occurs? 4. Write down what is happening during the change. 5. When matter changes to a different state, is it a new substance? Circle yes or no. <p>- Gallery walk. Have students walk around and observe each other's charts.</p> <p>-Discuss answers.</p>	<p>- Information observed during group work can be used for diagnostic purposes to see how much information the student knows and what other concepts they are able to apply regarding physical change and changes in states of matter. The group worksheet can be collected for diagnostic purposes as well.</p> <p>- For students who require accommodations or are ELL, a word bank will be provided to help them fill in the flow chart (see page attached to flow chart).</p>
<p>Debrief/Consolidation (After): Estimated Time: 20 min</p> <p>- Show video: https://www.youtube.com/watch?v=CMUmQRqJAo0 START at 0.39 sec.</p> <p>- Review the video. Discuss the different changes of state. Discuss physical change and emphasize that it is reversible – no new substance forms during this type of change.</p> <p>- Discuss what happens during the changes of state. Discuss release or absorption of heat.</p> <p>- Hand out the <i>Changes of States</i> worksheet to each student. Using the information gained from the discussion and the video, complete the worksheet independently.</p> <p>- Consolidate (What I am looking for): When a physical change occurs through a change in state, the substance remains the same. The change is reversible. Heat is either released or absorbed during the change in state.</p>	<p>Students who were able to complete the worksheet before the video are encouraged to provide one or two more real-life examples of each state of change.</p> <p>New words (literacy): freezing, melting, evaporation, condensation, sublimation, deposition</p>
<p>Lesson Extension/Homework/Future Responsibilities:</p> <ul style="list-style-type: none"> - <i>Phase Changes of Matter</i> worksheet. - Ask students to identify 3 different changes of states of water in their daily life. - As an Indigenous perspective, it would be great to tie in two books as an extension: <i>Winter in Nunavut</i> and <i>Summer in Nunavut</i> both by Nadia Mike. I would ask the students to identify different states of matter in Nunavut and why it occurs (warming or cooling of the seasons which is the result of the earth spinning and seasons occurring, etc.) I would ask them to identify changes in human activity as a result of the changes in matter. <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	

Part 4: Teacher Reflection:

Teacher Reflection and Future Planning:

Source: Template adapted from (1) "Understanding by Design: Professional Development Workbook" (p 31), by Jay McTighe & Grant Wiggins, Alexandria, VA; ASCD, 2004, and (2) "Start Where They Are: Differentiating for Success with the Young Adolescent," by Karen Hume, Pearson, Canada, 2007.



When matter changes from one state to another, is it a new substance? Circle:
Yes / No.

5.

Word Bank for Flow Chart

Solid
Liquid
Gas
Freezing
Melting
Deposition
Sublimation
Evaporation
Condensation

Words to help with understanding what is happening during changes of state

Temperature
Heat
Cooling
Increase (more of something)
Decrease (less of something)

Name: _____

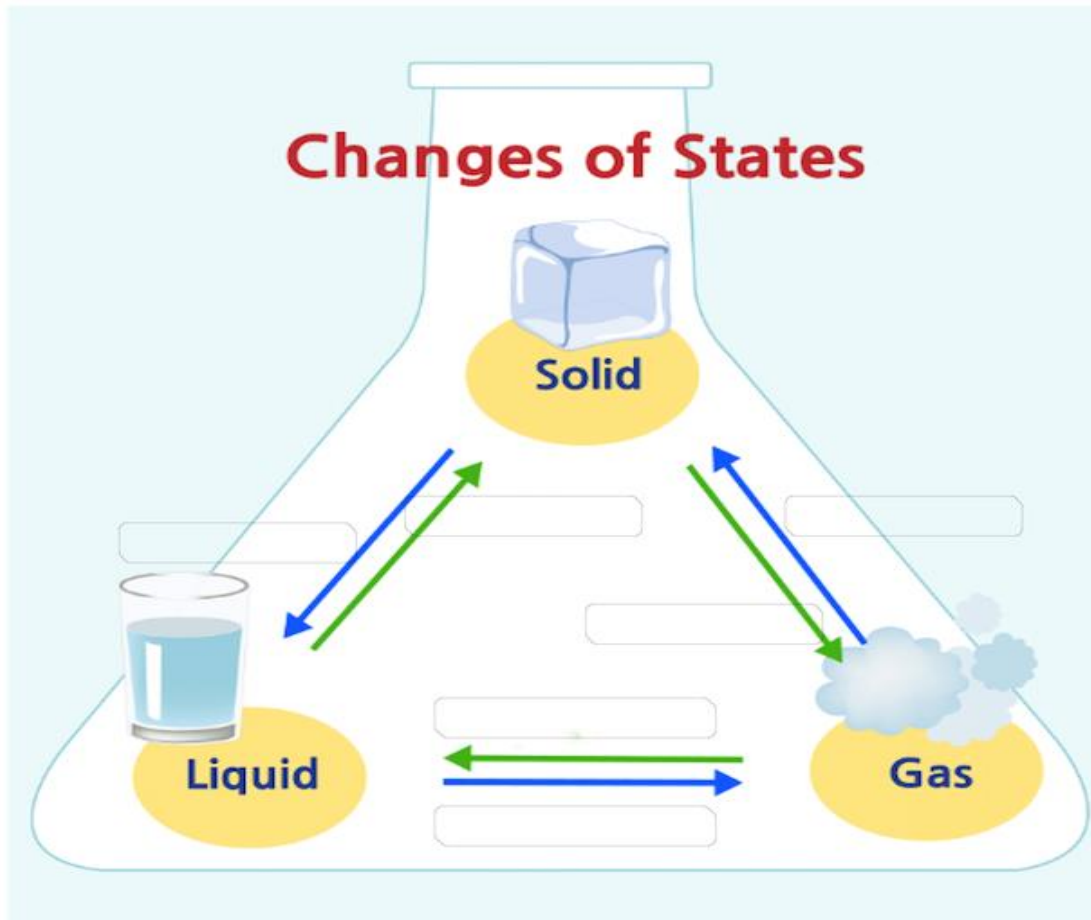


Image modified from broadwaycomputers.us

Fill out the chart above. Then come up with some real-life examples of each change below:

1. Solid to a liquid: _____
Is heat being released or absorbed during this process? _____ Released/Absorbed
2. Liquid to a solid: _____
Is heat being released or absorbed during this process? _____ Released/Absorbed
3. Liquid to a gas: _____
Is heat being released or absorbed during this process? _____ Released/Absorbed
4. Gas to a liquid: _____
Is heat being released or absorbed during this process? _____ Released/Absorbed
5. Gas to a solid: _____
Is heat being released or absorbed during this process? _____ Released/Absorbed
6. Solid to a gas: _____
Is heat being released or absorbed during this process? _____ Released/Absorbed
7. When matter changes from one state to another, does it become a new substance? **Explain your answer.** Use new words learned in class such as *physical change* and *reversible*.

Name: _____

Phase Changes of Matter

Use the word bank to fill out the sheet below:

Freezing	Deposition	Sublimation	Melting
Evaporation	Condensation	physical change	
Reversible	absorbed	released	

1. When matter changes from a **solid to a liquid** the process is called _____.
Heat is _____ during this process.
2. When matter changes from a **liquid to a solid** the process is called _____.
Heat is _____ during this process.
3. When matter changes from a **liquid to a gas** the process is called _____.
Heat is _____ during this process.
4. When matter changes from a **gas to a liquid** the process is called _____.
Heat is _____ during this process.
5. When matter changes from a **gas to a solid** the process is called _____.
Heat is _____ during this process.
6. When matter changes from a **solid to a gas** the process is called _____.
Heat is _____ during this process.

When matter changes states and goes through a _____ it is still the same substance. The change is _____.