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Sincerely,

Kent  
REAL Science Challenge Founder  
Science Department Head (Burnaby South Secondary)

# Sample Lesson Plan: The Three States of Matter (by ChatGPT)

**Subject:** Science

**Grade Level:** 4th Grade

**Duration:** 60 minutes

## **Objective:**

Students will be able to identify and differentiate between the three states of matter: solid, liquid, and gas. They will understand the properties and characteristics of each state and how they can change from one state to another.

## **Materials:**

- Three clear containers (one each for solid, liquid, and gas demonstration)
- Ice cubes
- Water
- Clear plastic bags
- Balloons
- Modeling clay or playdough
- Thermometer
- Whiteboard or chalkboard
- Markers or chalk
- Worksheets for evaluation

## **Engage (10 minutes):**

**Note to Teacher:** Begin the lesson by capturing students' attention and sparking their curiosity about the three states of matter.

### **1. Introduction Story: "The Adventures of Molecule Max"**

- Share a short fictional story about "Molecule Max," a tiny adventurer who travels through the three states of matter. Describe his adventures in each state, highlighting the characteristics and behaviors of molecules in solids, liquids, and gases.

### **2. Discussion Questions:**

- Have you ever seen water change from a liquid to a solid? When did this happen, and what was it like?
- Have you ever seen a balloon being inflated? What do you think is inside the balloon?
- Can you think of any other examples where matter changes its state?

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## **Explore (15 minutes):**

**Note to Teacher:** In this section, allow students to actively engage with the materials and explore the properties of each state of matter.

### **1. Activity 1: "Melting and Freezing"**

- Fill one container with ice cubes (solid) and another with water (liquid). Place both containers in front of the students.
- Ask the students to predict what will happen when the ice cubes are left at room temperature for a few minutes.
- Let the students observe the changes that occur in both containers as the ice cubes melt into liquid water and then refreeze when placed in the freezer.

### **2. Activity 2: "Gas in a Bag"**

- Give each student a clear plastic bag and a balloon.
- Ask them to place the balloon inside the bag and seal it tightly.
- Have them observe what happens when they blow air into the balloon inside the bag and then release the air.

## **Explain (15 minutes):**

**Note to Teacher:** In this section, provide students with the necessary information to understand the three states of matter and how they differ from one another.

### **1. Lecture:**

- Use the whiteboard or chalkboard to draw simple diagrams and explain the characteristics of each state of matter:
- Solids: Molecules are tightly packed and vibrate in place.
- Liquids: Molecules are close together but have more freedom to move and flow.
- Gases: Molecules are far apart and move rapidly in all directions.

### **2. Discussion Questions:**

- How are the molecules arranged in a solid, and how does this affect its shape and volume?
- Why do you think liquids take the shape of their container, while solids maintain their own shape?
- What happens to the energy of molecules when a substance changes its state?

### **Extend (15 minutes):**

**Note to Teacher:** In this section, encourage students to apply their knowledge to real-life situations and explore further.

#### **1. Activity: "Shape Shifters"**

- Provide students with modeling clay or playdough.
- Have them shape the clay into various forms (e.g., sphere, cube, pyramid) to represent solids.
- Then, ask them to change the shape of the clay to represent how molecules behave in a liquid state.

#### **2. Activity: "Thermometer Detectives"**

- Show students a thermometer and explain its purpose.
- Take the students outside or to different places in the school and ask them to record the temperature in different locations (e.g., shaded area, sunny spot).
- Discuss how temperature affects the state of matter in various substances they encounter.

### **Evaluate (5 minutes):**

**Note to Teacher:** In this section, assess students' understanding of the three states of matter and their ability to differentiate between them.

#### **1. Worksheet: "State of Matter Quiz"**

- Distribute worksheets with questions related to the characteristics of solids, liquids, and gases.
- Students will answer questions such as:
  - "What state of matter has molecules that are closely packed together and vibrate in place?"
  - "Give an example of a substance that can exist in all three states of matter."

#### **2. Discussion: "Reflect and Share"**

- Allow students to share their experiences from the activities and ask if they have any questions or things they would like to learn more about.

**Homework:**

Students will be given a take-home assignment to identify and record the three states of matter they observe in their daily lives. They can list examples of each state and describe how the substances change from one state to another.

**Assessment:**

The students' understanding will be assessed through class participation, observations during activities, and the completion of the evaluation worksheet. The teacher will also gauge their grasp of the concept through class discussions and responses to the discussion questions.