Subject/Grade: Science 7 **Lesson Title: Heat, Temperature and the Particle Theory**
Teacher: T. Chesney & C. Martinez

Stage 1: Identify Desired Results

Outcome(s)/Indicator(s):

HT7.2

Explain how understanding differences between states of matter and the effect of heat on changes in state provide evidence for the particle theory.

SI

(f) Trace the historical development of different scales (e.g., Kelvin, Celsius, Fahrenheit, and Rankine) and instruments used to measure temperature (e.g., liquid-in-glass thermometers, bi-metallic strips, digital thermometers, liquid crystal thermometers, thermocouples, and computer sensors) and discuss the need for standardized measurements of temperature.

(g) Distinguish between heat and temperature using the concept of kinetic energy and the particle model of matter.

Key Understandings: ('I Can' statements)	**Essential Questions:**
I can demonstrate how heat can be measured using scales. I can identify the difference between heat and temperature using the concept of kinetic energy. I can identify the difference between heat and temperature using the particle model of matter. I can understand how temperature affects the particles of a substance which in turn affects its state. I can understand the state of a matter determines what form something can exist in around us. I can illustrate that temperature can be measured in many ways. I can identify how heat deals with thermal energy while temperature deals with molecular kinetic energy.	- How does temperature affect the state of a substance? - Why is it important to understand how changes in temperature affect your daily life? - How can we measure temperature? How has this method changed over the years?

Prerequisite Learning:

- States of matter and the changes matter go through.
- Outside factors that affect states of matter.

- Particle theory of matter.
- How to conduct an experiment.
- Instruments that measure temperature.
- Vocabulary: States of matter, Particle theory of matter, Heat/temperature, Kinetic energy.

Instructional Strategies: Direct, Experiential learning, Interactive

Stage 2: Determine Evidence for Assessing Learning

Pre-Assessment:
Formative -- Students will review their prior knowledge of the particle theory of matter by analyzing our powerpoint and Youtube videos
Post-Assessment:
Formative assessment: Students will display their learnings on the worksheet and KWL chart during experiment
Summative Assessment: The KWL chart will be used as an Exit Slip based on their understanding of how the effects of heat provide evidence for the particle theory of matter. Students will be given a mark out of /3.

Stage 3: Build Learning Plan

Set (Engagement): **Length of Time:**15-20 mins

Prior to the lesson, the teachers have the option to write the vocabulary and definitions on the board as a review.
The teachers will hand out the worksheets.
The teachers will introduce the unit with a powerpoint including videos to review the particle theory of matter and explore their lesson on learning about heat.
The students will record their predictions on the handout.
Slideshow:
-What is kinetic energy?
-When do you think humans started trying to measure temperature?
-Have any of you ever used a thermometer? What kind?
-Do you know what it's for?
-What parts of our bodies can our thermometer measure our body temperature with?
At the end of the powerpoint ask the students:
-What are your predictions about how the food colouring will affect the water in each state?
-Why do we need standardized measurements of temperature?

Development: **Time:** 25-30 mins

Experiment:
-Identify safety considerations and precautions in a short class discussion.
-Divide the students into pairs to conduct the experiment.
-Hand out the materials needed to perform the experiment.

Materials/Resources:
- Mason jars
- Masking tape
- Food coloring/dye
- Projector
- Worksheet/KWL chart
  Pre-internship - Scie…
- Google slides
  Grade 7 lesson
- Heat video
  Heat | Class 7 | Scie…
- Temperature video
  Heating Matter and …
- Scaling video
  How WAS the Temp…

Possible Adaptations/ Differentiation:
-If there aren't enough supplies the teacher can demonstrate the experiment in front of the class

Management Strategies:
-Make sure the students are updated on their timelines between each activity in order to

-Instruct the students to add about 1 drop of food colouring into each cup of water. -Allow the students to analyze what they've found by colouring the mason jar sections in their handout. -Students record their observations on the hand out provided as well as be given opportunities for open discussion during the experiment. Note: In the case of a substitute teacher, allow them to access this link to understand the experiment: https://www.coffeecupsandcrayons.com/simple-heat-experiment/ **Learning Closure:** **Time:** 5-10 mins The teachers will hand out the KWL charts and the students will be asked to reflect and conclude their understanding about heat and temperatures' effect on the states of matter while filling out their KWL chart. What I know. What I want to know. What I learned.	provide them with time management. -Model ideal behavior -Clap once – to get the students attention **Safety Considerations:** - Be careful not to spill water and handling glass. - Caution for burning yourself on the hot water.
Stage 4: Reflection	