UNIT PLANNING TEMPLATE

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|  | **Unit Topic / Guiding Question: Science,  *Matter & Energy*** | | | | | | |
|  | **Rationale:** Students will be learning about the topics of *Matter* and *Energy* and how these concepts are found in our everyday lives. Matter makes up everything in the universe and therefore is an essential topic for students to learn about. Students will also be engaging with the topic of energy and how this is needed to make things move! Students will explore how energy makes things go, from powering vehicles to moving one’s body. Developing a strong understanding of the properties that make up various objects and the energy that exists within and between objects will allow these students to progress their knowledge on how we use various resources to produce energy that supports our daily lives. | | | | | | |
|  | **STAGE 1: Desired Results** | | | | | | |
|  | **UNDERSTAND** | **Big Ideas** | | | **Essential Questions** | | |
| *All matter is made of particles.*  *Thermal energy can be produced and transferred.* | | | *What are particles?*  *What is matter?*  *Where is matter?*  *How do the uses of liquids and solids impact society and the environment?*  *What are the properties of and interactions among liquids and solids?*  *What is heat?*  *What is thermal energy?*  *What are the three ways heat energy is transferred?*  *How do we use thermal energy?* | | |
|  | **DO** | **Core Competencies:** | | | | | |
| **Communication** | **Thinking** | | | **Personal & Social** | |
| * Communicating * Collaborating   I take on different roles and tasks in the group and work respectfully and safely in our shared space. I express my ideas and help others feel comfortable to share theirs so that all voices are included. I work with others to achieve a common goal and can evaluate our group processes and results.  ***These core competencies will be used throughout the course of this unit. Students will often be asked to perform experiments in partners or small groups, which will require them to work collaboratively and respectful with classmates. Due to the nature of this subject, students will also need to use their critical and reflective thinking processes as they work through theories, test their thinking, adapt their experiments, and build understanding from all areas of their work.*** | * Creative Thinking * Critical & Reflective Thinking   I can ask questions, make predictions, and use my senses to gather information. I can explore with a purpose in mind and use what I learn. I can tell or show others something about my thinking. I can contribute to and use simple criteria. I can find some evidence and make judgments. I can reflect on my work and experiences and tell others about something I learned. | | | * Personal Awareness & Responsibility * Positive Personal & Cultural Identity * Social Awareness & Responsibility | |
|  | **Learning Standards – Curricular Competencies:**  [**Questioning and predicting**](https://curriculum.gov.bc.ca/curriculum/science/3/core)   * Observe objects and events in familiar contexts * Identify questions about familiar objects and events that can be investigated scientifically * Make predictions based on prior knowledge   **Planning and conducting**   * Suggest ways to plan and conduct an inquiry to find answers to their questions * Safely use appropriate tools to make observations and measurements   **Processing and analyzing data and information**   * Sort and classify data and information using drawings or provided tables * Compare results with predictions, suggesting possible reasons for findings   **Evaluating**   * Demonstrate an understanding and appreciation of evidence   **Applying and innovating**   * Contribute to care for self, others, school, and neighbourhood through personal or collaborative approaches * Co-operatively design projects * Transfer and apply learning to new situations | | | | | |
|  | **KNOW** | **Learning Standards - Content:**   * energy is needed for life * matter is anything that has mass and takes up space * atoms are building blocks of matter | | | | | |
|  | **First Peoples Principles of Learning** | * *Learning ultimately supports the well-being of the self, the family, the community, the land, the spirits, and the ancestors.* * *Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place).* * *Learning involves recognizing the consequences of one’s actions.* * *Learning involves generational roles and responsibilities.* * *Learning recognizes the role of indigenous knowledge.* * *Learning is embedded in memory, history, and story.* * *Learning involves patience and time.* * *Learning requires exploration of one’s identity.* * *Learning involves recognizing that some knowledge is sacred and only shared with permission and/or in certain situations.* | | | | | **Comments on how you will address the FPPL:**  This unit supports learning that rests on students’ use of reflexive, reflective, and experiential thinking and processes specifically. Through forms of experiential learning students have the opportunity to test their knowledge, learn from the outcomes of various experiments, and deepen their understanding through experience. This unit will present information that allows for progressive learning, taking patience and time for students to develop knowledge on the subject. |
|  | **STAGE 2: Assessment Plan** | | | | | | |
|  | **Formative Assessment (Assessment as Learning and Assessment for Learning):** | | | | | | |
|  | Students will be assessed on their active participation in group discussions based on each lesson. This may include providing their thoughts on a topic, wonderings they may have, predictions, and their new learning. Students will also be assessed on their collaborative group work in various experiments/activities and their effort put into their learning. At the end of each lesson students will be asked about what they learned about – this could be in the form of exit slips and or class discussion (ask 3-4 students about what they learned) | | | | | | |
|  | **Summative Assessment (Assessment of Learning):** | | | | | | |
|  | Summative assessment will be based on student’s depth of understanding of learned material. Throughout various activities/experiments students will need to record their predictions and findings. This will be used to assess that students are understanding the science behind what they are doing.   * Candy Melt experiment: students will be assessed on their observations throughout the activity * Thermal Energy Handout: based on first day of learning of thermal energy – students draw three examples of thermal energy and how this is used in their every day lives * Thermal Energy Transfer Handout (done with experiment with ice cubes – 2nd lesson on thermal energy): students will record their observations | | | | | | |
|  | **Stage 3: Learning Plan** | | | | | | |
| **Date/Lesson** | **Learning Intentions** | | | **Instructional Activities**  **(brief description here – lesson plans will be used to flesh out each lesson)** | | | |
| **Introduction to Unit:**  ***Matter*** | I can describe what matter is, simply.  I can describe what particles are, simply.  I can name the various forms of matter (Solid, Liquid, Gas). | | | Introduce new unit topic to students: Matter and Energy. Explain that first we will be learning about Matter. Explain what matter is: Matter is another word for the stuff things are made of. Everything around us is made of matter, from the air we breathe to the water we drink—even our own bodies. Planet Earth is made of matter, and so are all the stars, planets, and moons in the universe. All matter is made up of tiny particles called atoms. Move onto the states of matter – solid, liquid, and gas. Have chart paper of matter song. Use this to go over the concepts of each form. Show visual of what the particles in each form look like (solid: tight and close together, liquid: have enough room to slide around each other, gas: lots of space between each particle). Go on matter scavenger hunt – give students worksheet to list various forms of matter they find under the categories of solid, liquid, and gas. After, have discussion as group about their findings. Ask students their wonderings on matter. Move onto “describing properties” of matter. Work through the worksheet together to practice skills on describing properties (colour, flexible, shape, texture). | | | |
| ***Matter***  **Oobleck** | I can describe what I am experiencing.  I can use my measurement knowledge to follow the instructions and proper amounts of ingredients.  I can see and feel how the Oobleck slime changes from a liquid to a solid.  I can describe how this form of matter changes form. | | | Read the Dr. Seuss book *Bartholomew and the Oobleck* with the students first. Facilitate conversation about what we just read. (ELA) Then (a bit later in the day/afternoon) instruct students that we will be creating our own Oobleck goop!  Instructions: (Basic ratio 2 parts cornstarch to 1 Part water)   * Step One Pour 2 cups cornstarch into a bowl * Step Two Add 1 cup of water and stir to combine * Step Three - If adding food coloring to your Oobleck do it at the mixing stage | | | |
| ***Matter***  **Why are so many toys made out of plastic?**  **Mystery Science** | I can distinguish between solid and liquid states of matter.  I understand how solid states of matter can become liquid states. | | | “In this lesson, students learn about melting, about the solid and liquid states of matter, and then discover why plastic was invented. In the activity, Candy Melt, students conduct an investigation to determine which types of candy melt in hot water. Using their observations, they decide which candy is the best choice to bring to a hot summer camp.” | | | |
| ***Matter***  **Ice cream in a Bag** | I can see how liquids change into a solid.  I can describe my observations both verbally and in written form. | | | Students will all be given one large Ziploc freezer bag and another medium sized bag. Students will be asked to come to the desk at the back by rows. When at the desk with ingredients and teacher; I will give students the ingredients they need and place in their bags. Once the bags are all properly sealed I will instruct students to begin rub their bags together to combine their ingredients together to create ice cream.  Instructions for Ice Cream:   * In a small resealable plastic bag, combine half-and-half, sugar, and vanilla. Push out excess air and seal. * Into a large resealable plastic bag, combine ice and salt. Place small bag inside the bigger bag and shake vigorously (with gloves/mittens on), 7 to 10 minutes, until ice cream has hardened. * Remove from bag and enjoy   <https://www.delish.com/cooking/recipe-ideas/recipes/a54721/ice-cream-in-a-bag-recipe/> | | | |
| ***Energy***  **Thermal Energy** | I can demonstrate an understanding of the concept of thermal energy  I can identify different sources of thermal energy  I can name examples of uses of thermal energy in everyday life | | | Describe this scenario to students: It’s the middle of May and your family has decided to go camping.  But as soon as you get to the campground the weather changes and it gets cold outside! What can you do to stay warm? Have students brainstorm all the ways they could stay warm. Explain to students these are all examples of heat, or thermal, energy. Explain to student’s thermal energy is the energy that comes from heat. When they feel or experience heat in their lives, they are experiencing thermal energy. Brainstorm some more examples (outside of the scenario). Use a kettle and a lit candle to show thermal energy. What are their observations of the transfer of heat? Present slideshow. Finish with worksheet based on learning -- Give each student a Thermal Energy Student Handout and have them draw three examples of thermal energy and explain how the example is used in everyday life. Have students record any questions they have about thermal energy on the back of their handout. Address these questions together as a class. | | | |
| ***Energy***  **Thermal Energy Transfer** | I can identify sources of thermal energy.  I can provide examples of conduction, convection and radiation.  I can give examples of thermal energy transfer in everyday life. | | | Write the phrase “thermal energy” on the board. With a partner, have students think about examples of thermal energy. Provide the hint that when thermal energy is transferring between objects or spaces, it is called heat. Have students share their examples. Give each student a copy of the Thermal Energy Transfer Student Handout. Put students in groups of three and explain the two observation activities:  - Observation one: half the groups will receive an ice cube in a plastic bag and a stopwatch. Students should take turns holding the ice cube in their hands and recording how long it takes for the ice cube to melt. While they are conducting the activity, students should note their observations in the “observe” column of their handout.  - Observation two: the other half of the groups will receive a clear cup of warm water and an ice cube with food colouring. Place the ice cube in the water and observe what happens as the ice cube melts. They should particularly pay attention to what happens to the colouring as the ice cube melts and record their observations.  Have students record their predictions on what they think will happen during the activity in the “predict” section in part 1 of the handout. Instruct students to fill out the “observe” section. After they have completed their activity, have groups that worked on observation 1 join with a group that worked on observation 2 and share their findings. Lead a class discussion about the activities. Present the Thermal Energy Transfer Slideshow, using the slideshow notes as guidance. After the slideshow, have students return to the handout and complete Part 2 together. | | | |
| ***Energy***  **What is Thermal/Heat Energy?** | I can describe what heat is.  I can describe the basic concept of thermal energy.  I understand that there are 3 ways that heat is transferred (radiation, conduction, and convection). | | | I will begin this lesson by asking students what “heat” is. We will explore this topic briefly and then I will show them a short video: <https://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/heat.htm>  This video talks about the difference between temperature and heat, the 3 ways heat I transferred (radiation, conduction, and convection), and how heat is transferred in these ways. I will pause the video after it explains each form of heat transfer. During these pauses I will ask students what the transfer of heat is called and how this happens. I will write their answers on a piece of chart paper that we will keep up for the remainder of the unit. | | | |
| ***Energy***  **Can You Really Fry an Egg on a Hot Sidewalk?**  **Mystery Science** | I can describe the properties of insulators and conductors.  I can distinguish between materials that conduct thermal energy and those that do not. | | | “In this lesson, students consider the insulating and conducting properties of different materials. In the activity, Feel the Heat, students test different materials and determine which would make the best oven mitts.”  I will show the class the Mystery Science video which poses the question “can you really fry an egg on a hot sidewalk?” Students will discuss their thoughts. They will then work in partners to test various hand coverings to pick up a water bottle to discover if the material is an insulator or a conductor of thermal energy. Students will fill in observations on worksheet. We will engage in a class discussion at the end of the experiment. | | | |
|  | **Resources needed:** | | | | | | |
|  | *Bartholomew and the Oobleck* by Dr. Seuss  Oobleck slime ingredients: \*Basic ratio 2 parts cornstarch to 1 Part water\*   * 2 Cups Cornstarch * 1 Cup Water * Food coloring (optional)   Ice cream Ingredients: \*Students should use gloves/mittens when shaking bags\*   * 1 c. homogenized milk * 2 tbsp. granulated sugar * 1/2 tsp. pure vanilla extract * 3 c. ice * 1/3 c. kosher salt * Ziploc bags – 1 big, 1 small   Testing Candy:   * Coolers * Rulers * Candy Variety 1 (Ex: Gummy Bears) * Candy Variety 2 (Ex: Starburst) * Candy Variety 3 (Ex: Jelly Beans) * Chocolate Chips * Plastic Containers w/ Lids * Thick Paper Plates * Ziploc Bags (Sandwich Size)   Heat Energy video: <https://studyjams.scholastic.com/studyjams/jams/science/energy-light-sound/heat.htm>  Thermal Energy Transfer (ice cube experiments):   * ice cube * plastic bag * stopwatch * clear cup (with warm water) * food colouring   Feel the Heat:   * Feel the Heat worksheet * Coolers * Aluminum Foil - 25 feet * Plastic Bottles (8oz) – 3 bottles for each group of 2 * Socks * Styrofoam Cups (6 oz) | | | | | | |
|  | **Interdisciplinary connections:**  (e.g. How did you weave ELA, Social Studies, Science, Math, Fine Arts, and/or ADST together in this instructional sequence?) | | | | | | |
|  | **ELA:** Students will need to use their reading and writing skills at times throughout the unit (when recording findings in experiments) | | | | | | |
|  | **Reflection** | | | | | | |
|  | **How did the unit go? How do I know?** | | | | | | |
|  | **Where to next?** | | | | | | |