Bachelor of Education (Elementary) &
Bachelor of Education (Secondary) STEM
Unit Plan Template

Unit Title:	Mixtures and Solutions!	Number of Lessons	8	Time (in weeks):	2 Weeks
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Rationale

This unit is important because it provides students with hands-on learning experiences centered around mixtures and solutions. These lessons are based on inquiry and will provide students with memorable experiences surrounding the properties of, the differences between, and how we can separate mixtures and solutions. This unit has students practice their problem-solving skills as their collaboration skills which will serve them throughout their lifetimes.

Overview:

Throughout this unit on mixtures and solutions, students engage in a series of experiential lessons that will help them gain a better understanding of the key concepts of mixtures and solutions. Starting with lessons on the characteristics of mixtures and solution, students explore elements of mixtures and solutions that affect their compositions. As we dive deeper into the unit, students focus more heavily on heterogenous mixtures and how we can separate them using density in a variety of ways. After students have explored the world of mixtures and solutions, their learning will be put to use when they construct their very own water filtration system using key concepts learned throughout the unit.

CORE COMPETENCIES

Communication	Thinking	Personal & Social

• Communicating: I communicate clearly and purposefully, using a variety of forms appropriately. • Collaborating: I can confidently interact and build relationships with other group members to further shared goals.	• Critical thinking I can gather and combine new evidence with what I already know to develop reasoned conclusions, judgments, or plans. • Creative thinking I can think "outside the box" to get innovative ideas and persevere to develop them.	• Personal awareness and responsibility I can recognize my strengths and take responsibility for using strategies to focus, manage stress, and accomplish my goals. • Social responsibility I can interact with others and the environment respectfully and thoughtfully.

BIG IDEAS
(multiple subject areas for integrated unit)

Science 6	Science 5
Everyday materials are often mixtures.	Solutions are homogenous.

LEARNING STANDARDS

Curricular Competencies	Content
Questioning and Predicting - Make observations in familiar or unfamiliar contexts Planning and Conducting - With support, plan appropriate investigations to answer their questions or solve problems they have identified	- Heterogeneous mixtures: - suspensions (e.g., salad dressing), emulsions (e.g., milk), colloids (e.g., aerosols)
Applying and Innovating - Co-operatively design projects Communicating	- Mixtures: - separated using a difference in component properties

- Communicate ideas, explanations, and processes in a variety of ways	- density (e.g., centrifuge or settling, silt deposits in a river delta, tailings ponds, Roman aqueduct settling sections) - particle size (e.g., sieves, filters)

Prerequisite Concepts and Skills:

- Observation skills
- Problem-solving skills
- Inquiry skills
- Familiarity with homogenous vs. heterogeneous mixtures

Teacher Preparation Required:

Lesson #	Teacher Preparation Required (See Unit Plan Sample)
Lesson 1	- Worksheets printed - Experiment materials prepped - Sticky notes - Clean-up necessities
Lesson 2	- Worksheets printed - Experiment materials prepped - Clean-up necessities
Lesson 3	- Worksheets printed - Experiment materials prepped - Clean-up necessities
Lesson 4	- Poster supplies - Example pictures for suspensions, colloids, and emulsions
Lesson 5	- Mixtures prepped - Separation tools - KWL charts - Worksheets printed
Lesson 6	- Info sheets printed - Poster supplies - Video demo of density (Denser Than You Think - Science Experiment)
Lesson 7	- Mixture prepped - Separation tools - Worksheets printed

Lesson 8	- Water filtration system materials - Workheets printed - Clean-up necessities

Cross-Curricular Connections:

- Math: connecting measurement to particle size, density, and other learning in this unit
- ELA: writing reflections and observations in a journal
- S.S.: - connecting clean drinking water issues to our filtration system
    - More in depth history of the Roman Aqueducts

Aboriginal Connections/ First Peoples Principles of Learning:

Learning is holistic, reflexive, reflective, experiential, and relational (focused on connectedness, on reciprocal relationships, and a sense of place

This unit is centered around the fact that learning is experiential because every lesson has a component of inquiry learning where students are immersed in the experiments and experiences of each lesson. The unit itself is reflexive because each lesson builds upon what the students learnt in the lessons before until the final lesson where they show a culmination of everything they have learned on their journey. This unit is also reflective because each lesson ends with a piece of reflection that each student must complete, having them reflect on what they learnt and how it relates to what they already knew.

Universal Design for Learning (UDL)

Representation:

- Prior knowledge of mixtures and solutions will be gone over
- A summary of key points of each lesson will be gone over after each lesson

Engagement:

- There will be a mix of lecture, experiential, and visual learning throughout the unit
- There are many opportunities for individual inquiry throughout the unit

Expression:

- There will be many different exit ticket, worksheets, and posters that will give students many different opportunities to show and use their learning

Differentiated Instructions (DI)

- Students with difficulty working in groups could be paired with an adult in the room
- Students worries abotu presenting in front of the class can present one-on-one with the teacher before or after the presentations
- Brain breaks and movement breaks will be used as necessary

We are unaware of any specific needs of students as this is a hypothetical plan that will be catered towards a real class in the future, at that time a more comprehensive DI will be formulated.

Overview of Lessons:
Lesson 1

Name & Time (Minutes Allotted):	Characteristics of Solutions and Mixtures (50 mins)
Learning Standards: Curricular Competencies	- Make observations in familiar or unfamiliar contexts - Make predictions about the findings of their inquiry
Learning Standards: Content	- heterogeneous mixtures - Mixtures and Solutions
Instructional Objectives	Students will differentiate between mixtures and solutions, identify examples of each, and describe some characteristics of each.
Assessment:	Observation: Observe how students interact with the materials at each station. Note if they are able to correctly classify the mixtures and solutions based on their characteristics. Watch how students collaborate and discuss their findings with their peers. Look for evidence of them identifying examples of mixtures and solutions and describing their characteristics. Conversation: One-on-One Discussions: Engage in brief conversations with individual students while they are working at the stations. Ask them to explain their reasoning behind their classifications and descriptions of mixtures and solutions. Group Discussions: Facilitate group discussions where students can share their findings and reasoning with their peers. Listen to their explanations and ask probing questions to assess their depth of understanding. Product: The worksheets and exit tickets students will be filling out during the lesson.
Teaching Strategies:	- Stations - Exit Tickets - Worksheets - Experimentation
Materials:	● Table salt ● Sand ● Kool-Aid powder (various flavors) ● Black pepper

	• Water • Clear cups or containers • Stirrers or spoons • Paper towels for cleanup • Worksheets or observation sheets for students • Writing utensils • Sticky notes • Optional: Safety goggles for students (especially when handling powders)
Lesson Activities:	
Introduction/Hook:	Hook: Put different pictures of mixtures and solutions up on the board. Have students say what they see, what they notice, and what they know about each of the photos. Write down some of the things they say about the different mixtures and solutions. Introduction Script: *Teacher*: "Now that we've observed different substances in our pictures, let's discuss a simple way to differentiate between solutions and mixtures using a new analogy. Let's think of solutions and mixtures as recipes. This comparison will help us understand the concepts in an easy-to-grasp manner." (Teacher uses visual aids or gestures to emphasize key points.) *Teacher:* "Imagine a solution as a recipe where all the ingredients are fully mixed in, like making lemonade where the sugar dissolves completely in the water. You can't see the sugar anymore because it's all blended in smoothly. That's what a solution is - everything mixed perfectly." (Encourage students to visualize the analogy and engage in the discussion.) *Teacher:* "On the other hand, mixtures are like a recipe where you can still see the different ingredients separately, like a fruit salad with distinct pieces of fruits. Each ingredient maintains its identity in the mixture. In mixtures, you can pick out the different parts because they are not fully combined." (Simplify the key differences between solutions and mixtures using the recipe analogy:)

	Solution: Ingredients fully mixed in, like sugar dissolved in water in lemonade. Mixture: Ingredients remain separate, like distinct fruits in a fruit salad. *Teacher:* "So, when you encounter a substance, think about whether it's a fully mixed recipe (a solution) or a recipe with separate ingredients (a mixture). This will help you understand how substances come together and if they can be separated easily. Keep these comparisons in mind as you explore your stations and have fun learning more about mixtures and solutions!"
Body:	Students will break into four groups and circulate through 4 stations, filling out their worksheets at each station. Station Activities (10 minutes per station, 40 minutes total): Station A: Salt and Water ● Students gather at Station A and are provided with materials: salt, water, clear cup, and a stirrer. ● Following the provided procedure, students mix salt and water in the cup, observing the dissolving process. ● Students record their predictions, observations, and conclusions on the worksheet provided by the teacher. ● The teacher circulates to each group, guiding discussions and prompting students to think critically about their observations. Station B: Sand and Water ● Students transition to Station B and receive materials: sand, water, clear cup, and a stirrer. ● They mix sand and water in the cup, observing the settling of sand in water. ● Students document their predictions, observations, and conclusions on the worksheet.

	● The teacher monitors student progress, asking probing questions to encourage deeper thinking and understanding. Station C: Water and Kool-Aid Powder ● At Station C, students receive materials: Kool-Aid powder, water, clear cup, and a stirrer. ● They mix the powder and water, observing the dissolving process. ● Students complete their worksheets with predictions, observations, and conclusions. ● The teacher engages with students, facilitating discussions and addressing any misconceptions. Station D: Salt and Pepper ● Students proceed to Station D and are provided with materials: salt, pepper, clear cup, and a stirrer. ● They mix salt and pepper in the cup, observing the physical combination of the two substances. ● Students record their predictions, observations, and conclusions on the worksheet. ● The teacher supports student learning by encouraging communication among group members and guiding them to articulate their reasoning.
Closure:	Students come together after filling out their sheets at each station. Teacher hands out a sticky note and has students write down how they will remember the difference between a mixture and a solution. Students will hand in their sticky notes and worksheets before moving into the next subject or break.

Name & Time (Minutes Allotted):	Investigating Factors Affecting Solubility (50 mins)
Learning Standards: Curricular Competencies	- Make predictions about the findings of their inquiry - Choose appropriate data to collect to answer their questions
Learning Standards: Content	- solutions and solubility
Instructional Objectives	Students will describe how the factors temperature, particle size, and stirring effect the speed of dissolution through hands-on experiments and observation.
Assessment:	Observation: - Observe students as they conduct the experiments at each station. Look for their ability to: ● Make predictions about the impact of temperature, particle size, and stirring on dissolution speed. ● Conduct the experiments accurately and follow the procedures. ● Record observations of dissolution rates and changes in solutions. ● Engage in discussions with peers about their observations and interpretations. Conversation: - Engage students in one-on-one or small group conversations during the experiment and after its completion. Ask questions to assess their understanding, such as: ● Can you explain how temperature affects the speed of dissolution based on your observations? ● What did you notice when comparing the dissolution rates of large and small particles? ● How did varying the stirring intensity influence the dissolution process?

	Product: The worksheet of observations each student filled out during the activity.
Teaching Strategies:	- Experimentation - Worksheets - Groupwork - Stations
Materials:	Hot water (in a thermos) Cold water (from a refrigerator) Ice cubes Sugar crystals Large salt crystals Small salt crystals Sugar or salt for solution preparation Clear cups or beakers Stirrers or spoons Timer or stopwatch Worksheets for each student Chart templates for each station Writing utensils Water source Safety goggles Paper towels or tissues
Lesson Activities:	
Introduction/Hook:	Hook: Teacher: "Welcome back, scientists! In our last lesson, we explored the world of mixtures and solutions, discovering how substances dissolve to form solutions. Today, we're diving deeper into solubility and investigating the factors that can affect how much solute can dissolve in a given solvent." ● "Let's start by revisiting what we learned about stirring in our last lesson. Watch closely as I demonstrate the impact of stirring on solubility." *Stir the cup of water with settled sugar crystals vigorously.* *Observe as the sugar crystals dissolve rapidly with stirring.*

	● "What do you notice happening to the sugar crystals as I stir the water? Take a moment to discuss with your elbow partner." ● "Just like stirring can speed up the dissolution process, today we'll be exploring how other factors like temperature and particle size can also influence solubility. Get ready to become solubility scientists and conduct hands-on experiments to investigate these factors!"
Body:	Students will break into three groups and attend each of the three stations. They will fill out a worksheet with their observations at each station. Exploration of Temperature Effect: ● Setup: Provide cups of hot water, cold water, and ice water with sugar for students to observe. ● Procedure: Students place sugar in each cup and record the rate of dissolution in their worksheets. ● Observation: Encourage students to note any differences in how temperature affects solubility. Investigation of Particle Size Effect: ● Setup: Offer large and small salt crystals for students to test in water. ● Activity: Students time and record the dissolution of each size of salt crystal. ● Analysis: Guide students in comparing the solubility rates based on particle size and discussing their findings. Exploration of Stirring Effect: ● Materials: Provide sugar solutions in two cups, one for slow stirring and one for vigorous stirring. ● Hands-On: Students stir the solutions as directed and observe the differences in dissolution rates. ● Discussion: Facilitate a conversation on how stirring impacts solubility and the role of agitation in the dissolution process.

Closure:	Have students do a snowstorm! - Each student writes one thing they learned during the activity that would be helpful in their real-lives on a scrap piece of paper. They ball them up and when you say go they through them in the air. Students then grab one that has fallen and take turns reading them aloud to the class.

Lesson 3

Name & Time (Minutes Allotted):	Concentration and ph of solutions (50 minutes)
Learning Standards: Curricular Competencies	- Communicate ideas, explanations, and processes in a variety of ways - Transfer and apply learning to new situations
Learning Standards: Content	- properties of solutions: concentration, pH, etc. - dissolving: process of forming a solution
Instructional Objectives	Students will investigate the concepts of concentration and pH in solutions through a hands-on activity using Kool-Aid solutions to understand how varying concentrations and pH levels influence solution properties.
Assessment:	Conversation: ● Engage students in discussions to explain their adjustments to solution concentrations and predict pH changes. ● Ask open-ended questions to assess understanding of how concentration and pH affect solution properties. ● Provide feedback and clarification during conversations to support student learning. Observation: ● Observe students as they create solutions and test pH levels, noting their accuracy and understanding. ● Assess students' ability to measure, mix solutions, and interpret pH results. ● Look for collaborative discussions and problem-solving related to concentration and pH.

	• Note student engagement and participation in the hands-on activity. Product: • $2 summary of learning • Observations worksheets
Teaching Strategies:	• Groupwork • Experimentation • Worksheet • $2 summaries • Video
Materials:	• Kool-Aid powder (or lemonade or another drink mix) • Water • Measuring cups and spoons • Clear cups or beakers • Stirrers or spoons • pH testing strips • Data recording sheets
Lesson Activities:	
Introduction/Hook:	Hook: Bring in either kool-aid or lemonade (whatever works) and create three different cups of the drink usign the powder. In the first one, put a tiny pinch of the powder, in the second put a spoonful of the powder, and in the third one put two spoonfuls. Stir the drinks up and ask the class which one they think they would enjoy more. You could get a volunteer to taste test if that would work in your class. Introduction: Teacher: Why do you think you would like that one more? Have students TPS and come up with a reason why they would prefer that certain drink. Assuming they would pick the one with a higher concentration ask them why they think that would be better and what is different about it compared to the other solutions? Show a video about concentration solutes and solvents in solutions

Body:	Hands-On Activity: Exploring Concentration with Kool-Aid Solutions (25 minutes) ● Guide students in creating solutions of varying concentrations using Kool-Aid powder and water. ● Have students observe and compare the properties of the solutions based on their concentration levels. ● Encourage students to record their findings and reflect on the relationship between concentration and solution characteristics. Transition to pH Exploration (5 minutes) ● Introduce the concept of pH as a measure of acidity or basicity in solutions. ● Explain that students will now investigate how pH levels can affect solution properties. Hands-On Activity: Testing pH Levels (15 minutes) ● Provide students with solutions of known pH levels for testing. ● Instruct students to use pH testing strips to determine the pH of each solution. ● Guide students in recording their observations and discussing the impact of pH on solution properties.
Closure:	Bring class back together and have students write a "$2 summary" of what they have learned about solutions and mixtures so far in the unit. Each word is worth 10 cents. They will hand them in when they are finished and will have the opportunity to share with the class if they would like.

Lesson 4

Name & Time (Minutes Allotted):	Suspensions, Colloids, and Emulsions (45 mins)
Learning Standards: Curricular Competencies	- Co-operatively design projects - Communicate ideas, explanations, and processes in a variety of ways
Learning Standards: Content	- heterogeneous mixtures

Instructional Objectives	Students will distinguish between suspensions, colloids, and emulsions by investigating their unique properties and compositions. They will create a visual representation of their assigned mixture, highlighting key characteristics that differentiate suspensions, colloids, and emulsions, and present their findings to the class effectively.
Assessment:	Observation: ● Observe students during the visual representation activity. ● Take note of engagement, collaboration, accuracy in representations, and use of scientific terminology. Conversation: ● Engage in one-on-one or small group conversations with students. ● Ask open-ended questions to assess understanding of suspensions, colloids, and emulsions. Product: The posters and the exit tickets
Teaching Strategies:	● Exit tickets ● Group work ● Poster making/ creating
Materials:	● Poster boards or paper ● Markers, colored pencils, or crayons ● Pictures or cut-outs representing suspensions, colloids, and emulsions
Lesson Activities:	
Introduction/Hook:	Hook: Have cards with the definitions of suspensions, colloids, and emulsions on the board as well as pictures of an example of each. Have the students discuss which picture matches with which definition and why. ● Suspension: Heterogeneous mixture where particles settle out over time. ● Colloid: Homogeneous mixture with particles that do not settle and scatter light. ● Emulsion: Mixture of two immiscible liquids where one is dispersed in the other. Introduction to Types of Mixture:

	● Review the concepts of suspensions, colloids, and emulsions with the students. ● Explain the differences between the three types of mixtures and their properties.
Body:	Visual Representation Activity: ● Divide students into groups and assign each group one type of mixture (suspension, colloid, emulsion). ● Provide materials for creating visual representations of the assigned mixture type. ● Instruct students to work together to design and create a visual representation that accurately depicts the characteristics of their assigned mixture. ● Encourage students to be creative and include labels or descriptions to explain key features of the mixture type. Presentation and Discussion: ● Have each group present their visual representation to the class, explaining the characteristics of the assigned mixture type. ● Facilitate a class discussion on the similarities and differences between suspensions, colloids, and emulsions based on the visual representations. ● Clarify any misconceptions and reinforce the key points about each type of mixture.
Closure:	Have students write down one example of each (emulsion, suspension, and colloid) that they use or know of and hand it in as an exit ticket.

Lesson 5

Name & Time (Minutes Allotted):	Separation Exploration (40 mins)
Learning Standards: Curricular Competencies	- With support, plan appropriate investigations to answer their questions or solve problems they have identified - Make observations in familiar or unfamiliar contexts
Learning Standards: Content	- Mixtures: separated using a difference in component properties

Instructional Objectives	Students will investigate the separation of mixtures and solutions through inquiry-based exploration, utilizing a variety of tools and techniques to separate different mixtures effectively. They will record their observations systematically on worksheets to analyze the separation processes and draw conclusions about the properties of mixtures and solutions.
Assessment:	Conversation: ● Engage students in discussions during the inquiry process to assess their understanding of the separation techniques being used and the properties of the mixtures. ● Ask probing questions to encourage students to explain their reasoning behind selecting specific tools and methods for separation. Observation: ● Observe students as they work on separating the mixtures, noting their use of tools, techniques, and their approach to recording observations on worksheets. ● Pay attention to their problem-solving strategies, collaboration within groups, and their accuracy in documenting the separation processes. Product: Brainstorm lists and KWL chart
Teaching Strategies:	● KWL Chart ● Inquiry ● Group work
Materials:	● Coffee filters ● Cups ● Beakers ● Funnels ● Stirring sticks ● Sieves ● Sand and water ● Rocks ● Pebbles ● Beads
Lesson Activities:	
Introduction/Hook:	Hook: Pose the solutions and mixtures we experimented with in earlier lessons. Give each student a KWL chart and ask them to fill in the Know side with some things they know about how they could separate the mixtures and solutions. There are no right answers, have them

	brainstorm and use prior knowledge to list methods they could use to separate them. Then have the students fill out atleast one question they have about separating mixtures and solutions in the Wonder section. Introduction: ● Begin by discussing the concept of mixtures and solutions with the students. ● Explain that mixtures can be separated using various methods based on their properties.
Body:	● Divide students into small groups and provide them with samples of different mixtures and solutions. ● Instruct each group to brainstorm and list possible ways to separate the components of the mixtures. ● Encourage students to consider the principles of density and filtration in their brainstorming process. ● Circulate among the groups and when each group has an idea of how to separate each mixture and solution provide them with the tools they need for executing their plan (filters, stirring sticks, funnels, beakers etc.) ● Encourage students to experiment and figure out what works and what does not. Ensure they are recording their methods and findings on a sheet of paper so they can share their process with the class. ○ Be sure to set strong expectations surrounding using the tools and working safely, without mess. ○ Ensure that a proper clean-up is done before moving on
Closure:	● When students have experimented with their separations, have each group pick their favourite method and share it with the class. ● Reflect on the importance of the properties of mixtures and solutions when working with them, and offer an opportunity to have students fill in more questions in the Wonder section of their KWL charts.

Lesson 6

Name & Time (Minutes Allotted):	Separating Mixtures with Density- Density focussed (45 mins)
Learning Standards: Curricular Competencies	- Co-operatively design projects - Communicate ideas, explanations, and processes in a variety of ways

Learning Standards: Content	- density (e.g., centrifuge or settling, silt deposits in a river delta, tailings ponds, Roman aqueduct settling sections)
Instructional Objectives	Students will explore the concept of density and its applications in real-world scenarios, settling river deltas, tailings ponds, and centrifuges, by working collaboratively in groups to research, analyze, and present their chosen example through the construction of an informative poster to teach their classmates about the role of density in separation processes.
Assessment:	Conversation: ● Engage in conversations with each group to delve into the specifics of their chosen real-world example and how density is a key factor in the separation processes involved. ● Encourage students to explain the scientific principles behind the use of density in their example and how it relates to the concept of separation. Observation: ● Observe students as they work in groups, noting their collaboration, division of tasks, and communication skills while researching and constructing their posters. ● Pay attention to how students interact with each other, share ideas, and contribute to the collective understanding of the role of density in separation processes. Product: Posters and exit tickets
Teaching Strategies:	● Group work ● Poster making ● Student-led
Materials:	● Info sheets ● Poster board or paper ● Art supplies ● Video demo of density Denser Than You Think - Science Experiment
Lesson Activities:	
Introduction/Hook:	Hook: show a video with a theatrical demonstration of density with three different liquids (water, syrup, and oil). This video shows how liquids with different densities separate and do not mix. The video then goes on to drop different objects into the liquid to show where they fall given their densities. Introduction:

	● Briefly explain how density is used in separation and use the Roman Aqueducts as an example.
Body:	● Assign three different groups and supply each group with an information sheet about: settling in river deltas, tailings ponds, and centrifuges. ● Have each group thoroughly read the info sheets and then brainstorm how they will design a poster to teach the class and explain their example of density separation to the class. ● After the groups are done their posters, have them present to the class and teach them about how their methods use density for separation in the real-world. ● Facilitate a class discussion on the similarities and differences between the real-world examples presented by each group. ● Emphasize the common theme of density-based separation and its importance in various contexts, from environmental conservation to ancient engineering.
Closure:	● Get every student a sticky note and have them write down the real-world example of density separation they found the most fascinating and why.

Lesson 7

Name & Time (Minutes Allotted):	Separating Mixtures with Density- Filters and Sieves (40 mins)
Learning Standards: Curricular Competencies	- Identify questions to answer or problems to solve through scientific inquiry - Generate and introduce new or refined ideas when problem solving
Learning Standards: Content	- particle size (e.g., sieves, filters)
Instructional Objectives	Students will investigate and analyze the separation of a mixture containing four different items using a variety of sieves to explore the concepts of density and particle size in mixtures, with a focus on understanding how varying densities and particle sizes affect the sorting process.
Assessment:	Conversation: ● Engage students in discussions during the experiment to inquire about their understanding of density, particle size, and the separation process using sieves.

	● Ask students to explain their reasoning behind selecting specific sieves for separating the mixture and how they are interpreting the results. Observation: ● Observe students as they work on separating the mixture using the sieves, paying attention to their techniques, collaboration, and problem-solving strategies. ● Note how students handle the materials, make decisions about sieve selection, and analyze the outcomes of the separation process. Product: The observation sheets
Teaching Strategies:	● Group work ● Worksheets ● Inquiry
Materials:	● Mixture of rice, beads, rocks, and sand ● Varying sizes of sieves ● Buckets or trays and bowls ● Worksheets
Lesson Activities:	
Introduction/Hook:	Hook: “Well I really made an oopsie! I accidentally dropped all the materials I needed for your lesson today and they all mixed together! I need your help to help me separate each of the items!” Intro: ● Go over what we learnt about density and particle size in previous lessons ● Ask questions about how what we learnt in those lessons could help with our predicament today.
Body:	● Have students work in groups and get them to collect a portion of the mixture as well as a few sizes of sieves (groups can share if needed) ● Have students work together to separate each item from the mixture as best they can. (rice, sand, gravel, beads all in separate bowls) ● Ensure students are filling out the worksheet with the steps they are taking and why, as well as observations of how their plans are working.

	● When students are finished separating their mixtures they will make sure their worksheets are finished and can compare the steps they took with other groups as they finish. ● Clean up
Closure:	● Have students share their findings and why they think their methods worked. ● As an exit question, ask students if they think their methods could be used on a solution or if they could only be used on a mixture like what we used today.

Lesson 8

Name & Time (Minutes Allotted):	Designing your own Water Filtration System (55 mins)
Learning Standards: Curricular Competencies	- Suggest improvements to their investigation methods - Co-operatively design projects
Learning Standards: Content	- Mixtures: separated using a difference in component properties
Instructional Objectives	Students will design and construct a water filtration system using household materials to demonstrate their understanding of the principles of separating mixtures and solutions.
Assessment:	Conversation: ● Engage students in one-on-one or small group conversations about their design choices, the materials selected, and the principles of filtration they are applying in their water filtration system. ● Ask probing questions to gauge their understanding of how filtration works, why certain materials were chosen, and how they expect their filtration system to separate mixtures and solutions effectively. Observation: ● Observe students as they work on constructing their water filtration systems, paying attention to their collaboration, problem-solving skills, and implementation of filtration principles. ● Take note of how students are assembling the materials, testing the filtration system, and making adjustments based on their observations. Product: Their observation sheets and the systems themselves

Teaching Strategies:	● Group work ● Inquiry ● Experimentation ● Worksheets ● KWL charts
Materials:	● 2L pop bottles cut in half ● Rocks ● Sand ● Coffee filters ● Cotton balls ● Water ● Worksheets ● Contaminants ● Cups
Lesson Activities:	
Introduction/Hook:	Hook: “We have spent the last 7 science lessons learning about mixtures and solutions, now I want to know if you can take what you have learned and create a system that will filter this water!” Intro: ● Show students the pop bottle apparatus they will be using to filter their water, as well as the supplies that they can use. ● Go over expectations before letting students use inquiry to build their systems
Body:	● Each group will be provided with a 2 liter bottle apparatus, water, coffee filters, sand, cotton balls, small rocks, and a cup. ● They will take their cup and fill it with water, then come up the the “contaminants” table and fill their water with dirt, leaves, and other items. ● After they have their contaminated water, they will discuss with their group about what materials they want to use in their system and what order they will be placed. ● They will put the materials in place in their bottle and then draw a diagram of their bottle labelling what they used and where. They will also fill out what contaminant they think will be filtered out by each material and why. ● Then they will pour their water through their mixture and jot down their observations. ● If finished with enough time, see what happens if they pour the water through again.

	• Clean up
Closure:	• Ask students what would happen if you put saltwater through their filter systems. It would not filter out the salt, why? Bring back solutions vs. mixtures. • Have students fill out the rest of the KWL charts from previous lessons. • Share findings and methods if time.

Resources:

https://www.sciencebuddies.org/blog/teach-mixtures-solutions-chemistry

https://learning.burnabyschools.ca/wp-content/uploads/2020/11/Science-6-Nov9-13_Mixtures.pdf

https://www.bctf.ca/classroom-resources/details/grade-6-chemistry-teacher-guide

Denser Than You Think - Science Experiment

Extensions to Unit:

This unit could be extended through exploring Indigenous ways of separation, and learning about how Indigenous peoples did and still do use elements from the land to construct ways of separation, or even created mixtures and solutions. It could also be extended by having students dive deeper into distillation and evaporation as ways of separating solutions as this unit focuses more on separating mixtures.

Reflections and Revisions

Brainstorming:

- 8 possible lessons
    - Characteristics of solutions and mixtures
    - Factors that influence solubility through experimentation
    - Concentration and ph can be changed in a solution
    - Difference between suspensions, colloids, and emulsions
    - Ways to separate mixtures and solutions
        - Density and filtration --> brainstorm themselves possible ways to separate mixtures and solutions
    - Density- separating mixtures with density and examples in real world
    - Density- Separating mixtures with density using filters and sieves focussing on particle size
    - summative assessment of creating a filter system and seeing which students' elements work the best to filter water you bring
    - How crystallisation separates solutions
    - Create a system to clean dirty water and use observation, measurement, and data recording skills developed in the unit

Math Ideas:

Perimeter & Area

1. Scavenger Hunt - Introduction to measurement (Have various classroom objects for the students to measure around the class)
    a. Introduce different tools for measuring (ruler, meter stick, measuring cups…)
        i. Non-Standard Units? Maybe using a tool of their choosing to measure with this lesson? Like a string or textbooks or water bottles or whatever they choose? Then the next lesson could be about using standard units because they will have made the connection about how important standard units are? May be too young though idk
    b. Differentiate between length, width, and height
2. Conversions
    a. Convert measurements from mm to cm to m to km then back again
    b. Broken centimeter ruler activity
3. Scale
    a. Understanding the meaning of scale
        i. Could use the same but different measurement images from Loney math?
        ii. Could also use the worksheet we used in math that goes with the little blocks and had us experimenting with perimeter and how it changes the area?
4. Calculating the perimeter of the classroom
5. Use perimeter and area to figure out which shape is bigger
    a. Have two rectangles that are different sizes
6. Maybe playing around with geoboards and creating certain shapes with prompts?
7.
8. Create/draw your dream house, calculating the area/perimeter of it
        i. Could also design their dream; playground, pool, video game land, car, garden, really any place

Other ideas
Finding perimeter of irregular shapes
Small number- I think there was a book and activity about perimeter?
Block letter names
Land grab game
Using cheez-its or unit blocks they could all create certain shapes from a prompt

- https://www.upperelementarysnapshots.com/2018/05/area-and-perimeter-activities.html

Playing with Geogbra perimeter visuals

Lesson 1: Introduction to Measurement and Perimeter

Objective: Introduce measurement concepts and basic understanding of perimeter.

- Activity: Scavenger Hunt - Students measure various classroom objects (10 mins).
- Discussion: Different tools for measuring (5 mins).
- Activity: Non-Standard Units - Students use alternative tools to measure (e.g., string, textbooks) and discuss differences (15 mins).
- Summary and Recap: Differentiate between length, width, and height (5 mins).

Lesson 2: Understanding Standard Units and Perimeter

Objective: Understand standard units of measurement and basic perimeter concepts.

- Discussion: Importance of standard units (5 mins).
- Activity: Broken Centimeter Ruler - Explore precision in measurements (10 mins).
- Discussion: Conversions between mm, cm, m, and km (15 mins).
- Practice Problems: Convert measurements (10 mins).

Lesson 3: Scale and Perimeter

Objective: Introduce the concept of scale and its relation to perimeter.

- Discussion: Understanding scale (5 mins).
- Activity: Scale Images - Using different scales to understand perimeter (15 mins).
- Activity: Perimeter and Area Worksheet - Exploring how perimeter changes with different shapes (20 mins). (land grab)

Lesson 4: Perimeter of Regular Shapes

Objective: Calculate perimeter of basic shapes.

- Activity: Calculating perimeter of rectangles and squares (15 mins).
- Discussion: Comparing shapes based on perimeter (5 mins).
- Activity: Geoboard Shapes - Creating and measuring perimeter of various shapes (20 mins).

Lesson 5: Perimeter of Irregular Shapes

Objective: Calculate perimeter of irregular shapes.

- Activity: Finding perimeter of irregular shapes using different strategies (20 mins).
- Discussion: Breaking down irregular shapes into simpler components (5 mins).
- Activity: Irregular Shape Challenge - Students measure and calculate perimeter of given irregular shapes (15 mins).
- Block letter name creation- finding the perimeter of their name?

Lesson 6: Perimeter and Area Integration

Objective: Integrate perimeter and area concepts.

- Activity: Designing real-life scenarios (playgrounds, pools, etc.) and calculating perimeter (20 mins).
- Discussion: How perimeter is used in various contexts (10 mins).
- Activity: Perimeter Problem Solving - Solving problems involving real-life scenarios (15 mins).

Lesson 7: Dream House Design Introduction

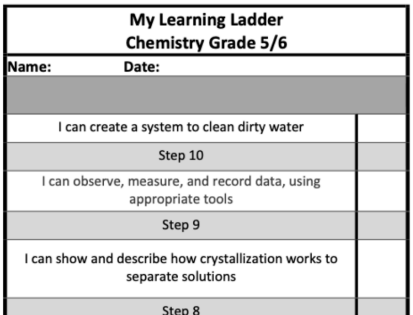
Objective: Introduce the dream house design project.

- Discussion: Discuss project guidelines and expectations (10 mins).
- Activity: Brainstorming - Students brainstorm ideas for their dream house designs (10 mins).
- Activity: Planning - Students begin planning their dream house designs and consider perimeter calculations (15 mins).

Lesson 8: Dream House Design

Objective: Culminate the unit with students designing their dream houses.

- Activity: Dream House Design - Students work on designing their dream houses and calculate their perimeters (30 mins).
- Discussion: Reflect on what students have learned throughout the unit (10 mins).
- Conclusion: Recap of key concepts and farewell (5 mins)



My Learning Ladder Chemistry Grade 5/6	
Name: Date:	
I can create a system to clean dirty water	
Step 10	
I can observe, measure, and record data, using appropriate tools	
Step 9	
I can show and describe how crystallization works to separate solutions	
Step 8	

solutions (e.g., apple juice, coffee) that can be separated through distillation, evaporation, and crystallization

density (e.g., centrifuge or settling, silt deposits in a river delta, tailings ponds, Roman aqueduct settling sections)

particle size (e.g., sieves, filters)