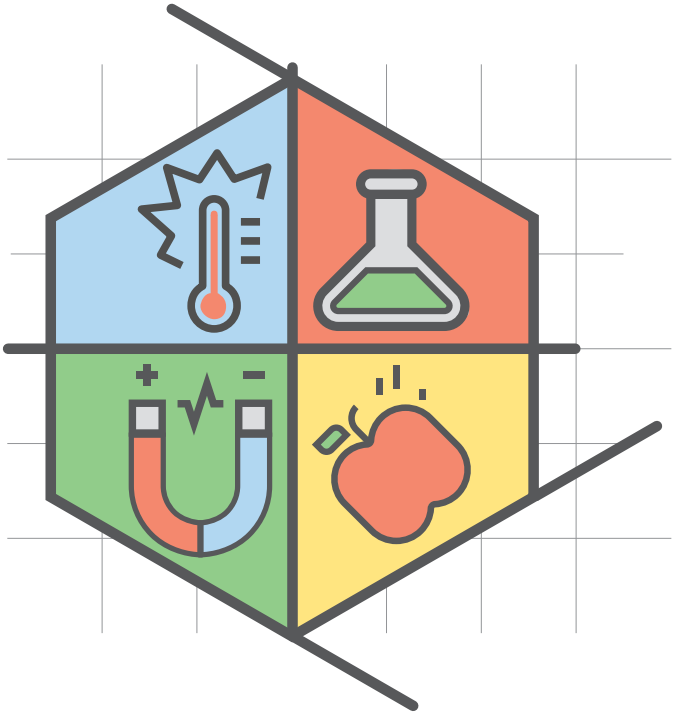
What's for Lunch?



5th Grade STEM Storyline to support the Mixtures & Solutions kit

STEM

6.9.20

ABOUT THIS UNIT

We are pleased to present this STEM Storyline Unit to help support educators in our region as we shift towards providing students with NGSS-aligned, phenomenon-based and project-based learning experiences. Our vision is to provide students with high-quality and equitable learning experiences that empower them to develop fluency in STEM and literacy. This unit strives to engage students in problem-solving to create the perfect snack for the 1st graders in their school.

This unit also contains links to online resources created by other organizations which may use a different license. Please make sure that you understand the terms of use of third-party resources before reusing them. Prior to publishing this unit of study, we have reviewed the content of this unit to ensure that all materials are in accordance with creative commons regulations. If you notice that a part of this unit infringes another's copyright, please contact us.

A digital copy of this document is available on the STEM Materials Center website at:
https://www.stemmaterials.org/whatsforlunch

ATTRIBUTION

This unit is a result of a collaborative effort between Educational Service District 112 and educators and specialists from other school districts and agencies.

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STEM
Science
Technology
Engineering
Math

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supporting Next Generation Science Standards

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OSPI

CLIME TIME
CLIMATE SCIENCE LEARNING

UNIT OVERVIEW

As our 5th grade students start the shift from childhood to adolescence, it is important for them to be equipped with the knowledge and skills needed to take care of their bodies by making healthy eating choices! This unit strives to engage students in the task of crafting a healthy and delicious snack for younger students in their building. Students master Physical Science performance expectations (5-PS1-1, 5-PS1-2, 5-PS1-3, 5-PS1-4), while learning about the properties of different foods that make them healthy or not! The unit culminates with students constructing a snack for their 1st grade buddies.

Please note that the sequence of FOSS activities in this storyline unit differs from the way that the FOSS teacher guide presents these investigations. For alignment with NGSS and to create an integrated STEM-based learning experience for your students, it is recommended that you use this storyline unit instead of closely following the sequence of the FOSS guide. The outline below can help in your planning. Please note that each session is intended to take a class period of 30-45 minutes.

For your convenience, all resources have been uploaded to this Google drive folder, What's for Lunch? bit.ly/healthyanddelicioussnack for easy access. Since curriculum revision during the school year will be limited, any additional resources and changes will be reflected in the live file folders on the Google drive. You may also make comments for suggested revisions on these documents. In order to modify the Google resources to make changes, click "file" and "make a copy." This will create a copy in your drive that you can edit to fit your needs or to share with your students on the Google platform.

LESSON 1: What's for lunch? *pg. 6*

In this lesson, students will launch into the project where they are designing a nutritious and delicious meal for their 1st grade buddies. The lesson will begin by allowing students to define the problem and ask questions. Students will then construct an initial model of their snack and create a survey to collect data from the 1st graders.

Session	Materials Needed		Page
1. "What's for lunch?" project launch	• Post-its • Chart Paper (for teacher) and Markers	• Slides presentation • Parent letter • Teacher letter	**7**
2. Brainstorming the meal	• Snack Initial Model template • Teacher slides (optional)	• Colored pencils, markers or crayons	**8**
3. Surveying our buddies	• Teacher slides for session 3 • Paper, markers, crayons, colored pencils	• Student devices for typing survey questions	**9**
4. Making sense of the data	• Teacher Slides for Session 4 • Chart paper or plain white paper	• Rulers • Markers • Data Gallery Walk Template	**10**

UNIT OVERVIEW (cont.)

LESSON 2: To drink or not to drink? *pg. 12*

In this lesson, students will explore the chemical and nutritional properties of different beverages. Students will investigate by creating solutions that are composed of different substances. Students will deepen their understanding of what to drink by researching the nutritional value of different beverages. Students will finish this lesson by constructing an argument about which drink they would or would not chose to accompany their snack and why.

Session	Materials Needed	Page
1. Mystery drinks	• Teacher slides • 5 disposable Dixie cups per each group of 3-4 students. • Spoon for each student • Observation template • Orange juice, lemonade, soda, coconut milk (or other allergy-friendly milk), water	**13**
2-3. Investigation stations	• FOSS Investigation Materials (Please see session for full list).	**14**
4. Which drink to choose?	• Research and thinking guide • Chart paper and markers	**16**
5. Revising the model	• Students previously developed models of the snack.	**17**

LESSON 3: Mixing it up *pg. 19*

In this lesson, students explore the various physical and nutritional properties of different foods and continue to develop their model of the perfect snack for their 1st grade buddies.

Session	Materials Needed	Page
1. Characteristics of foods	• Allergy friendly food items • Paper plates and napkins • Food Scientist's Template • Access to a sink with soap for students to wash hands before and after	**20**
2. Nutritious or NOT?	• Article, "Building your plate" • Students' snack plan/model	**21**
3. Food groups research	• Teacher slides for session 3 • Paper, drawing instruments • Student devices for typing survey questions	**22**

LESSON 4: Food and our environment *pg. 24*

In this lesson, students study the phenomenon of climate change and how the Pacific Northwest is being affected by changing land and water. Then, students research how the foods we eat can impact the environment. Students apply their learning to refine their snack to be more environmentally sustainable.

Session	Materials Needed	Page
1. What is climate change?	• *My Wounded Island* by Jacques Pasquet • Student devices with internet access	**25**
2. Does what we eat make a difference for the earth?	• Teacher slides • Students' snack plan/model	**26**

UNIT OVERVIEW (cont.)

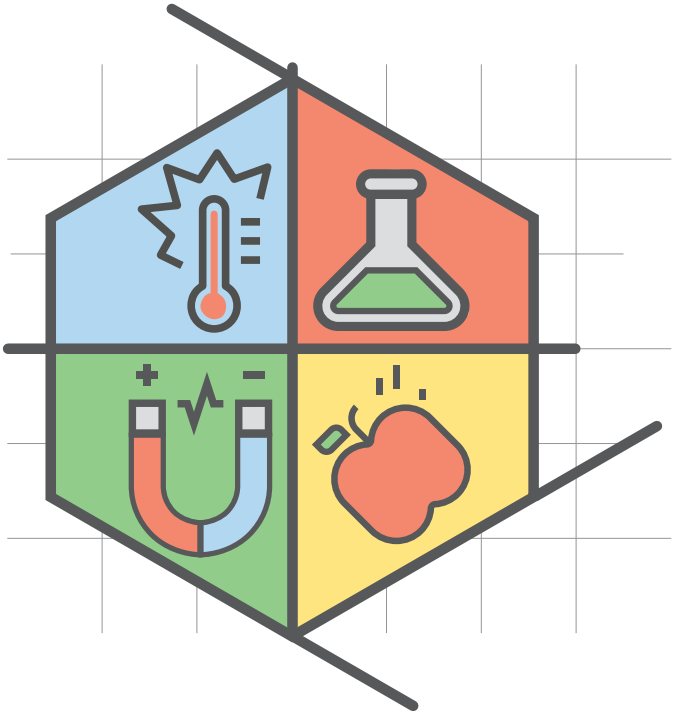
LESSON 5: And, snack is served! *pg. 28*

In this lesson, students refine their snack recipes using computational thinking and all the information and data they have collected throughout the unit. Their models are finalized as they get ready for the STEM snack fair! Students finally prepare and share snacks with their 1st grade buddies.

Session	Materials Needed	Page
1. Writing the ratio recipes	• Snack Recipe Template • Student devices with internet access	**29**
2. Refining the recipes	• The Secret Recipe thinking tool	**30**
3. Model of the amazing snack	• Students' models	**31**
4. Get cooking!	*These materials are not included in the ESD kit and will need to be borrowed from the cafeteria:* • Ingredients for students' snacks. • Large mixing bowls. • Knives to chop ingredients • Cutting boards to cut ingredients • serving spoons for mixing • aluminum foil or saran wrap for covering snacks	**32**
5. STEM snack fair: snacks are served!	• Prepped snacks • Plates and forks • Students' finalized models to be posted in space where 1st graders are eating.	**33**

Planning ahead!

Preparing for snack assembly: reach out to parents and volunteers a few weeks in advance asking for volunteers to help students with their snack assembly day in addition to volunteers that can help with purchasing the ingredients. Cafeteria staff are a great resource to use during this phase of the project. See if it is possible for your 5th graders to use the cafeteria space to assemble their snacks. If not, maybe it is possible for the cafeteria staff to visit your class and help?



LESSON 1: What's for lunch?

STRATEGY: ENGAGE

In this lesson, students will launch into the project where they are designing a nutritious and delicious meal for their 1st grade buddies. The lesson will begin by allowing students to define the problem and ask questions. Students will then construct an initial model of their snack and create a survey to collect data from the 1st graders.

STEM

SESSION 1:
"What's for lunch?" project launch

Warm-up

Engage: Start this unit by telling students that the 1st graders need help! The cafeteria staff has noticed that the first graders have not been finishing their lunches and that a lot of their food is being wasted! This slides presentation can be used to initiate that "call to action."

Present students with the driving question: "how can we create a nutritious and delicious snack for our 1st graders?" Tell students that each team of 5th graders will design a snack for a class of 1st graders. Once their mini-meal is designed, they will construct the meal and serve, hopefully making the first graders a little healthier and happier!

Materials Needed

- Slides presentation
- Post-its
- Chart Paper (for teacher) and Markers
- Parent Letter
- Teacher letter

Main activity: Notice, Wonder, Know and the Scientist Circle

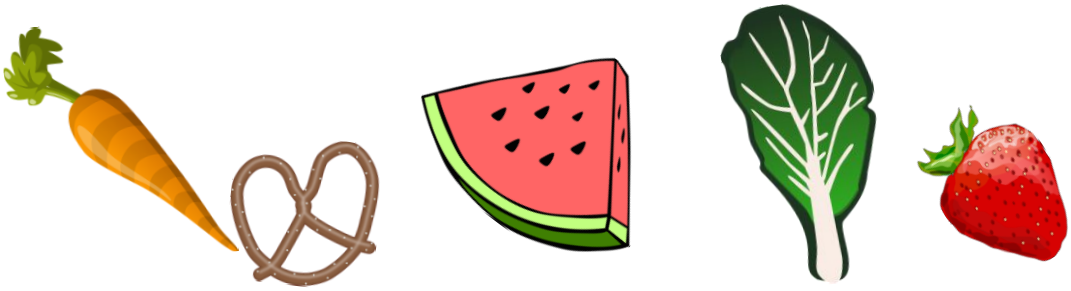
What do we notice, wonder and know about our problem? Ask students, what do they notice about the problem, what do they wonder about the problem, and what do they know about how to solve the problem? Remind students what the driving question is. Have each student write one thing they notice, wonder, and know on a separate post-it. While students are working on recording their thoughts, create three posters on chart paper titled, "Notice," "Wonder," and "Know."

Scientist Circle: Gather students around in a circle around the three NWK posters. Ask one student to start by sharing something they noticed by reading one of their post-its. Once one student has shared, take their post-it and stick on "notice" chart. Ask if any other students had any similar noticings, allow students to share and take their post-its and continue adding to the chart. Ask students if they had any new and unrelated noticings. Once all students have shared, ask one student to start by sharing a thing they wonder. Continue the discussion by having each student share a wondering. Once they have all shared, ask some students to share something they know. Not all students will have something to share for this, and that is ok. Note for teacher: the difference between a noticing and a wondering is that the noticing is directly related to the problem being discussed (i.e. the 1st graders not eating and the 5th graders trying to come up with a solution), and the knowing is a piece of prior knowledge they already have (something they walked into the classroom already knowing, like the idea that first graders generally don't like to eat veggies). Thank students for their participation in the Scientist Circle.

Wrap-up

Call attention to the "Wonder" poster that was compiled by the group. Acknowledge students' brilliant wonderings and let them know that their questions will play an important part in their learning as they complete the project. Ask students if there are any other things that they "need to know" in order to complete the project. Add more points to this chart.

Send home this family letter informing parents about the project and asking parents for support gathering materials for students' projects. This letter to your principal may also help get admin excited and onboard with the project.



Dear families,

We are thrilled to share that our 5th graders will be working on a project to contribute to their community while learning about science and nutrition. The fifth graders will be creating a healthy and delicious snack for their first grade pals.

We would like you to anticipate some interesting conversations about nutrition as our students embark on the journey towards becoming more conscious consumers of foods and beverages. Please rest assured that any foods being utilized will be allergy-friendly.

We would also like to ask for your help with the completion of project. We will be looking for donations of ingredients for the snacks that our 5th graders engineer. We would also love for you to join us towards the end of the project when we will be cooking our snacks. We will keep you posted about dates as we approach our amazing snack-a-thon!

Thank you in advance for your support with our exciting project!

Sincerely,
[insert teacher's name]'s Class

Dear Ms./Mrs./Mr./Dr. [insert Principal's name],

Our 5th grade classes will be participating in a PBL (project-based learning) Unit where we will be contributing to the wellness of our community while learning about science and nutrition. The fifth graders will be creating a healthy and delicious snack for their first grade pals.

It would be so helpful if the fifth graders could have the support of building admin and cafeteria staff as they take on the project.

Here are a few ways that we may need your help:

- ★ Communicate with the cafeteria staff to give students some mentoring about foods and nutrition.
- ★ Making cafeteria space and resources (mixing bowls, mixing spoons, saran wrap) available for snack day.
- ★ Helping reach out to the community/parents to donate some ingredients for the snacks.

We would also love for you to join us towards the end of the project when we will be cooking our snacks. We will keep you posted about dates as we approach our big snack-a-thon!

Thank you in advance for your support with our exciting project!

Sincerely,
Ms./Mrs./Mr. _____'s Class

SESSION 2:
Brainstorming the meal!

Warm-up

Engage: Tell students that today we will start the process of planning the awesome meal for the first graders. Ask students to share what some of their favorite meals are. What are some things that they know are healthy? What are some things that are delicious? You can make two charts for students to use in the next step. You can use these Teacher Slides (optional) if you'd like.

Main activity

Have students work in small teams to brainstorm what they think a good meal might look like. Use snack initial model template to have students record their initial ideas. This is an *initial* model that is being created by students based on their prior knowledge. Students will likely not come up with balanced or nutritious meals—this is ok! Through the course of the unit, students will develop an understanding of how to improve their meal plan for their 1st grade buddies.

Peer-sharing: Have students pair up with another team and share their designs. Ask teams to provide each other with feedback. What did they like about the plan? What questions or wonderings do they have about the plan? Before having students give each other feedback, be sure to discuss what kind and unkind feedback looks like and emphasize the importance of giving feedback that is kind. You can have students practice on the broccoli and potato chips example from the slide show. Have students pair up and talk to each other by sharing an example of a piece of kind feedback that can be given about this initial model (broccoli and potato chips) and one unkind feedback. Ask students: ***why is it important to be kind when you are giving feedback?***

Wrap-up

Have students meet back with their teams and debrief about the feedback they were given.

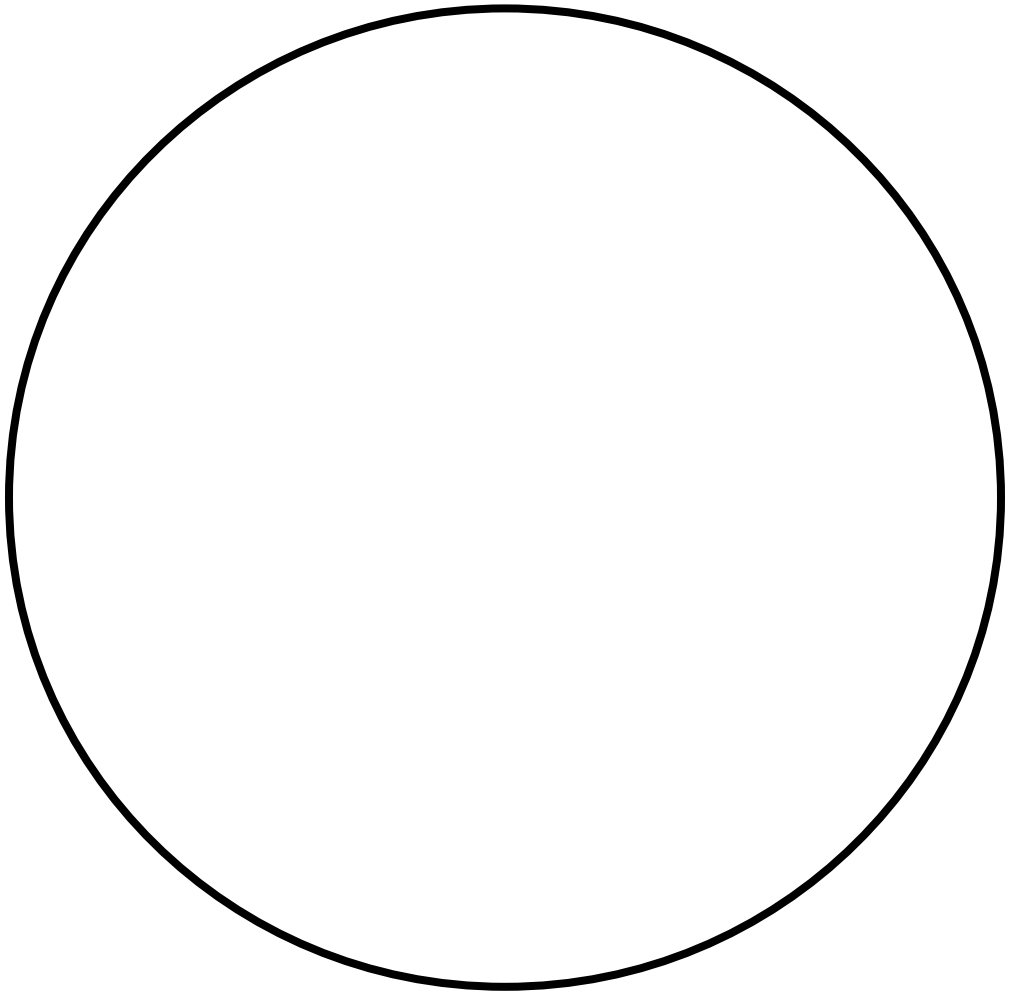
Materials Needed

- Snack Initial Model template
- Teacher slides (optional)
- Colored pencils, markers or crayons

Delicious Snack Plan

Name of Snack: _____

In the plate below, draw what you have in mind for your special snack. Your ideas will change as we learn more, and that is ok!



Label the different parts of your snack. Why is it healthy? Why is it delicious?

SESSION 3:
Surveying our buddies

Warm-up

Tell students that we will be surveying our 1st grade friends in order to create a snack that they will be happy (and healthy eating). Redirect students to the chart with the "wonderings" from the previous lesson and have them think again about the driving question. Remind students that one of the problems they are trying to solve was that the1st graders were refusing to eat their food! In order to make a snack that they will eat, we have to find out what they like to eat (and also what they can't eat, like allergies).

Materials Needed

Teacher slides

Paper, markers, crayons, colored pencils

Student devices for typing survey questions

Main activity

Have students work with their team to create a survey that they will use to see what their buddies like to eat. To help collect data for their snack, each group will survey a group of 1st graders. Have students type up their survey questions in a way that the 1st graders will be able to respond easily. Tell students that 1st graders do not have the same focus that a 5th grader has and so they need to make their questions short and have less than 10 questions in their survey. Also, ask teams to decide how they will collect information--will they create a survey for the 1st graders to fill out, or will they interview them? Have the team select a "survey liaison" who will implement the team's survey in the 1st grade classroom.

Peer Feedback: Have teams partner with another team to get feedback on their surveys. Make sure that teams are looking to see:

- Are the other team's questions easy to understand for 1st graders?
- Will the survey give the team information that will be helpful when creating a snack?
- Is there any advice that they need that you can help with?
- Have the first graders' needs been considered?

Wrap-up

Facilitate a gallery walk where teams' surveys are on display. Encourage students to pilfer or "steal" each others' ideas.

Planning ahead!

Between Session 3 and 4: Have the survey Liaison visit the 1st graders and collect survey data.

SESSION 4:
Making sense of the data

Warm-up

Tell students that today we will be interpreting and displaying the data we collected using a line plot.

Main activity

Give students time to tally the responses they got from their first grade buddies. How did their group answer each question?

Then, have students create line plots to show their data. Provide each team with a large piece of chart paper, or several small sheets, to create a line plot showing the data for each question. The slides can be used to scaffold the process for students.

Data Gallery Walk: Have students post their data displays by team around the classroom. Have students circulate the class and make sense of the data collected by other teams. This template can be used to give students a space to write their observations.

Wrap-up

After the data gallery walk, ask teams to huddle. What did they notice about the collective data that they found? What are some things that are important to consider when creating the snack? What do the 1st graders like and not like? Bring the class together as a whole and let students share their main takeaways from the data collection.

Materials Needed

- Teacher Slides
- Chart paper or plain white paper
- Rulers
- Markers
- Data Gallery Walk Template

Name_____

Data Gallery Walk

Some things I noticed about the preferences of the 1st graders.

★

★

★

★

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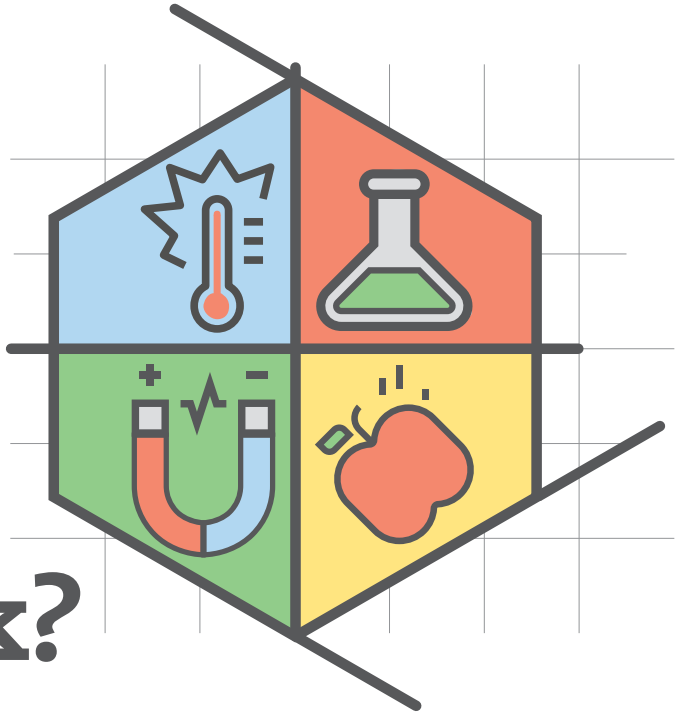
How Lesson 1 Supports Next Generation Science Standards

5-PS1-3. Matter and Its Interactions

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

Performance Expectation	**Connections to Classroom Activity,** *Students:*
5-PS1-3 Make observations and measurements to identify materials based on their properties.	• Begin to collect information about which types of foods will be used in the snack they are designing for the 1st graders. • Survey students to collect data on which properties of foods are most desirable for the 1st graders.
SCIENCE & ENGINEERING PRACTICES	
Analyzing and Interpreting Data Developing and Using Models Asking Questions and Defining Problems Using Mathematical and Computational thinking	• Ask questions to understand the task that they have at hand (creating a snack for the 1st graders) and connect to prior knowledge that can help them to solve the problem. • Develop an initial model of what their snack for the 1st graders will look like. • Survey the 1st graders and collect data about which foods the 1st graders like to eat and what their dietary needs are. • Use graphs to represent the data they collect.
DISCIPLINARY CORE IDEAS	
PS1.A Structure and Properties of Matter: Measurements of a variety of properties can be used to identify materials.	• Begin the process of identifying foods by their properties and collect information on which properties are valued by the 1st graders in a perfect snack.
CROSSCUTTING CONCEPTS	
Scale, Proportion and Quantity	• Begin to explore the different qualities of different materials and how these qualities can be used to identify and define them.



LESSON 2: To Drink or Not to Drink?

STRATEGY: EXPLORE

In this lesson, students will explore the chemical and nutritional properties of different beverages. Students will investigate by creating solutions that are composed of different substances. Students will deepen their understanding of what to drink by researching the nutritional value of different beverages. Students will finish this lesson by constructing an argument about which drink they would or would not chose to accompany their snack and why.

STEM

SESSION 1:
Mystery drinks

Teacher set-up: *For each group of 3-4 students, label 5 cups with the numbers 1-5. In the small cups, give each team the following liquids: orange juice, lemonade, soda (not colorless), coconut milk, and water. Also give each team enough spoons for each student to have one. They will be pouring the liquids onto the spoons for their taste tests. Note: please make sure that you are aware of and careful if there are students with allergies who cannot participate in parts of the tasting.*

Materials Needed

- Teacher slides
- 5 disposable Dixie cups per each group of 3-4 students
- Spoon for each student
- Observation template
- Orange juice
- Lemonade
- Soda
- Coconut milk
- Water

Warm-up

Tell students that before we select or design a drink for the 1st graders, we will be exploring what makes up a drink.

Main activity

Ask students to start with liquid number 1 and to:

1. Make visual observations and write them in the observations template.
2. Taste by pouring the liquid into their spoon and tasting.
3. Talk with their team about the taste.
4. Record observations about taste.
5. Make a hypothesis about what each drink is.

Making sense of our investigation:

- Have students partner with another team and discuss, what were the characteristics of each drink, and what do they think that drink is?
- Have the class vote on what their favorite drink was. Which drink did the students like the most and which one did they like the least?
- Share the sugar content of the different drinks that were tested. What are students' observations. Now can be a great time to invite a guest speaker (ex. Nurse) to talk to your students about the content of the beverages available and the impact that different ingredients have on the body (whether negative or positive).

Wrap-up

After groups have had a chance to discuss, bring the whole group back together and have students share their thoughts from the experience.

Mystery Drinks

Liquid #	Observations	What is this drink?
1		
2		
3		
4		
5		

SESSIONS 2-3:
Investigation stations

Teacher set-up: *FOSS Investigation 2 & 3 STATIONS: Instead of doing these investigations as separate activities, set-up stations for students so they are able to work in small groups in investigate different concepts in preparation for creating/choosing the drink for their snack. These station signs can be used to direct students.*

Warm-up

Tell students that today, our focus is to develop an understanding of what makes up drinks so we can make an informed decision about the drink we will be offering to our 1st grade buddies. This thinking template can be used to help students jot down their thoughts.

Main activity

Have students circulate the following stations. See directions for students below. Explain each station briefly before starting the station cycle. Provide a printed out station sign per station so students can refer to it for direction. ***NOTE: these directions are different than the FOSS Guide.***

Station 1 (FOSS Investigation 2 Part 1): Salty Solution

How much salt can you dissolve in water before it stops dissolving and reaches saturation?

1. Weigh the water to see how much you started with.
2. Add salt to the water and stir.
3. Continue step 1 until you see that the salt won't dissolve anymore. Look closely.
4. Once you've reached this step, your solution has reached saturation. This means that it has dissolved as much salt as it can.
5. Weigh the solution and write down the final amount.
6. How much salt did you add?

Station 2 (FOSS Investigation 2 Part 2): Acidic Solution

How much citric acid can you dissolve in water before it stops dissolving and reaches saturation?

1. Weigh the water to see how much you started with.
2. Add citric acid powder to the water and stir.
3. Continue step 1 until you see that the powder won't dissolve anymore. Look closely.
4. Once you've reached this step, your solution has reached saturation. This means that it has dissolved as much citric acid as it can.
5. Weigh the solution and write down the final amount.
6. How much citric acid did you add?

Materials Needed

Station signs

Thinking template

Paper towels

Access to water

Graph paper (for Session 3)

FOSS Station 1:
- Electronic Scale or balance
- Plastic cups (one per station)
- Funnel
- 1 spoon (one per station)
- Salt

Water (in a cup or plastic bottle)

FOSS Station 2:
- Electronic Scale or balance
- Plastic cups (one per station)
- Funnel
- 1 spoon (one per station)
- Citric acid
- Water (in a cup or plastic bottle)

FOSS Station 3:
- Electronic Scale or balance
- Plastic cups (2-3)
- Funnel
- 1 spoon for mixing (one per station)
- One spoon per student for tasting
- Soda powder mix
- Water (in a cup or plastic bottle)

Station 4 (these materials are not provided in kit):
- 4 cups
- Water bottle with water
- Stirring stick or spoon for each cup.
- Peanut butter
- Dish Soap
- Oil
- Paper towels

SESSIONS 2-3:
Investigation stations (cont.)

Station 3 Soft Drink Recipes (FOSS Investigation 3, Part 1)

You will have 4 tries to create the perfect concentration of the soda!

1. Start by mixing a small amount of the soda powder with water. Write down the amount of powder you used.
2. Taste. Strong enough? Too weak?
3. Try to adjust the amount for 3 more tries until you've reached a taste that your group likes. Make sure you use the same amount of water. Make sure you write down the amount of powder you used in each try.

Station 4: How mixable is this stuff? (optional)

You have 3 different substances to mix into the water.

1. Mix each and use a stirring stick to stir. Draw your observations.
2. Which ones mix well and which ones don't?
3. Which mixture actually made something new?

Wrap-up/Session 3

Graphing the findings: Have students wrap up their data collection and bring the whole group together. Present students with this graph. Ask one team to share their data with you for station 1. Graph students' quantities up. Ask another team to share their data and model the process of graphing their data on the graph. Allow teams to work in groups to graph their other two sets of data (for stations 2 and 3).

Gallery walk: Have students display their graphs around the class and have teams walk around to observe the different data displays (graphs) that were created by different teams. Do they see a trend? How do the three bars look? Can they find a pattern to explain how the first and second bar look in relation with the third? NOTE: The idea is for students to see that the mass of the two substances combined to form the mass of the final solution. (ex. 30 g of water + 5 g of powder resulted in 35 g of the final solution). Give students a chance to discuss in groups before sharing out with the class.

Materials Needed

Station signs

Thinking template

Paper towels

Access to water

Graph paper (for Session 3)

FOSS Station 1:
- Electronic Scale or balance
- Plastic cups (one per station)
- Funnel
- 1 spoon (one per station)
- Salt

Water (in a cup or plastic bottle)

FOSS Station 2:
- Electronic Scale or balance
- Plastic cups (one per station)
- Funnel
- 1 spoon (one per station)
- Citric acid
- Water (in a cup or plastic bottle)

FOSS Station 3:
- Electronic Scale or balance
- Plastic cups (2-3)
- Funnel
- 1 spoon for mixing (one per station)
- One spoon per student for tasting
- Soda powder mix
- Water (in a cup or plastic bottle)

Station 4 (these materials are not provided in kit):
- 4 cups
- Water bottle with water
- Stirring stick or spoon for each cup.
- Peanut butter
- Dish Soap
- Oil
- Paper towels

Investigation Stations Thinking Template

Station 1: Salty solution **Question:** How much salt can you dissolve in water before it stops dissolving and reaches saturation?	What did we notice?
Place to make calculations and jot down ideas:	What do we wonder? What do we now know?
Station 2: Acidic Solution **Question:** How much citric acid can you dissolve in water before it stops dissolving and reaches saturation?	What did we notice?
Place to make calculations and jot down ideas:	What do we wonder? What do we now know?

Investigation Stations Thinking Template

Station 2: Acidic Solution **Question:** What is the perfect recipe for a soft drink (soda)?	What did we notice?
Place to make calculations and jot down ideas:	What do we wonder? What do we now know?
Station 2: Mixing Stuff **Question:** How mixable is this stuff?	What did we notice?
Place to make calculations and jot down ideas:	What do we wonder? What do we now know?

SESSION 4:
Which drink to choose?

Warm-up

Ask students to think about their initial design for a perfect snack. What drink were they thinking of including and why? Ask students to talk in their groups and remind themselves about their choice. Tell students that this week, they will be breaking up into expert groups who will research different drinks. Then, they will advise the class whether or not their drink is a good choice for the 1st graders.

Materials Needed

Research and thinking guide

Chart paper and markers

Main activity (may last multiple class sessions)

Split students up into groups of 3-4 and assign them with a specific drink to research (some options soda, fresh juice, milk, soymilk, Gatorade, juice from concentrate). Students can use this Research and thinking guide which will also serve as a formative assessment for you to see what they are accomplishing individually. Their task is as follows:

1. Start researching.
2. Answer the following questions:
    a. What is your drink made of? How is it made?
    b. Is your drink nutritious? Why or why not?
    c. Would you recommend any classmates to include this drink as a part of their snack? Why or why not?
3. Create a model showing the different parts of your drink. This model should be a picture showing the unseen particles that your drink is made of. Are those particles healthy or not?
    a. What is your drink made of?
    b. Tell the class if you would recommend this drink or NOT.
    c. Give at least 3 reasons why you decided that.
4. Turn your individual models into a team poster or slideshow that you can share with the class.
5. Present your recommendation to the class.

Wrap-up

Ask class to vote on which drink is the most healthy and which is the least healthy.

Which Drink to choose?

Research and Thinking Guide

Drink:_____ ****Highlight the evidence you find.

a. What is your drink made of? How is it made?
b. Is your drink nutritious? Why or why not?
c. Would you recommend any classmates to include this drink as a part of their snack? Why or why not?

Which Drink to choose?

Research and Thinking Guide

Diagram of what our drink is made of. Particles are labeled.

SESSION 5:
Revising the model

Main activity

Meet with your group and revisit your initial model of a perfect snack. Did you learn something from your classmates that made you change your mind? Is your drink healthy? Why or why not? Do you want to switch to a different drink? If so, what might be a better choice? If not, why is your drink a good choice? Reflect on your model and make revisions.

Materials Needed

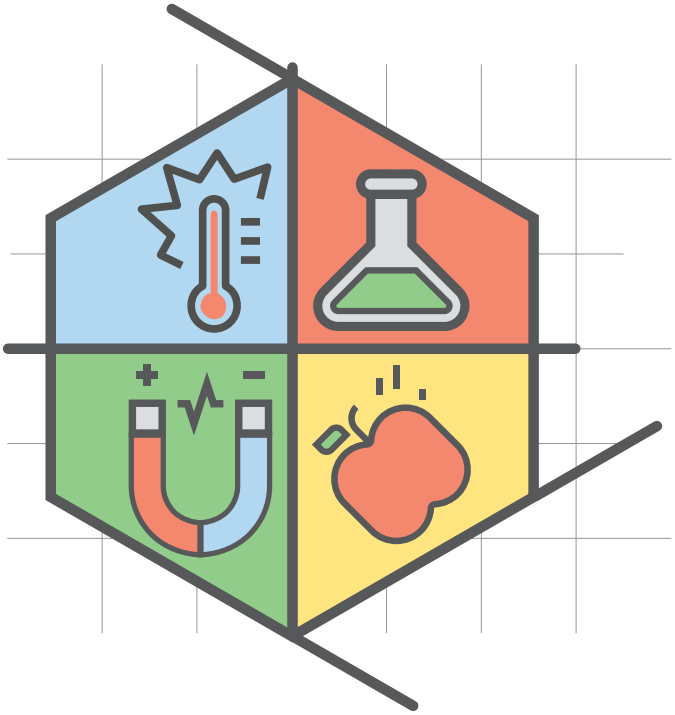
Students previously developed models of the snack

How Lesson 2 Supports Next Generation Science Standards

5. Structure and Properties of Matter

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

Performance Expectation	**Connections to Classroom Activity,** *Students:*
5-PS1-3 Make observations and measurements to identify materials based on their properties. 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen. 5-PS1-2 Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.	• Develop a model to show how drinks are made up of different ingredients that are too small to be seen but have an impact on our bodies. • Identify different liquids based on their visual and olfactory properties. • Collect data and graphs showing how matter is conserved when mixing different materials to make a drink.
SCIENCE & ENGINEERING PRACTICES	
Analyzing and Interpreting Data Developing and Using Models Planning and Carrying out Investigations Obtaining, Evaluating, and Communicating Information	• Conduct a variety of investigations where they create solutions by mixing substances • Strive to create the perfect formula for a soda drink • Investigate how some materials are easily mixable and some are not • Collect and communicate information about which drink is healthy and which drink is not • Continue to optimize their model of the perfect drink that can accompany their snack for the 1st graders
DISCIPLINARY CORE IDEAS	
PS1.A Structure and Properties of Matter: Measurements of a variety of properties can be used to identify materials. PS1.B: Chemical Reactions	• Investigate the properties of different edible liquids. • Mix a variety of solutions and observe how the mixing of two or more different substances creates a new substance with different properties. • Measure how combining multiple substances still leads to a conservation of mass.
CROSSCUTTING CONCEPTS	
Scale, Proportion and Quantity Cause and Effect	• Different drinks are made up of tiny particles that can't be seen. • Standard units are used to measure and describe the physical qualities of different substances. • When substances are mixed, this may cause a new substance to be formed.



LESSON 3: Mixing It Up

STRATEGY: EXPLAIN

In this lesson, students explore the various physical and nutritional properties of different foods and continue to develop their model of the perfect snack for their 1st grade buddies.

STEM

SESSION 1:
Characteristics of foods

Warm-up

Congratulate students on crafting their drinks and welcome them to the next and most important part of the project, planning the snack! Have students revisit their survey information and their initial brainstorm about the snack. Have their thoughts changed at all? Let students know that their initial ideas may change by the end of the next several lessons, and this is not only perfectly ok, but wonderful! Scientists refine their ideas all the time.

Career connection: Food Scientist

Tell students that in the following lessons, they will act as food scientists, studying the properties of foods, understanding what they're made of, and using this information to refine their own snack.

Materials Needed

- Allergy friendly food items
- Paper plates and napkins
- Food Scientist's Template
- Access to a sink with soap for students to wash hands before and after.

Main activity

The focus is for students use their observation skills to classify a variety of foods. Ask students: What does it mean to make an observation? What are different ways that we can make observations? [seeing, feeling, smelling, hearing and tasting). Have each team explore the properties of a variety of foods. Have them use their Food Scientist's Template to make a log of everything they try. Be careful of students' food allergies. To avoid spread of pathogens, make sure that students wash their hands before and after the experiment and not share foods through the duration of the experiment (each student should have a plate of samplings of various foods).

Wrap-up

Have students revisit their model. Are there any changes they want to make based on what they investigated today? What types of foods did the first graders want? Do they have any thoughts or ideas on how to make the snack better?

Planning ahead!

This lesson will require the teacher to gather some food items for exploration. Inquire if it is possible for the cafeteria staff to support this effort and/or if parents can contribute. The lesson can be conducted in the cafeteria (with the help of your cafeteria workers) to achieve a more authentic feel for your 5th graders. You can use this suggested list of foods to create a variety of foods to explore.

Food Scientist's Template

Food	See 	Feel 	Taste 

Here are some foods you can gather for students to test out:

- Rice cakes
- Fresh fruit like grapes or orange slices
- Fresh veggies like cucumber/carrot or celery sticks.
- Cheese cubes
- Pretzels
- Hummus
- Granola
- crackers
- Dried fruit like raisins or cranberries.

SESSION 2:
Nutritious or NOT?

Warm-up

Start by asking students what are some examples of healthy food? Students are likely to list a lot of fruits and vegetables. Write students ideas on a chart paper as an initial brainstorm.

Career connection: Dietitian

A dietitian is a person who has studied human nutrition very carefully. A dietitian can help a person figure out what types of foods they need to eat (or avoid) in order to stay healthy. Sometimes, dietitians will help a person to get better when they are sick, and some dietitians help plan meals for schools, or cafeterias!

Main Activity

Have students work in teams to read this article on Newsela title, "Building your plate: Comparing the newest symbols of healthy eating" (Note; you will need to have a free account in order to access). Use your preferred protocol for group reading. Then, ask students to look at their current plan for a snack. What areas of the "Healthy Eating Plate" does their snack fall into? What areas of the plate is the snack not covering? Tell students that it is okay if their snack does not hit all categories, because it is just a snack and not a meal. However, tell students that their snack needs to have foods from at least 3 of the categories. Provide students with computers to research recipes in case they are not able to think of what their snack actually includes (ex. If they were thinking trail mix in general, they may not know what the components actually are).

Wrap-up

Have students revisit their snack plan. What are some ideas that they can use to make their snack healthier? What are some things that they might add to their snack to make it more balanced? What are some things they might take out?

Materials Needed

Article, "Building your plate"

Students' snack plan/ model

SESSION 3:
Food groups research

Warm-up

Tell students that today, they will be researching the different food groups in detail.

Main activity (may last multiple class sessions)

Split students up into groups of 3-4 and assign them with a specific food group to research.

1. Start researching.
2. Answer the following questions:
    a. What are examples of foods in your food group?
    b. Why is your food group important for human nutrition?
    c. What nutrients does it have that our bodies need?
3. Create a presentation to share what you found with your classmates. You can make a poster, make a slideshow, write a song, do a skit, or something different with your teacher's permission. Make sure that the class understands why your food group is an important part of a balanced diet.
4. Present your information to the class.

Wrap-up

Give teams a chance to huddle around their plan and apply the information of the day on their snack. What food groups are a part of their snack? Is there snack balanced or is it skewed in one food group. Since its just a snack, it doesn't have to represent all food groups.

Materials Needed

Teacher slides for session 3

Paper, markers, crayons, colored pencils

Student devices for typing survey questions

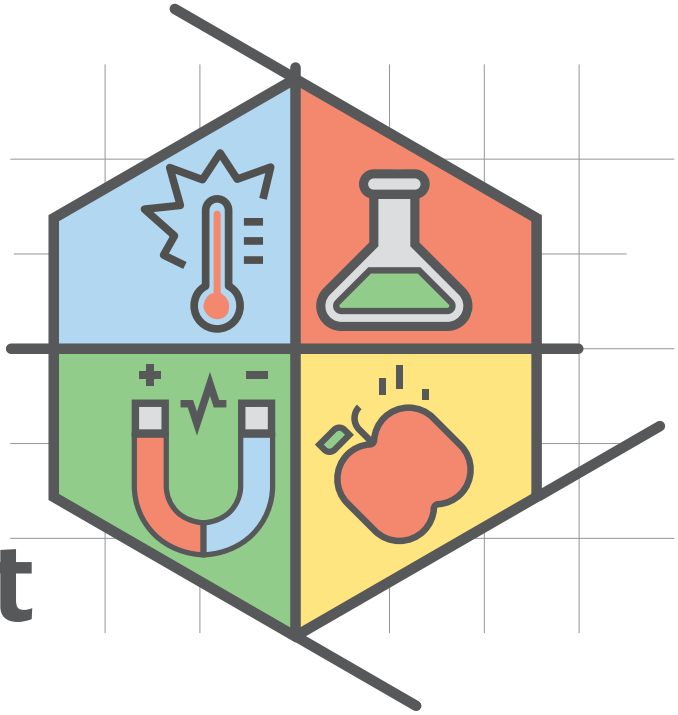
How Lesson 3 Supports Next Generation Science Standards

5. Structure and Properties of Matter

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

Performance Expectation	**Connections to Classroom Activity,** *Students:*
5-PS1-3 Make observations and measurements to identify materials based on their properties. 5-PS1-1 Develop a model to describe that matter is made of particles too small to be seen.	• Continue to develop and refine their models of the snack for the 1st graders. • Identify different foods and ingredients based on their visual and olfactory properties. • Study the chemical properties of different foods.
SCIENCE & ENGINEERING PRACTICES	
Analyzing and Interpreting Data Asking Questions and defining problems Developing and Using Models Obtaining, Evaluating, and Communicating Information	• Continue to develop their model of the perfect snack. • Ask questions to further answer the driving question and create the perfect delicious and nutritious snack for the 1st graders. • Collect and communicate information about what the different food groups are. • Collect information about a specific food, evaluate its healthiness, and communicate a recommendation to their peers. • Continue to optimize their model of the perfect drink that can accompany their snack for the 1st graders.
DISCIPLINARY CORE IDEAS	
PS1.A Structure and Properties of Matter: Measurements of a variety of properties can be used to identify materials. PS1.B: Chemical Reactions	• Investigate the properties of different foods. • Research the chemical properties of different foods.
CROSSCUTTING CONCEPTS	
Scale, Proportion and Quantity Cause and Effect Energy and Matter	• Research that foods are composed of different particles that have different chemical properties and value. • Collect, evaluate and communicate information about how some foods create a positive reaction in our bodies while others do not. • Discuss the importance of food and why our bodies need certain types of food for certain functions (ex. Energy).

LESSON 4: Food & Our Environment



STRATEGY: EXPLAIN

In this lesson, students study the phenomenon of climate change and how the Pacific Northwest is being affected by changing land and water. Then, students research how the foods we eat can impact the environment. Students apply their learning to refine their snack to be more environmentally sustainable.

STEM

SESSION 1:
What is climate change?

Warm-up

Start by asking students: "Is the climate on the earth changing? What is climate?" Show students the video on this slides presentation. What did they notice and what do they wonder? Have they heard of the words climate change before? What do they think it means?

Main activity

Read the story, *My Wounded Island*, by Jacques Pasquet and Marion Arbona. How was Imarvaluk's island being affected by changes? What were those changes, and what was causing those changes?

How are we affected by climate change in the PNW? Have students break up into teams of 3-4 and tackle one portion of the brief about how climate change is affecting the Pacific Northwest (threatened water resources, increased sea level rise, record breaking wildfires). Allow students to make a poster or slides presentation to share their ideas.

Wrap-up

Have each group share their findings with the whole class.

Materials Needed

My Wounded Island by Jacques Pasquet

Student devices (laptops, chromebooks, or ipads) with internet access

SESSION 2: Does what we eat make a difference for the earth?

Warm-up

Show students this video talking about how different foods have a different impact on the environment.

Main activity/discussion

Carbon footprint research: Allow students to take the carbon footprint survey and calculate how many pounds of greenhouse gases will be released into the atmosphere based on the ingredients that they like. Have students research some of the key ingredients in their snack.

Making sense of data: Show students the data graphs showing the amount of carbon released during the production, processing, and transporting (transporting could be considered a part processing) of certain foods. What do they notice about different slices of the pie chart? Which slices are bigger? Which slices are smaller? Are there any patterns that they notice? What foods are responsible for more carbon dioxide in the atmosphere? Which foods are responsible for less?

Wrap-up

Have students look at the ingredients in their meal plan. Are there any ingredients that they would like to change based on what we learned about foods and environmental impact? Allow teams to brainstorm and make adjustments to their plan.

Materials Needed

Teacher slides

Students' snack plan/ model

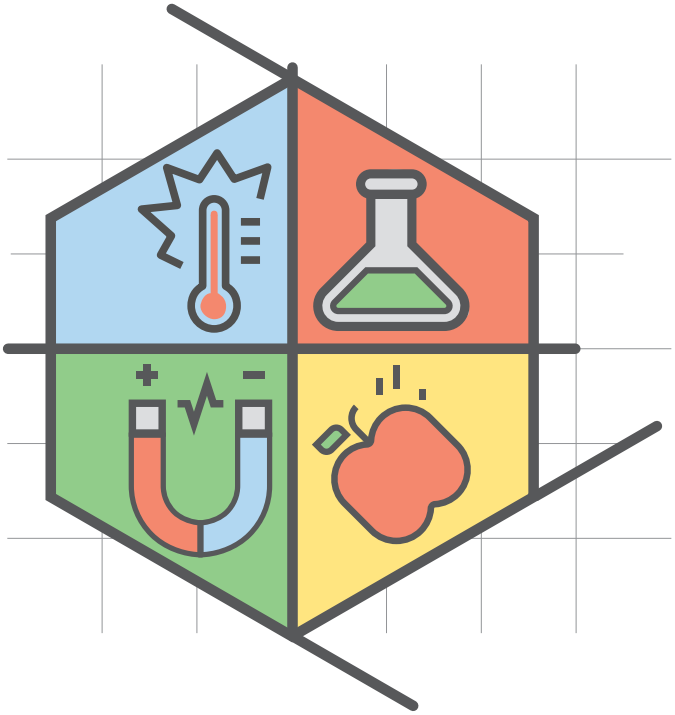
How Lesson 4 Supports Next Generation Science Standards

5. Structure and Properties of Matter

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

Performance Expectation	**Connections to Classroom Activity,** *Students:*
5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.	• Study the phenomenon of climate change and how food consumption is linked to impact on the environment.
SCIENCE & ENGINEERING PRACTICES	
Analyzing and Interpreting Data Asking Questions and defining problems Developing and Using Models Obtaining, Evaluating, and Communicating Information	• Ask questions about how production and consumption of certain types of foods can impact the environment. • Continue to refine their model and assess its eco-friendliness. • Obtain information about how climate change affects life in the PNW.
DISCIPLINARY CORE IDEAS	
ESS3.C: Human Impacts on Earth Systems Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments. -1)	• Investigate how certain types of food produce a greater carbon footprint than others have a greater impact on the environment.
CROSSCUTTING CONCEPTS	
Systems and System Models Energy and Matter	• Explore how their lifestyle and diet affects the local and global ecosystem. • Explore how production of certain foods requires a certain amount of energy to be used.

LESSON 5: And, Snack is Served!



STRATEGY: EVALUATE

In this lesson, students refine their snack recipes using computational thinking and all the information and data they have collected throughout the unit. Their models are finalized as they get ready for the STEM snack fair! Students finally prepare and share snacks with their 1st grade buddies.

Planning ahead!

Preparing for snack assembly: reach out to parents and volunteers a few weeks in advance asking for volunteers to help students with their snack assembly day in addition to volunteers that can help with purchasing the ingredients. Cafeteria staff are a great resource to use during this phase of the project. See if it is possible for your 5th graders to use the cafeteria space to assemble their snacks. If not, maybe it is possible for the cafeteria staff to visit your class and help?

SESSION 1:
Writing the ratio recipes

Warm-up

Tell students that before we make our snacks, we will have to figure out the different parts of the snack and how they will work together to create the healthy and delicious snack. Ask students if they have ever used a recipe. What is a recipe? Was it helpful? Why or why not? Why would it be helpful for us to create recipes for our snacks? Have students work with their teams to brainstorm the ingredients they plan on using. Students should already have a list going based on their previous work and refining their ideas.

Main activity

Have students work in their teams to make a recipe for their snack using this template. How much of each ingredient would they plan on using? What fraction of the main snack would each ingredient be? Have students create an initial diagram showing the fraction make-up of their snack. It may be helpful to show them this sample to clarify what is expected. Do not over-explain, as it is great if students make mistakes that they can learn from.

Materials Needed

Student devices with internet access

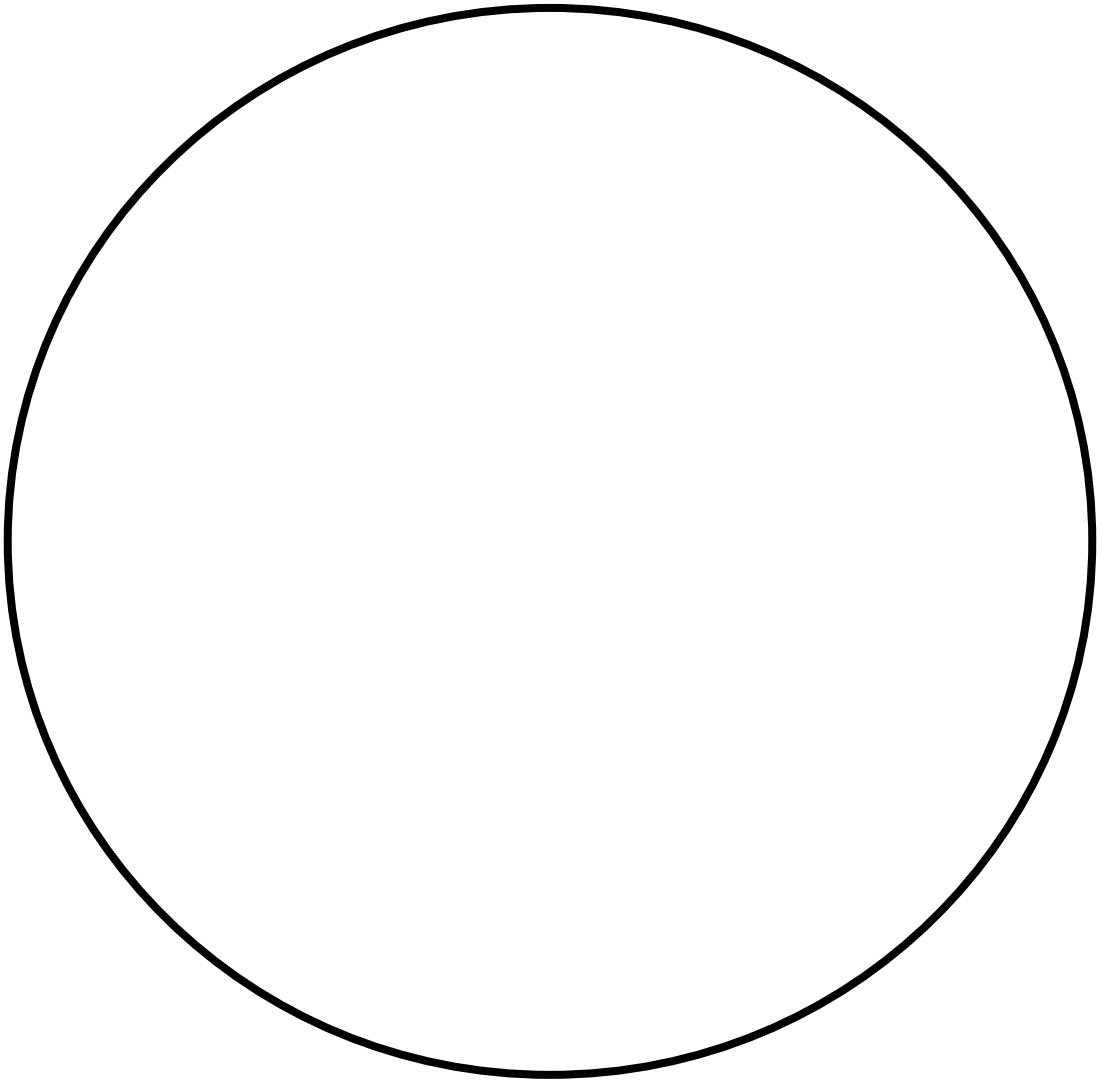
Snack Recipe Template

Delicious Snack Recipe

Name of Snack: _____

In the plate below, use lines to draw what portion of your snack will include certain ingredients.

Use fractions to label/describe the amounts you have chosen.



Checking our plan.

Add up all the fractions from your recipe above.

Do your fractions all add up to 1? If not, what can you adjust to make them add up to 1.

SESSION 2:
Refining the recipes

Warm-up

Tell students that we are going to refine our recipes further by deciding what measurements and how much of each ingredient we will be using. Make sure that students know how many 1st graders they are making their snack for (if your class will have a potluck-style share with the 1st graders, then they might want to make larger quantities, but if they are catering their snack to just a small group, then they would make a smaller portion).

Career connection: Master Chef

A chef, or a cook, is a person who prepares recipes and food for people at restaurants. Master Chefs usually come up with the perfect recipes by coming up with the right combination of ingredients in the right amounts. They also come up with cool techniques to help their food taste especially amazing!

Materials Needed

- The Secret Recipe thinking tool

Main activity

This template is a thinking tool that will help students make sense of their measurements. Feel free to modify the template to fit your students' needs. Tell students that unit conversions are things that even adults struggle with and it is normal to feel frustrated. Challenge students to try to match the fractions they decided on with real-life measurements. It may be easiest if students start by using 1 cup as the measurement of the main ingredient.

After a session of struggling, have students team up with another group and go through the Charette Protocol:

1. Share your design solution and let the partner team know what you'd like help with.
2. Stay quiet and let them talk through your problem.
3. When you feel that you got what you needed, thank them for their time.

Wrap-up

Give students time to return to their teams and fine tune their recipes. You may want to give students an additional mini-session to work on their recipes if they need the time. Have students share the strategies they used to come up with their refined recipes. If you feel that students are frustrated and need additional support pause after this session and model an example.

The Secret Recipe

Ingredient (hint: it may be easier to start with the ingredient you have most of)	Original Fraction of recipe	What measurement will we use? (ex. Cups, teaspoons, tablespoons, etc.)	How much of this measurement will we use?

U.S. Liquid Volume Measurements

Cups	Fluid Ounces	Tablespoons	Teaspoons
1	8	16	48
3/4	6	12	36
1/2	4	8	24
1/3	2 2/3	5 tbsp + 1 tsp	16
1/4	2	4	12
1/16	.5	1	3

SESSION 3:
Model of the amazing snack

Warm-up

Ttell students that "we want to make sure that the 1st graders know how much thought, research, and investigation went into creating their snacks! We will create a poster or google slide to share with them so they understand how hard we've worked!" This poster or slide will be up in the background as the 1st graders will be eating the snacks.

Career connection: Marketing Manager

A marketing manager develops and oversees efforts to market and advertise a product or products. Its their job to help get the word out about how great the product is so that people will want to buy it! In this case, you want to know how much research and thought was put into the creation of the snacks for the 1st grade buddies!

Main activity

Students will be creating a model to show how delicious and nutritious their snack is. Students should use the model they have been working on throughout the unit as a basis for this model. Give students a session to create a poster or one slide that shows:

1. The components of the snack, or the different parts that make up the snack.
2. At least 3 reasons why the snack is nutritious and delicious!

Wrap-up

Facilitate a gallery walk where students in your class can see each other's models. The excitement should be building, as the snacks are almost served!

Materials Needed
Students' models

SESSION 4:
Get cooking!

Recruiting volunteers: Be sure to communicate with parents and families who had expressed interest in joining the snack making-party. Coordinate with the first grade teachers to pick a time for the actual snack eating so that the fifth graders can be ready with their snack a few hours before. Make sure you have access to a refrigerator if needed (ex. for a fruit salad).

Teacher Prep: Ask volunteers/aids to help with the set up

Warm-up

The day is finally here and students will be creating the snack for their 1st grade buddies! Have one volunteer supervise each group (or 2 groups) of students. Have students wash their hands thoroughly before starting the cooking. Make sure students know that tasting is not allowed during the meal prep process. Ask that the adult volunteers help teams with chopping if needed (in case students are making a salad of some kind).

Main activity

Give students time to put together their snack.

Wrap-up

Ask students to prepare the snacks for delivery by covering with plastic wrap or foil or a reusable lid. Refrigerate snacks if needed.

Materials Needed

These materials are not included in the ESD kit and will need to be borrowed from the cafeteria:

Ingredients for students' snacks.

Large mixing bowls.

Knives to chop ingredients

Cutting boards to cut ingredients

Serving spoons for mixing

Aluminum foil or saran wrap for covering snacks

SESSION 5:
STEM snack fair! Snacks are served!

The exciting time is here! Celebrate your students' success!

Snack-time for the 1st graders can be implemented in a variety of formats. Here are some ideas:

Snack gallery-walk: The fifth graders set up their snack "booths" in a large area (ex. cafeteria). Their diagram of their snack (on poster) is next to or behind them and their snack bowl is set on a table. First graders grab a bowl when entering the gallery and can circulate and grab a small amount of snack. Fifth graders are ready to explain why the snack they created is healthy. (note: you may want to have the fifth graders practice explanations about their snack in advance). Bring the whole group together at the end and let the first graders share what they liked about the experience. Thank your class for their hard work!

Chef's and their tables: If students were creating their snacks for a small specific group of students, have the first graders sit in those groups, then have the fifth graders bring their snacks to the specific tables. Have the fifth graders share the process of the snack creation with the first graders who are enjoying their snack. Bring the whole group together at the end and let the first graders share what they liked about the experience. Thank your class for their hard work!

Snack Delivery: If it is not possible to coordinate a common time for the two grades to meet, have the fifth graders prepare their snacks and have them delivered to the first grade classrooms. Also have students models of the snack delivered so the first graders can see how much thought was put into the snack! Ask the first grade teacher if it is possible to get some of the first graders' appreciative thoughts on paper for the fifth graders to see. Thank your class for their hard work!

Materials Needed

Prepped snacks

Plates and forks

Students' finalized models to be posted in space where 1st graders are eating

How Lesson 5 Supports Next Generation Science Standards

5. Structure and Properties of Matter

The materials/lessons/activities outlined in this activity are just one step toward reaching the Performance Expectations listed below. Additional supporting materials/lessons/activities will be required.

Performance Expectation	**Connections to Classroom Activity,** *Students:*
5-PS1-3 Make observations and measurements to identify materials based on their properties.	• Refine their final model of the perfect snack for their 1st grade buddies and 1) finalize their recipes 2) communicate the components of their recipes 3) explain how the different properties of their snack make it fantastic for the taste buds and for health.
SCIENCE & ENGINEERING PRACTICES	
Using Mathematics and Computational thinking Developing and using models Obtaining, evaluating and communicating information Designing a solution	• Use computational thinking and mathematics to create recipes for their snacks which have appropriate ratios of ingredients and standardized measurements. • Refine their final model of the perfect snack and actually cook it. • Communicate how their snack was created and why it is nutritious. • Cook and present their amazing snacks (solution) to their intended audience.
DISCIPLINARY CORE IDEAS	
PS1.A Structure and Properties of Matter: Measurements of a variety of properties can be used to identify materials. PS1.B: Chemical Reactions	• Finalize their snack plans and articulate the quantities and characteristics of the various components of their snack. • Articulate the physical and chemical process of creating the snack (chopping, cooking, and chilling) are included in the recipes of the snack.
CROSSCUTTING CONCEPTS	
Scale, Proportion and Quantity Energy and Matter	• Culminate by demonstrating their understanding of proportions and quantities needed to create a snack for their first grade buddies • Explore how certain foods composed of certain ingredients can be nutritious and provide energy for the body.