



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 5 Science Unit 1 Sample Lesson “What is Air?” Matter and Its Interactions April 2023

The SIPS Grade 5 Science Unit 1 Sample Lesson “What is Air?”, Matter and Its Interactions was developed with funding from the U.S. Department of Education under the Competitive Grants for State Assessments Program, CFDA 84.368A. The contents of this paper do not represent the policy of the U.S. Department of Education, and no assumption of endorsement by the Federal government should be made.

All rights reserved. Any or all portions of this document may be reproduced and distributed without prior permission, provided the source is cited as: Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project. (2023). SIPS Grade 5 Science Unit 1 Sample Lesson “What is Air? ”, Matter and Its Interactions. Lincoln, NE: Nebraska Department of Education.

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

Purpose & Use Statement: *This sample lesson was developed for state and local administrators and teacher leaders (e.g., curriculum directors, instructional facilitators, professional learning specialists) to (1) illustrate an example of an instructional lesson developed using a principled design approach, and (2) support accompanying process documentation about how to use the SIPS unit as an instructional framework to intentionally design high-quality lessons in an aligned curriculum, instruction, and assessment system. This sample lesson should be evaluated and refined, as necessary, to align appropriately with a standards-based curriculum, instruction, and assessment system prior to its use. Additionally, teachers should refine this lesson to meet the local, cultural, and individual needs of the students.*

Desired Results

Overview of the Learning Goals

In this lesson, students experience a phenomenon and then begin the process of developing a particle model of matter focused on air. Students gather evidence to support the development of an explanation that matter is made of particles too small to be seen, communicate their thinking through diagrams and text, and make observations about the mixing of saliva and air in a mouth.

Connections to Prior Learning

DCI

- **Prior DCI Learning from K-2 (from NGSS Appendix E: DCI Progression within NGSS; pg. 7)**
 - Matter exists as different substances that have observable different properties.
 - Different properties are suited to different purposes.
 - Objects can be built up from smaller parts.
 - Heating and cooling substances cause changes that are sometimes reversible and sometimes not.
 - Matter can change states (solid, liquid, gas) when heated, cooled, and/or mixed [P2-PS1-1] (listed as a prior understanding Big Idea in Unit 1).

CCC - Cause & Effect

- **Prior learning from K-2:** Students are expected to understand that events can be described in terms of cause(s) and effect(s) and have some experience identifying causes and/or effects.
 - In Grades K-2, students learn that events have causes that generate observable patterns. They design simple tests to gather evidence to support or refute their own ideas about causes [Appendix G].
- **Prior learning from this grade band (e.g., Grades 3 & 4 and/or prior SIPS Grade 5 units):** During Grades 3-5, students are expected to become adept at identifying/testing causes and effects and become aware that events can be correlated, but not causally related.
 - Multiple Grade 3 and Grade 4 PEs use this CCC, so students will likely have some experience with the Grades 3-5 CCC elements, prior to starting Grade 5 and Unit 1.
 - An example Grade 4 PE that uses the same CCC element as the 5-PS1-4 CCC (i.e., students will have had experience with this CCC if they were previously taught this Grade 4 PE) is: *4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.*

CCC - Scale, Proportion, & Quantity

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

- **Prior learning from K-2:** Students are expected to have experience describing objects in terms of a property that can be described using relative scales (e.g., bigger than..., smaller than...) and using an absolute scale to describe the property of length.
 - In Grades K-2, students use relative scales (e.g., bigger and smaller; hotter and colder; faster and slower) to describe objects. They use standard units to measure length [Appendix G].
- **Prior learning from this grade band (e.g., Grades 3 & 4 and/or prior SIPS Grade 5 units)**
Minimal/not applicable:
 - Only 1 PE (3-LS4-1) in Grades 3 and 4 use the SPQ CCC and it is not directly relevant/preparatory for the CCC's use in the two Grade 5 PEs for this unit.

SEP- Developing and Using Models

- **Prior learning from K-2:** Students are expected to have had opportunities to develop models (i.e., diagrams, drawings, physical replicas, dioramas, dramatizations, or storyboards) that represent concrete events. More specifically, students should be able to:
 - Distinguish between a model and the actual object, process, and/or events the model represents.
 - Compare models to identify common features and differences.
 - Develop and/or use a model to represent amounts, relationships, relative scales (bigger, smaller), and/or patterns in the natural and designed world(s).
- **Prior learning from this grade band (e.g., Grades 3 & 4 and/or prior SIPS Grade 5 units):** During Grades 3-5, students are expected to build and revise simple models and use models to represent events and design solutions.
 - 4 other PEs in Grades 3 and 4 use the practice of modeling. They are: 3-LS1-1, 4-PS4-1, 4-PS4-2 and 4-LS1-2.

SEP- Asking Questions and Defining Problems

- **Prior learning from K-2:** Students have had opportunities in the context of asking questions about systems and defining a simple problem. More specifically, students should be able to:
 - Define how a new or improved object or tool can be developed.
- **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students should progress in their ability to define problem statements and to identify how objects or tools can be used to address the problem [Appendix F].
 - 4 PEs in Grades 3 and 4 use this practice. They are: 3-PS2-3, 3-PS2-4, 4-PS3-3, and 3-5-ETS1-1.

SEP- Analyze and Interpret Data

- **Prior learning from K-2:** Students are expected to have had opportunities to collect, record, and share observations. More specifically, students should be able to:
 - Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
 - **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students are introduced to quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
-

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

- 4 PEs in Grades 3 and 4 use this practice. They are: 3-LS3-1, 3-LS4-1, 3-ESS2-1, and 4-ESS2-2.

SEP- Obtaining, Evaluating, and Communicating Information

- **Prior learning from K-2:** Students have had opportunities to use observations and texts to communicate new information. More specifically, students should be able to:
 - Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).
 - Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.
 - Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
 - Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.
- **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5 students are expected to progress to evaluating the merit and accuracy of ideas and methods [Appendix F].
 - Two PEs (3-ESS2-2; 4-ESS3-1) focus on obtaining, evaluating, and communicating information in the domain of earth and space science.

Key Vocabulary

Students build conceptual meaning with and use key tier II and tier III vocabulary terms as they make sense of phenomena and phenomena-based design problems. This is not an exhaustive list of terms and should be reviewed and modified by educators, as appropriate.

- Matter
- Model
- Particle Arrangement
- Particle

Targeted Stage 1 Learning Goals

Acquisition Goals (AG)

A3: Conduct an investigation to measure and/or qualitatively describe the properties of substances.
A4: Develop or use a model that shows that a substance, regardless of the quantity, is made up of particles too small to be seen.
A5: Construct an explanation to support the claim that substances are made up of particles too small to be seen.
A7: Obtain, evaluate, and communicate information about how small particles that make up matter can be detected.
A8: Make observations and measurements to produce data about what happens when two (or more) substances are mixed.

Common Core State Standards (CCSS):

W.5.7	MP.2
5.MD.C.3	

Enduring Understandings (EU)/ Essential Questions (EQ):

EU1/EQ1

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<input checked="" type="checkbox"/> Analyze & Interpret Data <input checked="" type="checkbox"/> Ask Questions <input type="checkbox"/> Construct Explanations <input type="checkbox"/> Define Problems <input type="checkbox"/> Design Solutions <input checked="" type="checkbox"/> Develop & Use Models <input type="checkbox"/> Engage in Argument from Evidence <input type="checkbox"/> Mathematics & Computational Thinking <input type="checkbox"/> Obtain, Evaluate, & Communicate Information <input type="checkbox"/> Plan & Carry Out Investigations	<input checked="" type="checkbox"/> PS1. A: Structure and Properties of Matter <ul style="list-style-type: none"> Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects (5-PS1-1). 	<input checked="" type="checkbox"/> Cause & Effect <input type="checkbox"/> Energy & Matter <input type="checkbox"/> Patterns <input checked="" type="checkbox"/> Scale, Proportion, & Quantity <input type="checkbox"/> Stability & Change <input type="checkbox"/> Structure & Function <input type="checkbox"/> Systems & System Models

 **Formative Assessment Opportunities**

Monitoring	Success Criteria	Possible Instructional Adjustments
<ul style="list-style-type: none"> Listen to student responses about cloud formation to gain insight into students' notions on states of matter. As students share their questions for the driving question board, note relevant questions that may not already be part of future instruction plans and consider how to incorporate these questions into the learning. 	<p>Students can:</p> <ul style="list-style-type: none"> Make observations and generate questions about a scientific phenomenon (making a cloud in your mouth). Make appropriate observations and/or measurements to produce data on the properties of substances before and after they are mixed. 	<ul style="list-style-type: none"> Have students turn and talk to discuss their thinking first, giving students an opportunity to collect their thoughts, and then have them share with the whole class. Have students write down their questions before sharing them with the entire group on sticky notes.
<ul style="list-style-type: none"> Monitor student discussions in small groups as they engage with the syringe activity and use questions to encourage them to think about what evidence they have that air is in the syringes and how might that connect back to the question "Is air matter?" 	<p>Students can:</p> <ul style="list-style-type: none"> Make observations on the physical characteristics of air and document those observations. Recognize that air takes up space and has weight, therefore it is matter. Identify the difference between air and water's compressibility and express 	<ul style="list-style-type: none"> Place students in heterogenous groups where they can support each other, be supported, and all participate in the learning experience. Cycle around the room and encourage all students to be "hands-on" with the learning experiences.

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

-
- | | | |
|--|---|---|
| <ul style="list-style-type: none">• As students share, take note of their understandings and consider how incomplete understandings can be supported in <i>Zooming in On Air</i> and other future lessons. | <p>that understanding in a simple model.</p> <ul style="list-style-type: none">• Accurately identify and/or describe how an instrument can be used to determine the properties of substances.• Accurately describe the procedure for an investigation to determine the identity of a substance.• Make appropriate observations and/or measurements to produce data that will help identify a substance.• Draw appropriate conclusions from data about the identity of a substance. | <ul style="list-style-type: none">• Ask probing questions to encourage students to add detail to their annotated drawings.• Use the annotated drawings handouts for students who need additional support.• Encourage students to utilize the annotated drawing poster you have created when they have questions about the drawings.• For students with language expression challenges, encourage them to create a drawing and explain their drawing orally using a recording device. Then have those students use their oral recording to support them as they write down their thinking.• To support students who may be new to thinking between two scales, teachers should utilize questions that encourage students to consider how the evidence they are gathering connects with what is happening inside the gas. “What do you think it means that we can’t see the gas, but we can squeeze it? What is going on inside the syringe? How can we explain the difference between liquids and gasses in the syringe if we were to zoom way in? What might be happening |
|--|---|---|

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

on the microscopic (too small to see) scale?"

Instructional Plan

Lesson Overview

In this lesson, students observe a discrete phenomenon, [How to Make a Cloud in Your Mouth](#), to observe the vaporization of water in a human mouth. They will record their thinking about this phenomenon and then begin to explore the physical processes at work through a series of activities, documenting their thinking in annotated drawings. They will use their learning in this lesson and data collected in later lessons to develop a more complete explanation of the phenomenon and to support the particle theory of matter model.

Materials & Set-Up


- Video
 - [How to Make a Cloud in Your Mouth](#)
- Handouts
 - [Predicting the Compressibility of Water and Air](#)
 - [Heating and Cooling Air](#)
- Chart paper
- Clear $\frac{1}{4}$ in plastic tubing 16 in long, 2 per group
- 12cc syringes, 4 per group
- 4 16 in balloons
- Double pan balance
- Capped 12cc syringe with water, 1 per group
- 2-liter plastic bottle
- Dish soap
- Bucket with warm water
- Bucket with cold water
- Annotated drawing poster
 - Create this poster using chart paper in advance of class. For guidance on the poster, see [Model for an Annotated Drawing Poster](#).

Anchor or Investigative Phenomenon: Using baking bread (or another relevant phenomenon) as an example, the class examines the impacts of physical and chemical changes, explores the properties of different substances, and gathers additional to explain the anchoring phenomenon using evidence and reasoning.

For Segment One, students investigate the phenomenon [How to Make a Cloud in Your Mouth](#) to help them better understand the complex processes of baking bread.

Driving Question: How am I able to make a cloud in my mouth?

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

	Teacher Does	Students Do
<p>Engage</p> <ul style="list-style-type: none"> ☑ Introduce object, event, phenomenon, problem, or question ☑ Build background knowledge ☑ Facilitate connections 	<p>Begin by demonstrating to students how to make a cloud in their mouths. If you are unable to conduct the demonstration in class, students could watch How to Make a Cloud in Your Mouth stopping at 1:13. It is important to stop at 1:13 because the video goes on to explain the phenomenon.</p> <p>Facilitate a discussion where students share their thinking about what exactly is happening here, and how this phenomenon works. Students may share ideas such as, “It must be cold because when it is cold outside, I can see my breath. The cloud is made up of my spit which is floating on my breath. My breath is full of water, I’ve seen it when I breathe on glass, but normally you can’t see it. Here you can see it because there is extra water because we puffed out our cheeks.”</p> <p>For students who share ideas that are close or part of explaining the concept encourage them to consider what it means for the anchoring phenomenon. “How might gasses be part of baking? And how might that connect with our problem? What about liquids changing into gasses? What else do we need to know about this phenomenon to help us understand what happened with the bread?”</p>	<p>After viewing the opening demonstration and trying it themselves, students share their predictions about what is happening that causes this phenomenon to occur.</p> <p> As a class, students and the teacher work to develop a driving question board for this phenomenon. Students should generate questions about the phenomenon that they can answer that will help them explain each of the steps of making the cloud and add those questions to the driving question board.</p>

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

After students share and document their ideas about how the cloud formed as a class, develop a [driving question board](#) for this smaller, specific phenomenon. Ask students what questions we need to answer if we are going to figure out how we were able to form a cloud in our mouths. Have students document their questions on sticky notes and as you discuss their questions, encourage them to add them to the driving question board.

Explore

- Explore object, event, phenomenon, problem, or question
- Guided exploration with hands-on activities

The explore phase could be taught to the whole class where all students move through the activities together, or as a set of stations, where students rotate through the activities and gather data. For teachers with limited equipment, using stations would cut down on the equipment required. In this phase of the lesson, students will explore the properties of air in order to gather evidence to understand what is occurring at the molecular level. For example, the space between particles in a gas allows for it to be relatively easily compressed, but not so for liquids. Gathering evidence at one scale to understand a different scale is likely a new idea for students and students may need additional support moving between the different scales. Start the next phase by asking students “What is in your mouth when you puff out your cheeks?” Encourage students to

Students **brainstorm ideas** of what is in their mouths during the activity, and then share their ideas with the class through a class discussion.



Next, students work in small groups to **explore the properties of air** using the syringe setup provided by the teacher. Students can document their thinking as they use the handout in Appendix A or for students who need a greater challenge, they can follow an open inquiry model where they explore the three questions but without guidance on the structure of how they explore the resources.

As a class, students **brainstorm different properties of air** and share those as part of a class discussion.

Next, students **make predictions on the compressibility of air and water** using the handout [Predicting the Compressibility of Water and Air](#). After making

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

consider not just the physical things (tongue/teeth), but also what is causing the cheeks to puff out. If necessary, use questioning to guide students to air and water/saliva.

Explain to students that in this lesson, they are going to explore and experiment with air. We will look at answering three questions: 1. “Is air matter?”, 2. “What are some properties of air?”, and 3. “Is air compressible?”

Provide students with the handouts in Appendix A for students who need the added structure and scaffold.

Alternatively, students could explore in an open inquiry setup where they are tasked with finding evidence to support the answers to the selected driving questions for the activity.

Encourage students to work in their small groups independently on *Is Air Matter?* which utilizes syringes and balloons. At the close of this activity, bring the class together to discuss their evidence and share as a class before having students return to complete their claim with evidence to close out *Is Air Matter?*

To support connections between the activities, use chart paper to create a table labeled, “Properties of Air.” Ask students what properties they think air has. Facilitate a class discussion where students are encouraged to share ideas and

their predictions, students work with the syringes to **test their predictions and record their evidence.**

As a class, **students develop a consensus annotated drawing** that explains the compressibility of air but not of water. Students are expected to have an incomplete explanation as they have not yet been introduced to the concept of particles. After developing a class consensus, **students document their annotated drawing** either on a handout or in their scientific notebooks.

The class **discusses the observed properties of air, and students brainstorm different ideas to add to the poster**, with a focus on the *Is Air Compressible* activity.

Then, students **observe a demonstration of the heating and cooling of air** by the teacher. Using the scaffold [Heating and Cooling Air](#), students work in small groups to **create their own annotated drawings**, referring to the annotated drawing poster to ensure that they include all of the necessary elements of an annotated drawing.

Finally, the class comes together to **share their annotated drawings** with other groups and get feedback on their drawings.

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

add those ideas to the chart. Encourage students to utilize all their senses when considering the properties of air.

After students have had a chance to document their thinking in *Is Air Matter?* Bring the class together to discuss the words, compress and compressible. Once students are familiar with these terms, distribute the handout [Predicting the Compressibility of Water and Air](#). Have students record their thinking on the handout, then have them share in their small groups what they are thinking.

Next, have students get back into their small groups and explore the activity *Is Air Compressible?* in Appendix A. Again, the teacher can increase the rigor of the activity by switching to an open inquiry structure and only providing students with the question and resources to explore without the guiding scaffold.

After students have experimented with the two plungers, bring the class together to introduce the idea of an [annotated drawing](#). Use the poster you have created to help facilitate this. Annotated drawings are resources students can use when developing multimodal scientific explanations and explanatory models. Facilitate a class discussion where students create an annotated drawing for the two syringes. Encourage

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

students to use the magnifier and add labels, arrows, and text explanations to the class drawing. After the class creates a consensus model, have students document that model using either the handout or recording it in their science notebooks. Note: students have not been introduced to the idea of particles yet. When they zoom in on the drawings they may or may not consider the idea that there are tiny particles moving around. Most likely they will have a different idea and this drawing provides an important formative assessment opportunity to prepare for *Zooming in on Air*. After students have completed their annotated drawings, revisit the “Properties of Air” chart and discuss as a class, adding any new properties (air is compressible) to the chart. Finally, using the 2-liter bottle, warm and cold water, and dish soap, demonstrate to students how air will expand or contract when heated or cooled. Begin by asking students to make predictions about what will happen. They can record their thinking on their handouts or in scientific notebooks. As you go through the demonstration, pause and have students record their observations.

Provide students with the annotated drawing scaffold [Heating and Cooling Air](#), and have students work in their small groups to create a group

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

annotated drawing. Remind students of the key elements of an annotated drawing by referring to the poster you created. As students work in their small groups, cycle between groups and use questioning to encourage students to develop annotated drawings that are as complete as possible.

After the class has completed their annotated drawings encourage students to share their group drawings and provide each other feedback. Then revisit the Properties of Air poster and add additional properties to the poster based on the demonstration from today.

Explain

- Explain understanding of concepts and processes
 - Introduce new concepts and skills to seek conceptual clarity
-

Elaborate

- Build on or extend understanding and skill
 - Apply concepts in new or related contexts
-

Evaluate

- Self-assess knowledge, skills, and abilities
 - Evaluate student development and lesson effectiveness
-

Closing

Finally, close the class and preview *Zooming in on Air* by asking the class to complete an exit ticket prediction to the question, “What do you think is happening to air at the microscopic (too small to see) level when the air is heated, cooled, or compressed?” Use these tickets to gauge student understanding in preparation for *Zooming in on Air*.

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

Differentiation Strategies and Resources

“Universal Design for Learning (UDL) is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn” (CAST, 2022). Taking time to reflect on prior instruction when planning for accessible, differentiated, and culturally responsive instruction for diverse learners and culturally diverse classrooms serves to identify ways to improve future instructional practices. The UDL Guidelines provide a framework for this reflection. The guidelines include three principles as ways to focus on variety and flexibility in instructional practices:



Multiple Means of Engagement







Multiple Means of Representation





Multiple Means of Action & Expression




By examining instruction and instructional materials through the lens of each of these principles, teachers can identify and thus reduce or remove barriers to diverse learners.

Learning Opportunities	UDL Principle	Example Differentiation Strategies & Resources
Engage		
<i>Students observe a phenomenon and discuss its causes.</i>		<ul style="list-style-type: none"> • Encourage collaboration with partners and in groups. <ul style="list-style-type: none"> ○ Have students turn and talk about their ideas before sharing. ○ Encourage students to build on each other’s ideas during whole class discussions.
		<ul style="list-style-type: none"> • Supply or activate background knowledge. <ul style="list-style-type: none"> ○ Pose questions to encourage students to consider what they already know about water, clouds, and air as they discuss the phenomenon.
<i>Students generate questions they have to help them explain the phenomenon.</i>		<ul style="list-style-type: none"> • Provide choices. <ul style="list-style-type: none"> ○ Students generate questions based on what they are curious about. • Support self-reflection and evaluation. <ul style="list-style-type: none"> ○ Students consider their prior knowledge when generating questions.
		<ul style="list-style-type: none"> • Provide options for accessing instructional activities and materials. <ul style="list-style-type: none"> ○ Students can watch the teacher do the phenomenon, watch a video of the phenomenon, or attempt to do the phenomenon themselves.

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

		<ul style="list-style-type: none"> • Vary the ways for students to respond to questions or a task. <ul style="list-style-type: none"> ○ Students opt to document their thinking on sticky notes or to share orally.
Explore		
<p><i>Students work in small groups to explore the properties of air and gather evidence to explain the particle theory of matter.</i></p>		<ul style="list-style-type: none"> • Present clear and important goals and objectives. <ul style="list-style-type: none"> ○ Utilize the three questions to guide students' actions as they engage in the learning experiences. • Provide supports to help with managing information and resources. <ul style="list-style-type: none"> ○ Provide students with handouts to support their development of annotated drawings. • Encourage collaboration with partners and in groups. <ul style="list-style-type: none"> ○ Be intentional about how groups are formed so that they include a variety of students (e.g., race, national origin, socioeconomic status, disability, etc.). ○ Ensure everyone has the means to contribute. For some this might be to assign a role that matches their strengths, for some, it might be to provide needed vocabulary on their AAC system, and for some, it might be to reduce the size of the group and allow options for seating (e.g., exercise ball). ○ Have a collaborative group work on a fun activity with the teacher modeling how to provide support to a student with a disability.
<p><i>Students create an annotated drawing in small groups.</i></p>		<ul style="list-style-type: none"> • Provide information in a variety of ways. <ul style="list-style-type: none"> ○ Students observe the properties of air in three different activities. • Emphasize key information. <ul style="list-style-type: none"> ○ Utilizing a class chart as well as individual charts will support students in identifying the key information. • Provide models and scaffolds to aid in comprehension. <ul style="list-style-type: none"> ○ Handouts on annotated drawings provide a starting point for students. The annotated drawing poster provides students with a place to refer to for what to include in the drawings. • Support transfer and generalization of skills and knowledge. <ul style="list-style-type: none"> ○ As students learn about the properties of air they should be encouraged to make connections back to the anchoring phenomenon.

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

		<ul style="list-style-type: none"> • Vary the ways for students to respond to questions or a task. <ul style="list-style-type: none"> ○ Annotated drawings provide an opportunity for students to document their thinking in words, drawings, and symbols. • Provide supports to help with managing information and resources. <ul style="list-style-type: none"> ○ Annotated drawings, class organizers, and science notebooks provide students with a process and system for organizing their learning.
<p><i>Bring the class together to discuss the words, compress and compressible.</i></p>		<ul style="list-style-type: none"> • Allow ownership of parts of instructional tasks. • Provide several options for students to practice the science vocabulary terms (e.g., use terms in a story, create a song about each, pair with illustrations that describe the term) and how to present what they did (e.g., perform live, record and share, with photos, written format, orally share).
		<ul style="list-style-type: none"> • Describe the meaning of vocabulary and symbols. • Create a word wall or a glossary for science and academic terms.

Resources

- [Let's Talk Science: Matter](https://letstalkscience.ca/educational-resources/backgrounders/introduction-particle-theory-matter)
[https://letstalkscience.ca/educational-resources/backgrounders/introduction-particle-theory-matter]
- [ACA Matter is Made of Tiny Particles](https://www.acs.org/education/resources/k-8/inquiryinaction/fifth-grade/chapter-1-investigating-matter-at-the-particle-level/matter-is-made-of-tiny-particles.html)
[https://www.acs.org/education/resources/k-8/inquiryinaction/fifth-grade/chapter-1-investigating-matter-at-the-particle-level/matter-is-made-of-tiny-particles.html]
- [Victoria \(Canada\) Dept. of Education—The Particle Theory](https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/particletheory2.aspx)
[https://www.education.vic.gov.au/school/teachers/teachingresources/discipline/science/continuum/Pages/particletheory2.aspx]
- [BBC—The Particle Model](https://www.bbc.co.uk/bitesize/guides/z3gxdxs/revision/3)
[https://www.bbc.co.uk/bitesize/guides/z3gxdxs/revision/3]

Core Text Connections

- Walliman, D. (2016). Professor Astrocat's atomic adventure.
- Kelsey, E. (2012). You are stardust.
- Berne, J. (2016). On a beam of light: A story of Albert Einstein.
- Wells, R. (1995). What's smaller than a pygmy shrew?
- [What's Matter? – Crash Course Kids](#)

Science Grade 5
Unit 1: Matter and Its Interactions
Sample Lesson: What is Air?
Suggested Time to Complete: 100 minutes

[<https://youtu.be/ELchwUllWa8>]

- [Bill Nye The Science Guy—Phases of Matter](#)

[<https://youtu.be/k3SJuoZgbfU>]

- [Particle Model of Matter—GenerationGenius](#)

[<https://youtu.be/Uk3uRSIcBaA>]

- [Part\(icles\) of Your World—Crash Course Kids](#)

[<https://youtu.be/npv74D2MO6Q>]

Appendix A: Sample Handout Materials

Center/Activity One: Is Air Matter?

Turn and Talk, Syringes:

As a group talk about the question: Does air take up space?

Record your thinking here:

Setting Up, Syringes:

Use the clear tube to connect the two syringes like the teacher's set up. Make sure the plungers are in before connecting them and that there is some air in each syringe.

Looking at your setup, discuss this question with your group: What are the components of this system?

Draw a picture of your setup with labels.

Working with Syringes:

Explore with the system. As you do talk about what you notice/observe. What do you see? What do you feel? What do you hear? Record your observations below:

Claim:

Air _____ (does/does not) take up space. (Complete the sentence.)

Evidence:

What evidence did you find to support your claim?

Turn and Talk, Balloons:

As a group turn and talk to each other about the question, Does air have weight?

Record your thinking here:

Exploring Air in Balloons:

Use the balance to compare the weight of the two empty double balloons. How do they compare?

The two empty double balloons are the _____ (same / different) weight/s.

Now compare the weight of one of the empty double balloons to the double balloon filled with air. How do they compare?

The empty double balloons weigh _____ (more / less) than the double balloons with air.

What else do you notice/observe about the double balloons with and without air. Record your observations here.

Claim:

Air _____ (does / does not) have weight.

Evidence:

What evidence did you find to support your claim?

Claim:

Matter takes up space and has weight. Is air matter? Write your claim and evidence to support that claim below.

Center/Activity Two: Is Air Compressible?

Air in A Syringe:

To test our predictions, take a single syringe that has only air in it. (Disconnect it from the tube) Put the plunger into the 12cc mark. Cover the small opening and while it is covered push in the plunger. Experiment with what happens when you push in and let go. Record what you notice/observe below:

Now repeat this with a syringe filled with water. Your teacher will provide you with a capped syringe with water in it. Experiment with pushing it in and pulling it out. Record what you notice/observe below:

Turn and Talk:

In your small group talk about what you saw and what it means. Is air compressible? Write down what you think and give evidence to support your thinking.

Annotated Drawing One: Water and Air in the Syringe

Annotated Drawing:

Draw an annotated drawing below of the two syringes that helps answer these two questions:

- How do you explain the difference in the compressibility of air and water?
- What would you see at the particle level to explain what is going on?