

How Do Our Noses Smell Things?



Daily Do 

Welcome to NSTA's Daily Do

Teachers and families across the country are facing a new reality of providing opportunities for students to **do** science through distance and home learning. The **Daily Do** is one of the ways NSTA is supporting teachers and families with this endeavor. Each weekday, NSTA will share a sensemaking task teachers and families can use to engage their students in authentic, relevant science learning. We encourage families to make time for family science learning (science is a social process!) and are dedicated to helping students and their families find balance between learning science and the day-to-day responsibilities they have to stay healthy and safe.

What is Sensemaking?

Sensemaking is actively trying to figure out how the world works (science) or how to design solutions to problems (engineering). Students **do** science and engineering through the [science and engineering practices](#). Engaging in these practices necessitates students be part of a learning community to be able to share ideas, evaluate competing ideas, give and receive critique, and reach consensus. Whether this community of learners is made up of classmates or family members, students and adults build and refine science and engineering knowledge together.

Materials

Items: A small medicine syringe, a plastic bottle with a screw cap, or a tire pump (if you can cap the end)

Article: Discover Magazine – Sense of Smell in Humans is More Powerful Than We Think.

Handout: Activate Learning – IQWST unit - How Can I Smell Things from a Distance?

Informational Handout: What Are Dinner Table Discussions (DTD's)? & Dinner Table Discussion – Guidance for Families

Optional Handout: Science and Engineering Practices – Developed by NSTA using information from Appendix F of the Next Generation Science Standards

Collection of Resources: Direct links to all videos, articles, handout materials, and other resources – <https://bit.ly/DD-04-09-2020>

Introduction

In today's Daily Do, *How do our noses smell things?*, families participate in a **Dinner Table Discussion** about the sense of smell. This sensemaking discussion has four parts:

1. Families raise the question "**How do our noses smell things?**" by introducing the phenomenon of being able to smell what's for dinner (or any meal when the family is together).
2. Families ask students to explain what they currently understand about the sense of smell.
3. Families prompt students to generate questions about the sense of smell.
4. Families read an article together to find some answers to their questions about the sense of smell.

How do our noses smell things?

The mechanisms why which the humans receive and process sensory information are scientifically complex, but equally fascinating. Senses are things we commonly take for granted - especially the sense of smell. This Dinner Table Discussion is focused on exploring what family

members know about the sense of smell and the pursuit of common questions associated with those.



Introducing the Phenomenon & Raising the Question

There are 2 options for introducing this phenomenon:

1. Keep what is for dinner a secret from your children. See if they can guess what it is from the smell. Ask them leading questions such as:
 1. *What do you think is for dinner based on what you smell?*
 2. *Where were you when you smelled it first?*
 3. *What do you notice about the smell based on the distance you are from the food?*
2. At the dinner table, ask your children to think of their favorite food items and how they smell. Ask them more leading questions such as:
 1. *What memories do you recall when you think of that food?*

2. *What other foods smell good when they are cooked or baked?*
3. *What do you notice about the smell based on the distance you are from the food?*

Tell us what you know...

Encourage your children to explain to you what they know (or think they know) about how they are able to smell things.

Ask them to “*explain the science of how you smell something*”. Children will attempt many varieties of explanations, but our goal here is not to distinguish between right vs. wrong answers or ideas. Rather, we want to foster discussion about the “*how*” and the “*why*” of smell.

Ask follow-up questions to explanations such as:

“Can you tell me more about that?”

“How do you know that?”

What questions do you have?

You can say something like ***“It sounds like we have more questions than answers. What questions do you have about how we smell things?”***

Encourage children to ask as many questions as possible that are relevant to the discussion.

Common questions could include:

- How does our brain know what the smell is? How does our nose “talk to” our brain?
- How do some animals (like dogs) have a better sense of smell than others (like humans)?
- How do people have their “own scent”? Why does my pillow smell like me?
- How does the smell get to our nose?

Pursuing Common Questions

Read the Discover Magazine article linked here (as a family or individually) : [The Sense of Smell in Humans is More Powerful Than We Think](#). High school students will be able to read this article independently. Younger students will need more assistance.

After reading the article, ask your children the following questions:

- What is one new thing you learned that you didn't know before?
- Which of our original questions did we answer in our discussion and by reading the article?
- What other questions do you have about the sense of smell?
- What questions do you have about other senses?

Many students want to know, 'How does smell get in the air and move around?' To help students answer these questions introduce them to the idea that odors are a gas. To help students understand more about the properties of gas, have them engage in an activity from, *How Do We Smell Things From A Distance?*, a middle school unit from IQWST. This activity helps kids figure out how smells travel from a source to a nose.

Activity Guidance: This activity uses a syringe to get kids thinking about the properties of air, if you do not have a syringe available there are several options that you can use instead: a small medicine syringe, a plastic bottle with a screw cap, or a tire pump (if you can cap the end).

NSTA Collection of Resources for Today's Daily Do

NSTA has created a [How Do Our Noses Smell Things? collection of resources](#) to support teachers and families using this task. If you're an NSTA member, you can add this collection to your library by clicking ADD TO MY LIBRARY located near the top of the page (at right in the blue box).

Acknowledgment

Thank you to Activate Learning for allowing us to use a lesson from their IQWST unit, *How Do We Smell Things From a Distance?*.

Activate
Learning

IQWST[®]

*Investigating and Questioning Our World
through Science and Technology*

HOW CAN I SMELL THINGS FROM A DISTANCE?

Particle Nature of Matter and Phase Changes



*Student Edition
Introduction to
Chemistry 1 (IC1)
IC1 Smell SE 2.0.2
ISBN-13: 978-1-937846-93-0*

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ABOUT THE PUBLISHER

Activate Learning is a mission-driven company that is passionate about STEM education. We make it easy for teachers to teach with quality, investigation-centered science curriculum, tools, and technology.

For more information about what we do, please visit our website at www.activatelearning.com.

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IQWST

How Can We Model the Things Gases Do? Part 2

WHAT ELSE CAN GASES DO? AND DEVELOPING MODELS

What Will We Do?

We will use a large syringe to investigate two more characteristics of air. We will also create models of what we would see if we could look at the air inside the syringe up close.

Procedure

1. Fill the syringe with air by pulling the plunger back halfway.
2. Block the end of the syringe with your finger.
3. While keeping the end of the syringe blocked with your finger, push the plunger in as much as you can.
4. While still blocking the end of the syringe, pull the plunger back as far as possible, but not all the way out.

Creating Models

If you had a special instrument that would allow you to see inside the syringe, what would the smallest parts of air look like? Create models of what you would see if you focused on one tiny spot:

Model 1: When the syringe is filled with air

Model 2: After pushing the plunger in

Model 3: After pulling the plunger back

Draw a key that explains what the parts of your models represent.

The image contains three models of a syringe, each with a circular callout area for drawing a key. Model 1 shows a syringe with a callout on the barrel. Model 2 shows a syringe with a callout on the plunger and a downward-pointing arrow. Model 3 shows a syringe with a callout on the plunger and a downward-pointing arrow.

Model 1

Model 2

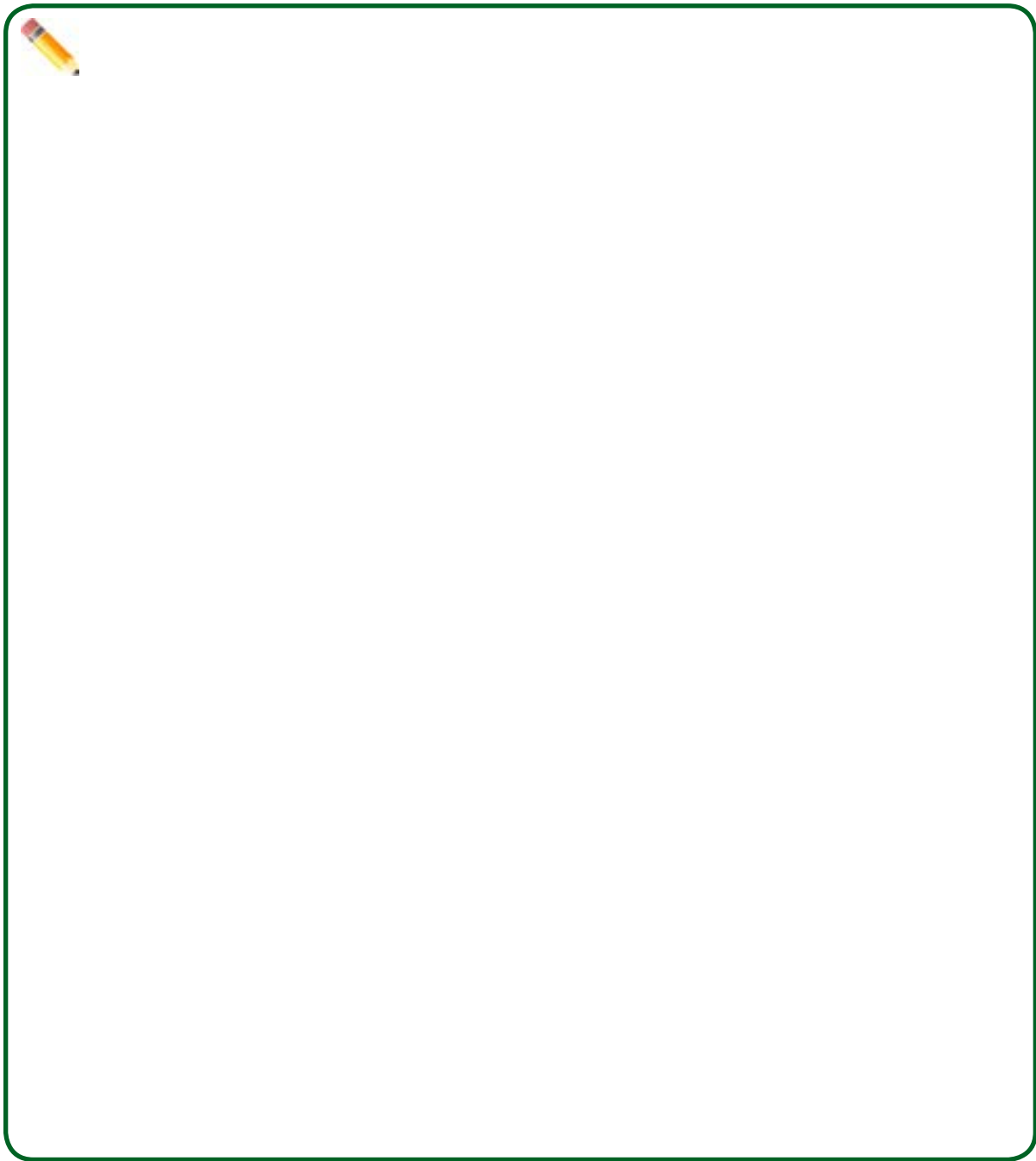
Model 3

HOW CAN I SMELL THINGS FROM A DISTANCE?

DEVELOPING AND USING A CONSENSUS MODEL

What Will We Do?

We will develop a consensus model and use it to explain the behavior of gases when they are not in the syringe.



HOW CAN I SMELL THINGS FROM A DISTANCE?

What Are Dinner Table Discussions (DTD's)?

This activity is called a Dinner Table Discussion (DTD). Dinner Table Discussions do not have to physically happen at the dinner table. Rather, they are intended to facilitate connections for the family around a discussion about science ideas wherever you may congregate for a meal. Whether you cook dinner at home or order take-out, the Dinner Table Discussions are centered around relevant science phenomena and raise common questions children have about the world around them. The goals of DTD's are to:

- (1) Foster connection among the family through discussion of relevant science ideas.
- (2) Prompt students and their families to think about what they currently know.
- (3) Help students and their families ask what they want to know more about.
- (4) Discover something new that moves everyone along the learning continuum of a particular science idea.

Like Daily Do's, these types of activities are considered "micro-learning experiences". They are not intended to replace classroom science learning, and are not intended to be used as "home school" stand-alone science lessons. They are not intended to result in being able to generate robust, complete scientific explanations of phenomena. Conversely, they are intended to move student thinking along the continuum of learning.

These are intended to be family-style discussions, with provided parent talk-moves, that stimulate thinking among family members and move everyone along the continuum of learning. Each dinner table discussion has these components to them linked below. These components provide fertile ground for the discussion to be authentic, phenomena-driven, rooted in science, and focused on **sensemaking**.

Dinner Table Discussion - Guidance for Families

Dinner Table Discussions have three main components. The following guidance will support you in facilitating your family discussion.

Introducing the Phenomena & Raising the Question

Our goal is to raise a puzzling question for students that does three things: (1) prompts them to think about what they currently know, (2) makes them ask what they want to know more about, and (3) helps them discover something new that moves them along the learning continuum.

Tell me what you know....

We want to foster children explaining what they think they understand to be true. These previous understandings are critical to exposing what they know and the questions they have. As they work to explain their current understandings, they will realize they don't know as much as they think, which will spur the generation of further questions.

What questions do you have?

In developing insufficient explanations for things, students generate authentic questions they have that are the pathway to discovering the answer. In other words, these are our explanatory questions. That, if we were able to investigate, we would understand more about what we currently don't understand. Our goal here is to generate lots of questions, but anticipate the common ones. The common questions are central to developing an explanatory idea, and we want to foster that environment by giving adult family members discussion prompts (talk moves) to facilitate the discussion for students as they work to articulate what they want to know more about.

Pursuing Common Questions

Our goal here is not to develop a robust and complete scientific understanding of a particular phenomenon. However, our goal is to help students/children understand a puzzling phenomenon more deeply than they do. Learning is a continuum, and our goal with these discussions are to move students further along the continuum; not get them to the end. The objective is to stimulate thoughtful discussion that is rooted in a scientific phenomenon and a scientific explanation.