# Connecting Social Issues and Human Health Inequities, Lesson 1

## Understanding Asthma

Alonna Smith, Lindsey Link
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| **Grade Level** | 9th – 12th Grade | **Time Frame** | 240-300 minutes |
| **Subject** | Science | **Duration** | 4-5 periods |
| **Course** | Biology I, Environmental Science | | |

## Essential Question

How do inequitable environmental factors affect human health?

## Summary

In this introductory lesson to the Connecting Social Issues and Human Health Inequities unit, students will explore asthma through a variety of station activities, videos, readings, and charts. In doing so, students will better understand what occurs in the respiratory system before, during, and after an asthma attack.

## Snapshot

**Engage, Part 1 (Unit Introduction)**

While watching a video clip, students record observations and questions. Student questions are documented on a Driving Questions Board.

**Engage, Part 2 (Lesson Introduction)**

Students create a model describing what lungs look like before, during, and after an asthma attack.

**Explore**

Students rotate through six stations with activities that include readings, videos, and short activities related to asthma and using inhalers.

**Explain**

As a whole class, students debrief from the station activities using guiding questions.

**Extend**

Students use a modified CUS and Discuss strategy to annotate while they read an article.

**Evaluate**

Students revise their lung models—or make new models—that include new information they've learned over the course of the lesson. Students also answer reflection questions.

## Standards

*Next Generation Science Standards (Grades 9, 10, 11, 12)*

**HS-LS1-2:** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
**HS-LS1-3:** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

*Oklahoma Academic Standards (Biology)*

**B.LS1.2:** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
**B.LS1.2.1:** Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.
**B.LS1.3 :** Plan and conduct an investigation to provide evidence of the importance of maintaining homeostasis in living organisms.
**B.LS1.3.1:** Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Outside that range (e.g., at too high or low external temperature, with too little food or water available) the organism cannot survive.

## Attachments

- Driving-Question-Board - Spanish.docx
- Driving-Question-Board - Spanish.pdf
- Driving-Question-Board.docx
- Driving-Question-Board.pdf
- Homeostasis-and-Its-Relation-to-Asthma-Understanding-Asthma - Spanish.docx
- Homeostasis-and-Its-Relation-to-Asthma-Understanding-Asthma - Spanish.pdf
- Homeostasis-and-Its-Relation-to-Asthma-Understanding-Asthma.docx
- Homeostasis-and-Its-Relation-to-Asthma-Understanding-Asthma.pdf
- Lesson-Slides-Understanding-Asthma.pptx
- Rubric-Understanding-Asthma - Spanish.docx
- Rubric-Understanding-Asthma - Spanish.pdf
- Rubric-Understanding-Asthma.docx
- Rubric-Understanding-Asthma.pdf
- Station-Cards-Understanding-Asthma - Spanish.pdf
- Station-Cards-Understanding-Asthma - Spanish.pptx
- Station-Cards-Understanding-Asthma.pdf
- Station-Cards-Understanding-Asthma.pptx
- Station-Journal-Understanding-Asthma - Spanish.docx
- Station-Journal-Understanding-Asthma - Spanish.pdf
- Station-Journal-Understanding-Asthma.docx
- Station-Journal-Understanding-Asthma.pdf
- The-Respiratory-System-Understanding-Asthma - Spanish.docx
- The-Respiratory-System-Understanding-Asthma - Spanish.pdf
- The-Respiratory-System-Understanding-Asthma.docx
- The-Respiratory-System-Understanding-Asthma.pdf

## Materials

- Lesson Slides (attached)
- Homeostasis and Its Relation to Asthma (attached; one per student)
- Station Cards (attached)
- Station Journal (attached; one per student)

- Rubric (attached; one per student)
- Driving Question Board (attached; one per student)
- Internet-connected student devices (one per student, if possible)
- For students' Lung Models (directions linked):
    - Empty plastic soda or water bottles (approximately 500 mL)
    - Scissors
    - Balloons (15-30 cm diameter if inflated)
    - Disposable gloves
    - Rubber bands
    - Clear Tape
    - Pushpins, thumbtacks, or safety pins
- Asthma Demonstration (directions linked)
    - Regular drinking straws (one per student)
    - Coffee stirrer (one per student)

# Engage, Part 1 (Unit Introduction)

Begin the lesson by displaying **slide 2** from the attached **Lesson Slides** as the students are entering the classroom.

Display **slide 3** and share the instructional strategy I Notice, I Wonder with students. Tell them that they are about to watch a video, and instruct them to use this strategy to record anything that they notice (their observations) or wonder (their questions). This is a good time for you to evaluate students' prior experience related to the topic of the video.

Display **slide 4** and share the segment from 2:53-6:24 of the following video: "Health Disparities, Focus on Asthma | Children's National Medical Center."

> **Teacher's Note: Playing the Video Segment**
>
> It is important for the unit, and this lesson, that you play only the segment of the video that has been noted. You and your students will revisit the video again later on in the unit.

Display **slide 5** and instruct students to talk with an Elbow Partner about what they wrote. During their conversations, students should discuss what is similar and/or different about what they recorded and add any new questions or observations that come up in their discussion.

Display **slide 6**. Walk students through creating a Driving Question Board together. Use the observations and questions they come up to do so.

# Engage, Part 2 (Lesson Introduction)

Display **slide 7** and share with students the instructions for creating an initial model of the respiratory system before, during, and after an asthma attack. Each student should create their own individual model. Pass out the attached **The Respiratory System** handout and the attached **Rubric** to students. Instruct them to refer to the rubric for guidance on what they should include in their model. It is important to express to students that their initial model will not be graded for accuracy, but it will be used to see what their current level of understanding is.

Display **slide 8** and instruct students to pair up again with their Elbow Partners to compare their models. Instruct students to explain their models to their partners and use their models as a visual aid. Students are not expected to have a full understanding of an asthma attack yet. Again, it is important to express to students that it's okay if they aren't sure—they should still attempt to create a model to the best of their ability.

Display **slides 9-10** and share the lesson's essential question and learning objectives.

# Explore

### Teacher's Note: Station Setup

Prior to beginning the lesson, you will need to set up six stations using the links below and the attached **Station Cards**. These station activities include a variety of learning experiences, each intended to help students gain a better understanding of the performance expectations. To prepare for each station, do the following:

- Station 1: Create 2-3 lung models for students to use. Ensure that the reading, "*What's Going On?*" and *"What's Asthma?"* (Card 4 of the Station Cards) are easily accessible for students to read. You may consider including multiple copies at the station.
- Station 2: Set up the Asthma Demonstration for students to experience a constricted airway.
- Station 3: Set up a laptop or device with the following video ready for students to watch: "How does asthma work?"

**Embedded video**
https://youtube.com/watch?v=PzfLDi-sL3w

- Station 6: Ensure that the images on Cards 10-11 of the Station Cards are easily accessible for students to view. You may consider including multiple copies at the station.

Display **slide 11**, pass out one of the attached **Station Journal** handouts to each student, and briefly explain each station activity. Instruct students to include new information in their handout as they complete each station. This will help them with the Respiratory System Model at the end of the lesson.

Display **slide 12**, which includes a seven-minute timer. Use this timer to provide students with a minimum of seven minutes for each station. This serves to allow enough time for them to watch videos and interact with manipulatives.

### Teacher's Note: Formative Assessment

As students are working through the station activities, listen in on their conversations, help struggling students, and ask probing questions. Keep in mind: students are still developing their understanding of performance expectations.

# Explain

Display **slide 13** and instruct students to answer the following questions with their small group. Once they have had time to answer as a small group, have students share out their group's thoughts.

1. What did you figure out that you didn't know before?
2. Which station did you get the most benefit from? Why?
3. Which station surprised or interested you? Why?

Display **slide 14** and turn students' attention back to the Driving Question Board from earlier in the lesson. Ask students if there are there any questions that can be answered at this point.

**Teacher's Note: Formative Assessment**

Spend an ample amount of time on this discussion. Allow as many students to respond to the questions as possible. At this point in the lesson, there should be a few questions that could be answered by the knowledge students have gained so far.

Each student might be at a different place in their current understanding, and that is okay.

# Extend

Display **slide 15**. Pass out the attached article **Homeostasis and Its Relation to Asthma** (this article was adapted to an appropriate reading level from Verywell Health's article of the same name). Share the following instructions, which are a modified version of the instructional strategy CUS and Discuss, with students:

- **C**: Circle any words that you don't know.
- **U**: Underline any information that helps you understand the word "*homeostasis*."
- **S**: Star any information that helps you answer the question, *"Why do humans have asthma attacks?"*

**Teacher's Note: Formative Assessment**

As students are reading, walk around looking at what words they are unfamiliar with. Rather than putting them on the spot about words they don't know, record the words and their definitions on the board.

You will also want to pay close attention to what students starred and underlined.

At this point, students should have a basic understanding of asthma, how it occurs, and the structures involved.

Once students have all completed the reading, have a brief discussion over the term *"homeostasis"* and the question, *"Why do humans have asthma attacks?"*

# Evaluate

Display **slide 16** and instruct students to look back at 1) the initial Respiratory System model that they created at the beginning of the lesson, and 2) the rubric for their final product. Instruct students to revise or recreate their model to show what happens before, during, and after an asthma attack; to describe the new information that they added to their new model that wasn't included in their initial model; and answer the following short response questions:

- In what ways did you revise or recreate your model and why?
- Describe what is happening in your model before, during, and after an asthma attack.
- Why does our body respond this way?

This assessment should be completed individually as a way to see how each student is progressing.

### Teacher's Note: Formative Assessment

While students are completing their models and answering the final questions for the lesson, you should move around the room, checking on students that might require extra support. You should allow students to use all of the materials that they used throughout the lesson. Their final product should be at a high level of detail.

### Teacher's Note: Performance Mastery

At this early phase in the unit, students are just beginning to understand the performance expectations addressed. Therefore, they will slowly gather pieces of evidence throughout the lessons that will help them understand the broader phenomena introduced in this lesson. The rubric provides general criteria that students should include in their final models.

## Resources


- Bupa Health UK. (2013). *How an asthma attack occurs*. *YouTube*. https://www.youtube.com/watch?v=Yp5ixuFiMmM
- Children's National Medical Center. (2013). *Health Disparities, Focus on Asthma*. *YouTube*. https://youtu.be/fMufgnJId58?t=173
- K20 Center. (n.d.). *CUS and Discuss*. Strategies. https://learn.k20center.ou.edu/strategy/162
- K20 Center. (n.d.). *Driving Question Board*. Strategies. https://learn.k20center.ou.edu/strategy/1511
- K20 Center. (n.d.). *Elbow Partners*. Strategies. https://learn.k20center.ou.edu/strategy/116
- K20 Center. (n.d.). *I Notice, I Wonder*. Strategies. https://learn.k20center.ou.edu/strategy/180
- National Institute of Environmental Health Sciences. (n.d.). PDF. UNC-Chapel Hill.
- Oklahoma State Department of Health. (2012). *Asthma In Oklahoma.* https://oklahoma.gov/health/health-promotion/asthma.html
- Pat Bass, M. D. (2020, July). *Can You Achieve Asthma Homeostasis?* Verywell Health. https://www.verywellhealth.com/homeostasis-and-asthma-200952#citation-3
- TED-Ed. (n.d.). *How does asthma work? - Christopher E. Gaw*. *TED*. https://ed.ted.com/lessons/how-does-asthma-work-christopher-e-gaw#watch
- *The Chemistry of Asthma Inhalers*. Compound Interest. (2017, May 8). https://www.compoundchem.com/2014/11/25/asthma/
- The Regents of the University of California. (2015). Build a Lung. Oakland.
- Turley, S. M. (2016). *Understanding pharmacology for health professionals*. Pearson Education.