

## ACTIVITY 1: AIR IS A SUBSTANCE

<b>Objective</b>	To demonstrate to students that air is a substance, even though we cannot see it.
<b>Materials</b>	<p><i>Part 1:</i></p> <ul style="list-style-type: none"> <li>• 1 plastic bottle for the teacher</li> <li>• Paper</li> </ul> <p><i>Part 2:</i></p> <ul style="list-style-type: none"> <li>• 2 plastic cups per student</li> <li>• 1 straw per student</li> <li>• Water</li> </ul>
<b>Procedure – Part 1 (performed by the teacher)</b>	<ol style="list-style-type: none"> <li>1. Form small balls of paper.</li> <li>2. Place the plastic bottle horizontally in front of the face.</li> <li>3. Put a small piece of paper in the mouth of the bottle.</li> <li>4. Blow to introduce the paper ball into the bottle.</li> </ol>
<b>Questions – Part 1</b>	<p>Will I be able to put the paper ball inside the bottle with one blow? Why doesn't the paper ball go into the bottle?</p>
<b>Procedure – Part 2 (performed by students)</b>	<p>The Greek physicist Empedocles demonstrated in 440 BC that air is a substance, so the bottle in the previous demonstration is not empty, but rather full of air. Now, each student will be able to repeat, with small changes, the experiment carried out by Empedocles to verify that air is a substance.</p> <ol style="list-style-type: none"> <li>1. Fill one of the glasses with water.</li> <li>2. Place your finger over one of the openings in the straw and place the other end in the water.</li> <li>3. Remove your finger from the opening and insert the straw again. Cover the end that is outside again with your finger.</li> <li>4. Pick up the straw and place it on the empty glass.</li> </ol>
<b>Questions – Part 2</b>	<ul style="list-style-type: none"> <li>• During step 3: What happens to the water? Why doesn't the water go into the straw? Since the air was in the straw, it prevented the water from entering, so the air must, in fact, be a substance.</li> <li>• At the end: Why does the water enter the straw? Why does the water flow once you lift your finger from the opening? Observe, as Empedocles observed, that water flows through one opening while air leaves through the opposite opening.</li> </ul>

## Complementary material

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AirNow.gov, U.S. EPA. (n.d.). *Properties of Air. Air Quality Workshop for Teachers: A Toolkit for Facilitators*. Retrieved February 6, 2023, from [https://www.airnow.gov/sites/default/files/2020-10/properties\\_of\\_air.pdf](https://www.airnow.gov/sites/default/files/2020-10/properties_of_air.pdf)

Muy Interesante. (2020, March 5). *Experimentos increíbles que puedes hacer con una botella*. Muy Interesante. Retrieved February 6, 2023, from <https://www.muyinteresante.es/ciencia/14558.html#:~:text=Emp%C3%A9docles%20demostr%C3%B3%20que%20el%20aire,simple%20de%20demostrar%20su%20existencia>.

### ACTIVITY 2: BREATHE, BREATHE

<b>Objective</b>	To teach students the effects, respiratory diseases such as asthma have on the human body.
<b>Materials</b>	1 straw for each student
<b>Procedure</b>	<p>Tell students they will have a chance to feel what it is like to have an asthma attack and follow the next steps.</p> <ol style="list-style-type: none"><li>1. Ask students to place the straw in their mouths and breathe through it for 30 seconds (discuss what that was like, and how it felt).</li><li>2. Ask students to do jumping jacks (or some other physical activity they can do while standing near their desks) without the straw in their mouths for 1 minute.</li><li>3. When students are done with the physical activity, ask them to quickly place the straw in their mouth and breathe through their mouths (through the straw) for 30 seconds (again, discuss how this feels and compare this situation with the original).</li><li>4. Ask students to repeat the physical activity for 1 minute, but this time with the straw in their mouths, and remind them to only breathe through their mouths while doing the physical activity.</li><li>5. When students finish their 1-minute exercise, ask them to breathe through the straw again. (Again, ask students to discuss the experience and compare it to the original activity.)</li></ol>

	Students now have a general understanding of what it feels like to work hard to get enough air into their lungs. Upon completing this activity, students will begin to gain content knowledge about asthma and other respiratory diseases such as pneumoconiosis.
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### **Complementary material**

AirNow.gov, U.S. EPA. (n.d.). *Easy breathers. Air Quality Workshop for Teachers: A Toolkit for Facilitators*. Retrieved February 6, 2023, from [https://www.airnow.gov/sites/default/files/2020-10/easy\\_breathers.pdf](https://www.airnow.gov/sites/default/files/2020-10/easy_breathers.pdf)

Curiosidades con Mike. (2017, May 31). *¿Fumas? Experimento Casero muestra Efecto en Pulmones* [Video]. Retrieved February 6, 2023, from <https://www.youtube.com/watch?v=DS8-dnc4-4M>.