

A Model of the Lungs - Mizzen

ACTIVITY OVERVIEW

STEM Focus Area: Health Sciences

Learning Goal: Youth will learn how to build a functioning model of human lungs

Youth Learning Targets:

- "I can build and apply a model of human lungs."
- "I can explain the function and mechanisms of human lungs."

LEARNING ENVIRONMENT

Activity Duration: 45 minutes

Class Size: Any size, teams of 2

Age of Youth: Grades 6 – 8

Guiding Question - What is the question to explore OR the problem or challenge to solve?

What do our lungs do, and how do they work?

Throughout this activity, youth will:

- *Examine how their lungs work and what they do for their body*
- *Build a model of human lungs with a partner*
- *Investigate, analyze, and discuss what happens in human lungs and why*

Facilitator Prep:

- *Facilitators will need to gather the needed materials for the activity and set up work stations for groups of two around the room. Facilitators will need to have a whiteboard or anchor chart for group discussion during the activity. Facilitators will need to prepare a model of the lungs for students to refer to as they build their own models.*

Literacy Connection:

- *[Human Body: A Visual Encyclopedia](#) explores all the nooks and crannies of the body. This book has you covered from head to toe, literally!*

Facilitator Checklist in the Learning Environment:

- Predict and hypothesize
- Develop and use models
- Measure materials
- Observe
- Investigate
- Record observations
- Analyze and infer
- Share and communicate data

- Interpret data
- Test and revise
- Draw conclusions and relationships
- Have voice and agency, make decisions and guide their own learning

PREPARATION

Materials:

- For each student pair, a pre-made model, and one to work on concurrently
 - o Empty plastic water bottle with no cap
 - o 2 balloons
 - o Scissors
 - o A ball of modeling clay, about 1 inch in diameter
 - o Plastic straw
 - o Pencil
 - o Tape
- For the whole group
 - o Whiteboard or anchor chart
- [Example Video #1](#)
- [Example Video #2](#)

Room

- For the model of human lungs activity, you will need enough stations for student pairs to make their models and an area to display the example model created prior to the activity. The room will be arranged in a way to allow for the pairs to work but to also encourage large group discussion post-activity.

Content

We have to breathe all the time in order to supply our bodies with oxygen and get rid of carbon dioxide. We use our lungs to do this. Air travels through your mouth and nose, down your windpipe, to reach your lungs. It gets warm and damp on its journey. Inside the lungs oxygen enters the bloodstream and a waste gas, called carbon dioxide, which can poison the body if its levels rise, is removed from the blood and breathed out.

Common misconceptions:

Respiration and breathing are the same thing - breathing is a physical or mechanical process which comprises inhalation and exhalation and respiration is a chemical process that occurs internally in the cells for releasing energy.

The respiratory system works alone in transporting oxygen through the body – the respiratory system works directly with the circulatory system to provide oxygen to the body. Oxygen taken in from the respiration system moves into blood vessels that then circulate oxygen-rich blood to tissues and cells.

Inquiry

Your primary goal as facilitator is to encourage youth to explore and discuss as a group how the human lungs work. You can prompt this discussion with questions like the following:

- What do your lungs do for your body?
- What body system are the lungs the main organ for?
- What environmental things can affect breathing?

Facilitator Checklist for Preparation:

- Organization: I practiced the activity/technology, prepared materials/extras/place to record youth ideas, completed an activity (including timings).
- Materials: Materials are appropriate for teaching the learning goals; youth will be able to use them and will think they are appealing.
- Space Utilization: The space is set up appropriately for the activity and there will be no safety issues or distractions.
- Relevance: I have researched why the content matters to youth's everyday lives.

- Content Learning: I have become familiar with the content.
- Inquiry: I have become familiar with how authentic, age-appropriate inquiry practices look in this activity.

INTRODUCTION TO ACTIVITY (15 MINUTES)

Have students take a deep breath, hold it, and then exhale. Then ask students to describe the process of breathing at the level of organs and body systems. Confirm or explain that the lungs work together with other organs of the respiratory system. Explore the level of understanding the group has of the respiratory system and circulatory system to identify the potential for additional human sciences activities.

Tell students that today they will work with a partner to build a model of the lungs. Invite students to examine the model that was made prior to the activity.

Facilitator Checklist for Introduction to Activity:

- Space Utilization: I will use the space informally avoiding the lecture hall format.
- Purposeful Activities: This intro section gets youth on track for the learning goal.
- Content Learning: If age appropriate, I will accurately present content.
- Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- Relationships: I will make each youth feel welcome.
- Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.

ACTIVITY ENGAGEMENT (20 MINUTES)

Divide students into pairs and direct them to their work stations. Model for the students how to use the scissors to cut a water bottle in half horizontally. Then have students complete this step. Explain that they will use the upper half of the bottle, which is the half with the neck.

Next, have students cut off the neck of the balloon. Have pairs work together to stretch the balloon over the wide opening of the upper half of the water bottle. Instruct students to place the plastic straw inside the second balloon. Then have them tape the balloon's neck tightly to the straw so no air can escape.

Have students roll the modeling clay into a round ball and stick the pencil through the clay to make an opening. Model for students how to put the straw through the ball of clay and pinch it off to make a tight seal on the straw. Have students deflate this balloon and push it inside the half bottle. The straw should stick out of the bottle. Tell students to seal the clay tightly around the top of the bottle.

To make their own lung breathe, have them pull down the diaphragm, or balloon that is stretched along the base of the bottle. In response, the interior balloon should expand as it fills with air. When students let go of the balloon diaphragm, the interior balloon should expel air.

Invite student pairs to describe to each other what is happening and why. Have students transfer this knowledge to explain how the human lungs work.

Facilitator Checklist for Activity Engagement:

- Space Utilization: I will use the space informally avoiding the lecture hall format.
- Participation: All youth will have access to the activity.
- Purposeful Activities: This core section helps youth to move toward the learning goal.
- Engagement: This activity has youth physically engaged with their hands and their minds.
- Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- Reflection: If appropriate, I will ask youth questions during the core activity that will help them make sense of what they are learning.

- Relationships: I will take steps to share my enthusiasm and create a nurturing, safe learning environment.
- Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.
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REFLECTION & RELEVANCE: (10 MINUTES)

Reconvene the whole group to discuss the following questions:

- 1) *In your model, what does the balloon at the base of the bottle represent? What does the balloon inside the bottle represent?*
 - a) *The balloon at the base is the diaphragm and the balloon inside represents the lung when it fills with air and when it releases from the body.*
- 2) *Apply this model to how the lungs work.*
 - a) *Air is pulled into the lungs when the air cavity expands. Air is pushed out of the lungs when the air cavity contracts.*
- 3) *How do you think your model compares to real human lungs?*
 - a) *The model is similar to real lungs. When you breathe in, you expand your chest and pull in air to your lungs. When you breathe out, your chest contracts, and air is expelled.*

Facilitator Checklist for Activity Reflection & Relevance:

- Space Utilization: Again, I will use the space informally.
- Participation: I will prompt youth who do not have access to the activity to participate.
- Purposeful Activities: The closing section helps youth to reach the learning goal.
- Content Learning: I will help youth make connections between different ideas. I will create opportunities for youth to ask questions/provide ideas that show a deeper level of understanding.
- Inquiry: In this or another section of the activity, youth carry out one or more inquiry practices.
- Reflection. I will provide youth with a sustained opportunity to make sense of their learning.
- Relevance: In this or another section, I will guide the youth in a sustained discussion of how the activity relates to their everyday lives.
- Youth Voice: In this or another section, I will allow youth the opportunity to make decisions about their learning experiences.