

The Respiratory System and Oxygen Exchange

Florida Benchmark: SC.5.L.14.1 - Identify the organs in the human body (such as the lungs) and describe their functions, including the respiratory system's role in breathing and oxygen exchange.

NGSS Standard: MS-LS1-3 (adaptable for upper elementary) - Use evidence to explain that the body is a system of interacting subsystems, including the respiratory system's role in oxygen intake and carbon dioxide release.

Objective: By the end of this project, students will be able to:

1. Identify major respiratory system organs (lungs, trachea, diaphragm, etc.).
2. Explain the function of each organ in the respiratory system.
3. Create a model to demonstrate how the respiratory system works.

Materials:

- Balloons (2 per student)
- Plastic bottles (one per group)
- Straws (one per student)
- Rubber bands
- Diagram of the respiratory system
- PowerPoint presentation
- Observation worksheet

Safety Precautions:

- Ensure students handle scissors carefully during the bottle-cutting step.
- Remind students not to inhale or blow air directly into the straws during the experiment.
- Supervise the use of rubber bands to avoid snapping injuries.

Procedures:

1. Cut the bottom off a plastic bottle.
2. Stretch a balloon across the bottle's open bottom and secure it with a rubber band (this represents the diaphragm).
3. Insert a straw into the neck of another balloon, secure it with a rubber band, and place the straw and balloon inside the bottle.
4. Seal the bottle's opening with modeling clay around the straw to prevent air from escaping.
5. Pull the balloon diaphragm down to make the balloon lung expand, simulating inhalation. Release it to contract the balloon, simulating exhalation.

Note: Clean-up

- Instruct students to dispose of used balloons properly.
- Ensure all materials are returned to designated areas.

Project Report Questions:

1. What organs are part of the respiratory system?

2. What role do the lungs play in breathing?

3. How does the diaphragm help with breathing?

4. What happens to the balloon lung when the diaphragm balloon is pulled down?

5. Why is oxygen important for the body?

6. What is carbon dioxide and why does the body need to release it?

7. How does the respiratory system connect to the circulatory system?

8. What effect does exercise have on your breathing rate?

9. How does air pressure change when you inhale and exhale?

10. What would happen if the diaphragm stopped working properly?
