

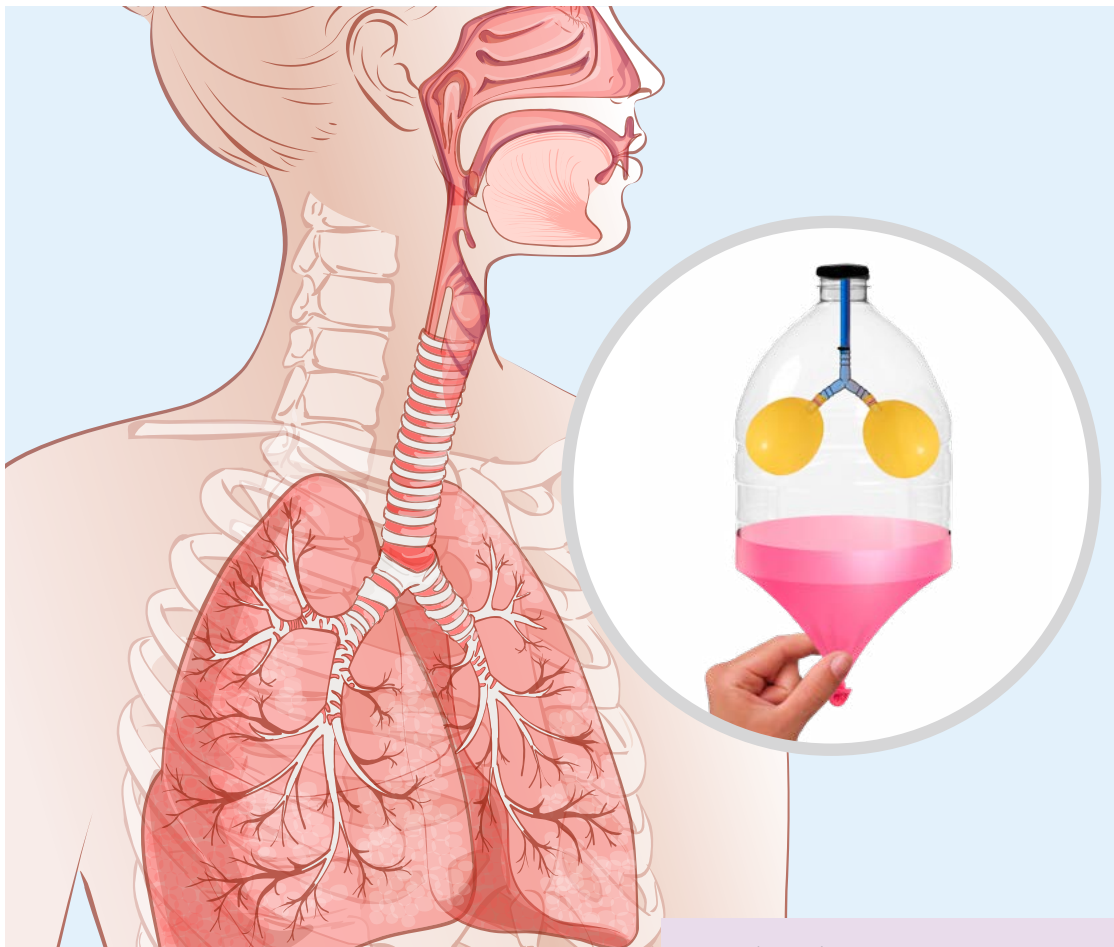


Developed with Laura Beres

Volume 8 | Gr. 6–8

Time: 50+ mins.

Take a breath – Modeling the respiratory system



MS-LS-1.A

In multicellular organisms, the body is a system of multiple interacting subsystems. These subsystems are groups of cells that work together to form tissues and organs that are specialized for particular body functions.

Materials list

- Scissors
- 3 large balloons
- 2 rubber bands
- Electrical tape
- Plastic 2-liter bottle
- Flexible plastic tubing – 8"
- Y-shaped hose connector

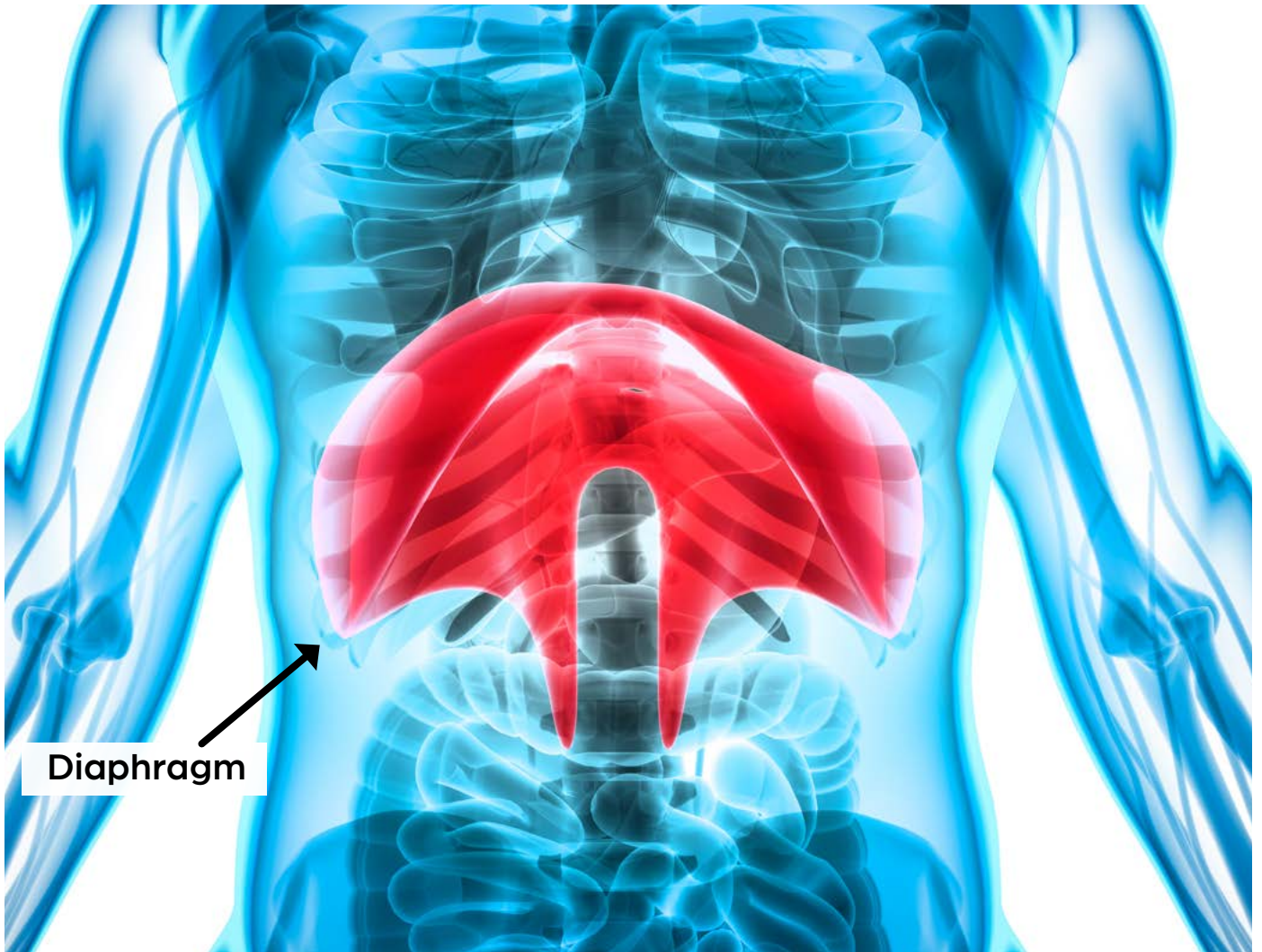
Objective

Students will...

- Be able to create a working model of the respiratory system

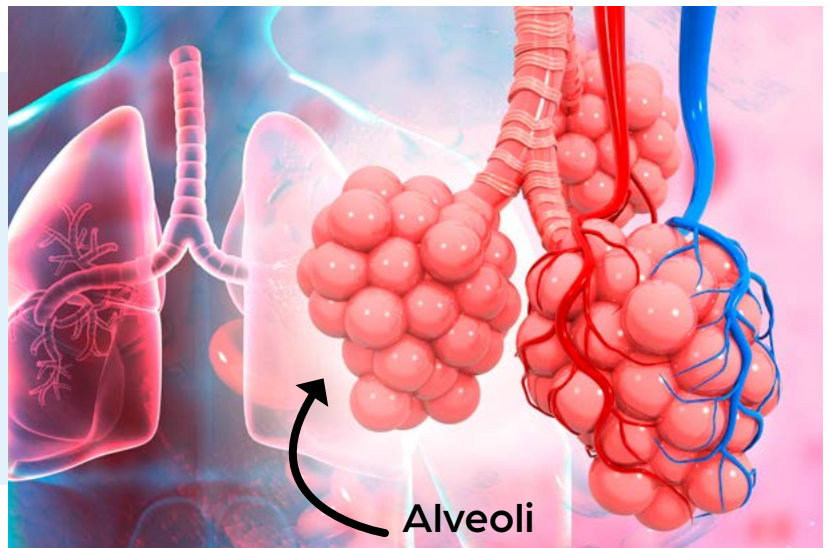
Extensions and content connections

- Some students might choose to make a larger or more detailed model using other materials.
- **Optional extension:** Discuss drowning and its impact on breathing. Students could mimic drowning by filling balloons with water and see what “breaths” they can take using the model. Students might see that a small amount of water may still allow breaths but large amounts of water will not allow gas exchange.



Misconceptions

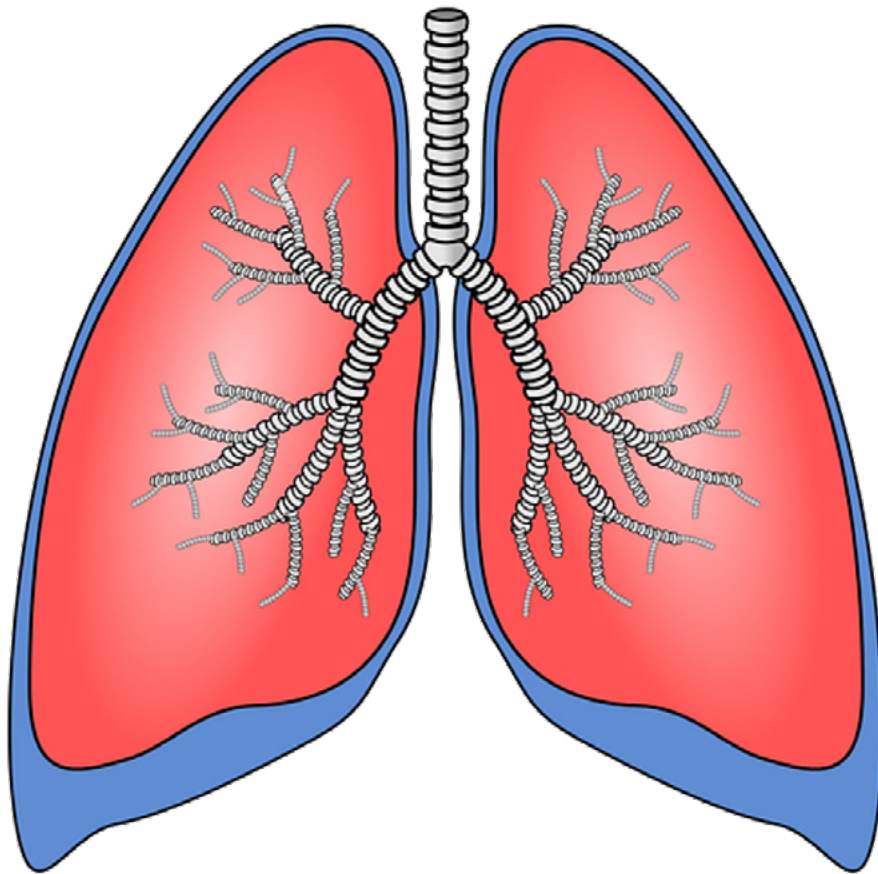
- The lungs expand and contract for breaths. Students have a hard time realizing there is the diaphragm and what it does.
- The lungs are hollow like a balloon. Lungs are dense with millions of alveoli, where gas exchange takes place.



Name: _____ Date: _____

Take a breath – Respiratory system model

Directions: Label the following diagram of the respiratory system:



What is the role of the diaphragm?

Materials list

- Scissors
- 3 large balloons
- 2 rubber bands
- Electrical tape
- Plastic 2-liter bottle
- Flexible plastic tubing – 8"
- Y-shaped hose connector

Directions

1. Gather materials.
2. Insert the plastic tubing into one of the openings of the hose connector and use electrical tape to make an airtight seal around where the two pieces meet.
3. Connect a balloon around each of the remaining two openings and secure with rubber bands.
4. Measure 2" from the bottom of the 2-liter bottle and cut to remove the bottom.
5. Place the structure from steps 2 and 3 into the bottle. The plastic tubing should come through the neck of the bottle.
6. Use electrical tape to seal the opening of the bottle where the plastic tubing comes through. This should be an airtight seal.
7. Tie a knot at the end of the remaining balloon and cut the main part of the balloon in half horizontally. Using the knotted half of the balloon, stretch the open end over the bottom of the bottle.
8. Gently use the knot to pull down on the balloon, then release the balloon with the knot and watch what happens.



Name: _____ Date: _____

Take a breath – Respiratory system model

Directions: Fill in answers.

Process explained:

In this model, the structures of the respiratory system are represented as follows:

Plastic bottle = _____

Plastic tubing = _____

Y-shaped connector = _____

Balloons inside bottle = _____

Balloon covering the bottom of bottle = _____

Think it through:

1. What brings oxygen to all parts of the body? _____

2. What waste products are created by breathing? _____

3. What does pulling the balloon down represent? _____

4. When you inhale:

a. The ribs move _____.

b. The diaphragm moves _____.

c. There is now _____ space in the chest area.

d. Air rushes _____ to fill this space.

5. When you exhale:

a. The ribs move _____.

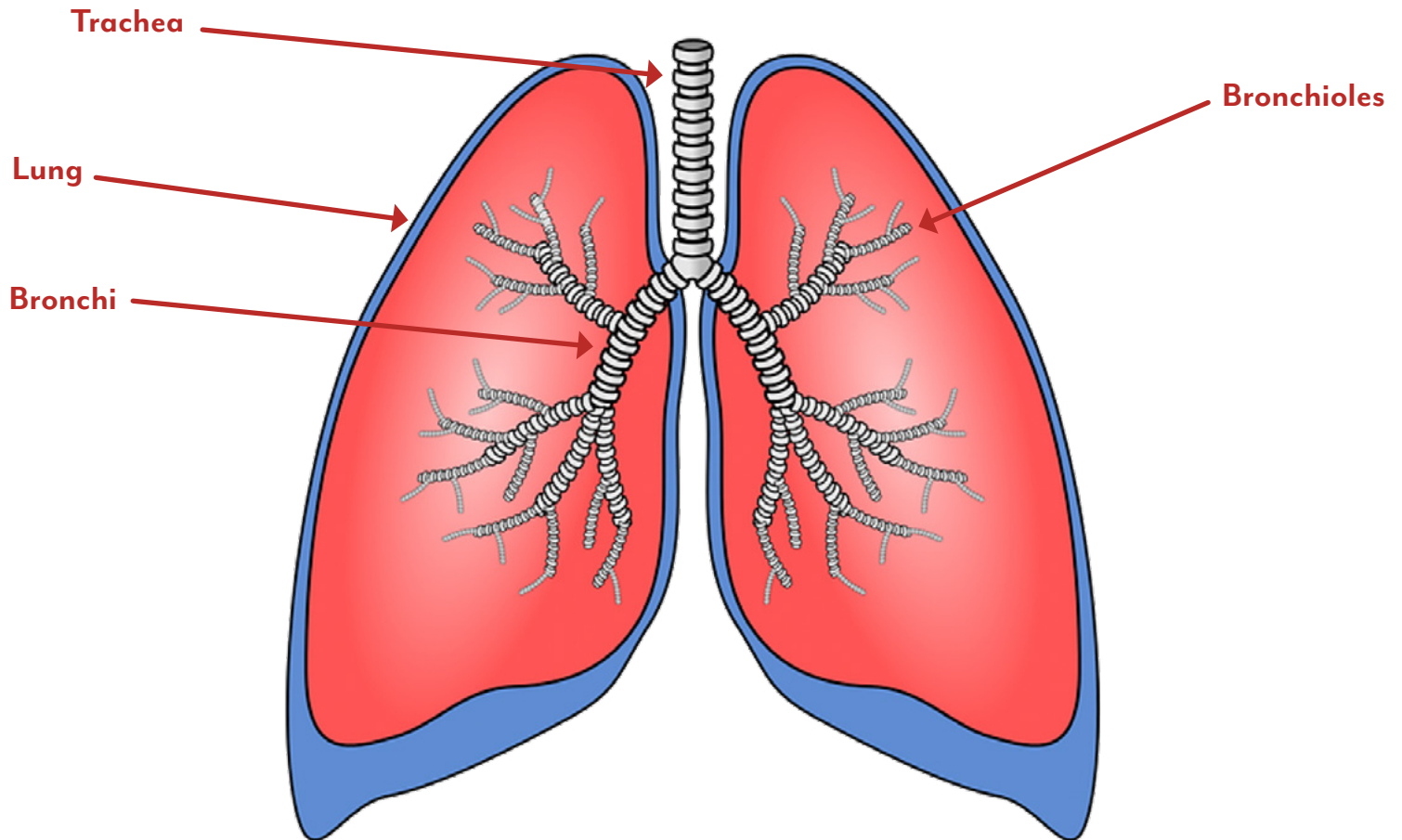
b. The diaphragm moves _____.

c. There is now _____ space in the chest area.

d. Because of this pressure, air moves _____ the lungs.

Take a breath – Respiratory system model

Directions: Label the following diagram of the respiratory system:



What is the role of the diaphragm?

The diaphragm is an involuntary muscle that expands and contracts to allow air to go into and out of the lungs.

Name: _____ Date: _____

Take a breath – Respiratory system model

Directions: Fill in answers.

Process explained:

In this model, the structures of the respiratory system are represented as follows:

Plastic bottle = **chest cavity/rib cage**

Plastic tubing = **trachea**

Y-shaped connector = **bronchi**

Balloons inside bottle = **lungs**

Balloon covering the bottom of bottle = **diaphragm**

Think it through:

1. What brings oxygen to all parts of the body? **Red blood cells in the circulatory system**
2. What waste products are created by breathing? **Carbon dioxide and water vapor**
3. What does pulling the balloon down represent? **Diaphragm contracting**
4. When you inhale:
 - a. The ribs move **outward**.
 - b. The diaphragm moves **downward**.
 - c. There is now **extra** space in the chest area.
 - d. Air rushes **in** to fill this space.
5. When you exhale:
 - a. The ribs move **inward**.
 - b. The diaphragm moves **upward**.
 - c. There is now **less** space in the chest area.
 - d. Because of this pressure, air moves **out of** the lungs.