

14-2

What are breathing and respiration?

Objectives ► Compare breathing and respiration. ► Explain the process of breathing.

TechTerms

- **diaphragm** (DY-uh-fram): sheet of muscle below the lungs
- **exhale**: to breathe out
- **inhale**: to breathe in
- **respiration** (res-puh-RAY-shun): the process of carrying oxygen to cells, getting rid of carbon dioxide, and releasing energy

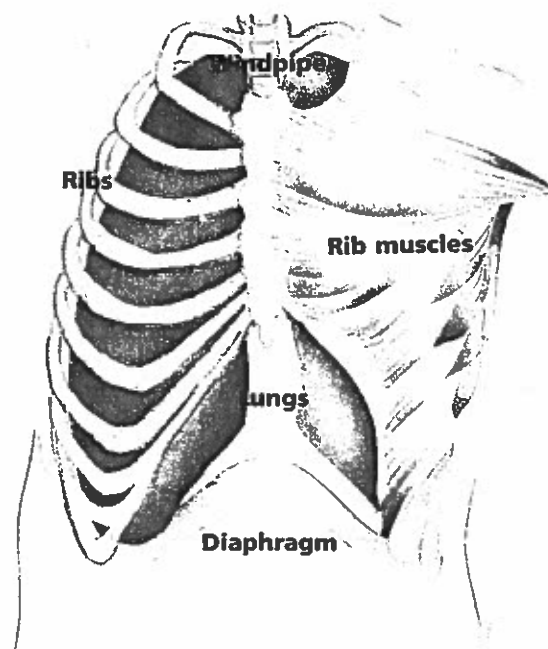
Comparing Breathing and Respiration Breathing is the process by which air is taken into the body. It is a mechanical (muh-KAN-i-kul) process. When you breathe, oxygen is not carried to your cells. Breathing does not release energy for your body to use. Carrying oxygen to your cells, getting rid of carbon dioxide, and releasing energy is called **respiration** (res-puh-RAY-shun).

Respiration is a chemical process. It has three parts.

- **External Respiration** During external respiration, oxygen and carbon dioxide are exchanged between the lungs and the blood.
- **Internal Respiration** During internal respiration, oxygen and carbon dioxide are exchanged between the blood and the cells of the body.
- **Cellular Respiration** Cellular (SEL-yoo-lur) respiration is the chemical process by which energy is released by cells. The cells change food into energy. Carbon dioxide and water are given off as waste products.

Classify: Is breathing a chemical or mechanical process?

The Diaphragm Below the lungs, there is a sheet of muscle. It is the **diaphragm** (DY-uh-fram). The diaphragm helps you breathe. It works



with the ribs and rib muscles. Many organs work together to help you breathe.

List: What parts of the body work together to help you breathe?

Breathing In When you **inhale**, or breathe in, your ribs move up and out. The diaphragm moves downward, away from the lungs. The space inside the chest becomes larger. Because of this, there is less air pressure in the lungs than outside the body. The outside air pressure causes air to rush into the lungs. The lungs fill with air and expand.

Define: What does the word "inhale" mean?

Breathing Out When you **exhale**, or breathe out, the ribs move down and in. The diaphragm moves upward, toward the lungs. The space inside the chest becomes smaller. Because of this, the air pressure in the lungs is greater than the air pressure outside the body. Air moves out of the lungs. The lungs contract and take up less space in the chest.

Describe: What happens to the size of the space in the chest when you exhale?

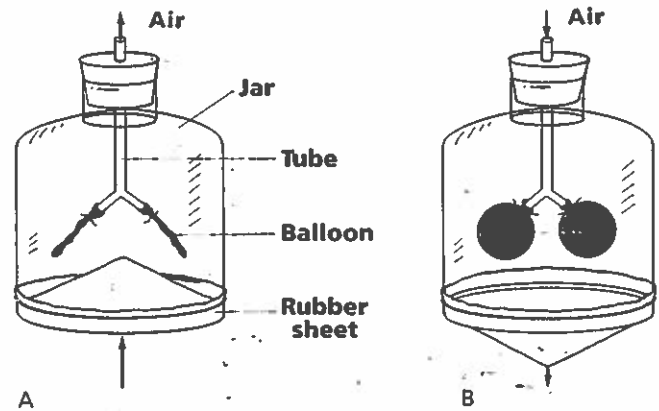
LESSON SUMMARY

- ▶ Breathing is the process by which air enters and leaves the body. Respiration is the process of carrying oxygen to cells, getting rid of carbon dioxide, and releasing energy.
- ▶ The diaphragm, ribs, and rib muscles work together to help you breathe.
- ▶ When you inhale, the lower air pressure in the lungs causes air to rush into the lungs.
- ▶ When you exhale, the air pressure in the lungs is higher than the air pressure outside the body, causing air to move out of the lungs.

CHECK Find the sentence in the lesson that answers each question. Then, write the sentence.

1. How does the diaphragm move when you exhale?
2. What is breathing?
3. Does breathing release energy?
4. What are the waste products of cellular respiration?
5. What happens to the space inside your chest when you inhale?
6. What does "inhale" mean?
7. What does "exhale" mean?

APPLY Use the model to answer the questions.



8. a. Which model shows inhaling? b. Which model shows exhaling?
9. What do the balloons represent?
10. What does the rubber sheet represent?
11. What does the jar represent?

Ideas in Action.....

IDEA: Breathing is a mechanical process. A mechanical process is one that involves only physical changes.

ACTION: List three examples of things that you do that involve only mechanical processes.

ACTIVITY

EXERCISE AND BREATHING RATE

You will need a watch or clock with a second hand.

1. **Measure:** Breathe in and out normally. Have a partner time the number of breaths you take in one minute. Record the number of breaths.
2. Jog in place for 20 seconds. Then stop. Have a partner time the number of breaths you take in one minute. Record this number.
3. Jog in place for 40 seconds. Then stop. Have a partner time the number of breaths you take in one minute. Record.
4. Change places with your partner and repeat the activity.

Questions

1. a. What was your breathing rate at rest? b. After 20 seconds of jogging? c. After 40 seconds of jogging?
2. **Compare:** How did your breathing rates compare to your partner's breathing rates?
3. **Analyze:** What effect does exercise have on breathing rate?

