

# BREATH OF LIFE

**Grade Level or Special Area:** 4<sup>th</sup> Grade

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**Length of Unit:** Five lessons (approximately 2.5 weeks (13 days); one day = 45 minutes)

## I. ABSTRACT

Students will understand the parts and function of the respiratory system as well as preventative measures they can take to avoid damaging this system and keeping it functioning correctly throughout their lifetime. Engaging activities students will be participating in include experiments showing the gas exchange during respiration, finding their own breathing rate and air capacity of their lungs, constructing a lung model, performing skits promoting healthy respiratory habits, and creating campaign material against smoking.

## II. OVERVIEW

### A. Concept Objectives

1. Students will understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
2. Students will know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
3. Students will understand that science involves a particular way of knowing and understand common connections among scientific disciplines. (Colorado State Science Standard #6)

### B. Content from the *Core Knowledge Sequence* p. 104

1. Science: The Human Body
  - a. The Respiratory System
    - i. Process of taking in oxygen and getting rid of carbon dioxide
    - ii. Nose; throat; voice box; trachea (windpipe)
    - iii. Lungs; bronchi, bronchial tubes; diaphragm; ribs; alveoli (air sacs)
    - iv. Smoking; damage to lung tissue; lung cancer

### C. Skill Objectives

1. Students will learn what the respiratory system consists of including its function.
2. Through experimentation using the scientific process steps, students will understand the relationship between carbon dioxide and oxygen during respiration.
3. Students will become aware of oxygen and carbon dioxide's presence in their lungs, and will notice that with more carbon dioxide build up, the oxygen amount decreases, making it difficult to breathe.
4. Students will trace the path of airflow through the body and recognize which body parts are involved in the process.
5. Students will locate where in the body the lungs, diaphragm, and ribs can be found.
6. Students will recognize that the lungs, diaphragm, and ribs work in conjunction with the rest of the system parts to help a person breathe.
7. Students will apply scientific process steps when constructing a workable lung model, recording information during the process.

8. Students will realize their own responsibility in keeping a healthy respiratory system by controlling spread of germs when coughing and sneezing, avoiding smoke, and strengthening the lungs through exercise.
9. Students will correlate smoking with harmful effects on the respiratory system.

### III. BACKGROUND KNOWLEDGE

- A. For Teachers
  1. Parker, Steve. *The Lungs and Respiratory System*. Austin, TX: Raintree Steck-Vaughn Publishers, 1997. 0-8172-4803-X.
  2. VanCleave, Janice. *The Human Body for Every Kid*. New York: John Wiley and Sons, Inc., 0-471-02413-9.
  3. Walker, Richard. *Encyclopedia of the Human Body*. New York, NY: DK Publishing, Inc., 2002. 0-7894-8672-5.
- B. For Students
  1. Kindergarten: Human Body (Taking care of your body)
  2. Grade 1: Human Body (Body Systems)

### IV. RESOURCES

- A. *Blood and Guts* pp. 62, 65, by Linda Allison (Lesson Two and Four (optional))
- B. *Encyclopedia of the Human Body* pp. 166-167, by Richard Walker (Lesson Three)
- C. *Breathing* pp. 4-9, by Anita Ganeri (Lesson Four)
- D. *The Lungs and Breathing* pp. 28, 30-32, by Steve Parker (Lesson Five)
- E. *The Lungs and Respiratory System* pp. 38-42, by Steve Parker (Lesson Five)
- F. *Heart and Lungs* pp. 28-29, by Jane Saunderson (Lesson Five (optional))

### V. LESSONS

#### Lesson One: Respiratory System Introduction (one day)

- A. *Daily Objectives*
  1. Concept Objective(s)
    - a. Students will know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
    - b. Students will understand that science involves a particular way of knowing and understand common connections among scientific disciplines. (Colorado State Science Standard #6)
  2. Lesson Content
    - a. Process of taking in oxygen and getting rid of carbon dioxide
  3. Skill Objective(s)
    - a. Students will learn what the respiratory system consists of including its function.
- B. *Materials*
  1. Appendix A: Respiratory System Information (one copy per student)
  2. Appendix B: Additional Respiratory System Notes (one copy for teacher reference)
- C. *Key Vocabulary*
  1. Respiratory system – the whole system used in breathing, including the mouth, nose, pharynx, larynx, trachea, bronchi, lungs, diaphragm, and breathing muscles
  2. Respiration – the overall exchange of oxygen and carbon dioxide between the atmosphere, lungs, blood, and body cells

D. *Procedures/Activities*

1. Ask students if they remember which other body system, aside from the circulatory system, is the most vital to us (Respiratory System). Ask the following discussion questions:
  - a. What parts of the body does the Respiratory System use?
  - b. Why is breathing so important?
  - c. What happens if we stop breathing?
  - d. How long can a person go without breathing?Discuss student answers for several minutes, and tell them that we can survive without many things, food for a few weeks, even water for several days, but irreversible brain damage can occur if you stop breathing for 3-4 minutes. Death may occur if breathing stops for longer than that.
2. Read together information about the respiratory system (Appendix A). Go over information together as a class.
3. Tell students a few other facts about this system they need to jot down on the backside of their papers (use Appendix B for reference). Note-taking information will consist of the following topics: respiration - the process of oxygen forming with glucose to create energy, water vapor, and carbon dioxide, how your breathing rate is measured, and the automatic controlling system of the medulla. Explain information in more detail as needed.
4. Have students complete questions on the bottom of their information sheets for their assessment (Appendix A).

E. *Assessment/Evaluation*

1. Students will answer a series of questions about the respiratory system's main parts and its function (Appendix A).

**Lesson Two: Oxygen/Carbon Dioxide Exchange (two days)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
  - b. Students will know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
2. Lesson Content
  - a. Process of taking in oxygen and getting rid of carbon dioxide
3. Skill Objective(s)
  - a. Through experimentation using the scientific process steps, students will understand the relationship between carbon dioxide and oxygen during respiration.
  - b. Students will become aware of oxygen and carbon dioxide's presence in their lungs, and will notice that with more carbon dioxide build up, the oxygen amount decreases, making it difficult to breathe.

B. *Materials*

1. Appendix C: Breathing Rate Activity (transparency and one copy per student)
2. Appendix D: Scientific Process Experiment Form (one copy per student)
3. Fogger Activity Materials:
  - a. Roll of paper towels
  - b. One or two hand-held mirrors
4. Appendix E: Candle in the Jar Experiment (one copy per student)

5. Candle in the Jar Experiment Materials per groups of four-five students:
    - a. One beaker (1000mL)
    - b. One candle, matches
    - c. One stopwatch (or clock with a second hand)
  6. *Blood and Guts* p. 65, by Linda Allison (optional)
- C. *Key Vocabulary*
1. Oxygen – a gas that is breathed in and transported to every cell in the body through the bloodstream; helps cells release energy from food
  2. Carbon dioxide – a gas that is a normal waste produced by cells when they use energy; transported in the bloodstream to the lungs, then breathed out
  3. Gas exchange – takes place in the lungs; oxygen from the air is transferred to the blood and carbon dioxide from blood to the air
  4. Inhale – an intake of breath that involves expanding the lungs to force air into them
  5. Exhale – forcing air out of the lungs by relaxing the diaphragm and letting the ribcage fall
- D. *Procedures/Activities*
1. Ask students if they remember from their previous note taking (activity 1) what the average breathing rate is for most people. Let them know that they will be finding out their own breathing rate and the average breathing rate of the class.
  2. **Breathing Rate Activity.** Hand out Appendix C: Breathing Rate Activity. Have each student pair up with a partner. One person will be the timekeeper and will need to be watching the second hand of the clock for a full minute. When the timekeeper begins timing, the other partner is to silently count the number of times he/she inhales until his/her partner says stop (after one minute). Now the other person becomes the timekeeper while the original timekeeper now counts his/her breath intakes in one minute. Have students record the number of breaths they inhaled in one minute on question #1 of their sheet.
  3. Show transparency of Appendix C. Go through each row and have students raise their hand for the range their number of breaths falls in. Tally results on the chart. Have students do the same on their own forms. Have students spend a few minutes completing questions 2-4 on their forms.
  4. Have students look back at their notes (from activity 1) to explain what is included in respiration. Be sure they mention the exchange of carbon dioxide and oxygen in the blood stream. If not, be sure to review this concept at this time.
  5. Ask students which gas we breathe out. Tell them that this next demonstration will show them evidence of breathing out carbon dioxide. Hand out Appendix D: Scientific Process Experiment Form. If students are not familiar with these steps, spend a few extra minutes (or extra lesson) explaining the terms and steps.
  6. **Fogger Activity:** Students need to fill out “Fogger Activity” as the activity title on their forms. Tell students to fill in the following question on their form: Can we see one of the gases we exhale? Have students record hypotheses and discuss a few of them. Next, students need to record the following materials: paper towel, hand mirror. Tell students the following procedure steps to record in the procedure section on their sheets:
    - a. Clean the mirror with the paper towel.
    - b. Hold the mirror near your mouth without touching it.
    - c. Exhale two-three times onto the mirror.
    - d. Look at the surface of the mirror.

Demonstrate the steps to the class by having several volunteers come forward to try this activity. (A possible variation would be to provide more mirrors and have one person per group follow the steps). Have students record their results. They should have found that the mirror fogged up. Then, ask students to formulate their conclusions and record these on their experiment forms. Discuss conclusions together. Explain that during respiration glucose and oxygen form to produce two waste products (carbon dioxide and water vapor) and energy. The water on the mirror is the water vapor produced by the constant respiration reaction inside your cells. Condensation formed when the warm water met the cool mirror, because the mirror is colder than the inside of your lungs.

7. Inform students that they will now have a chance to participate in another experiment showing the evidence of carbon dioxide in the lungs and they will be looking at its relationship to oxygen and what may happen if those two gases are out of balance.
8. **Candle in the Jar Experiment.** Give students Appendix E: Candle in the Jar Experiment. Students will need to be grouped, four-five students per group, for this activity and parent helpers are recommended. (If parent helpers are not available, this experiment would work best as a class demonstration, since it involves matches and candles.) Students are to follow the directions on their lab sheets, recording results and discussing data as a group during the process. When they have finished all the lab procedures and recorded their data, they should answer the questions under the conclusion section. Meet together as a class and discuss findings. Results should show that the flame burned the longest in plain air, and went out quicker when coming into contact with lung exhaust containing lots of carbon dioxide. The flame should have gone out the quickest when breath was held for 30 seconds before breathing into the jar which covered the candle. Explain that the longer the air is held in the lungs, the longer time there is for carbon dioxide to diffuse into the lungs from the blood stream, and the longer time there is for oxygen to diffuse into the bloodstream from the lungs. The result is more carbon dioxide and less oxygen as time passes. (Helpful hints: Try this experiment several times yourself before performing it with the class. Be sure to inform parent helpers that it is tricky to put the candle out with the lung exhaust and not by the gush of wind from putting the jar down too quickly and that they will need to monitor this activity closely.)
9. An alternative activity showing this same principle can be found on p. 65 of *Blood and Guts*, "In the Bag." In this activity you breathe into a baggie and see how many times you can breathe that baggie air in until it gets real uncomfortable. This shows how your lungs struggle when filled with too much carbon dioxide. In turn, you can then use the baggie air to pour onto the candle to see how quickly it goes out, similar to the activity above.

E. *Assessment/Evaluation*

1. Students will participate in a lab in which they will observe the effect of carbon dioxide production in the lungs on a candle, and must conclude the relationship between oxygen and carbon dioxide by following a series of procedures. They will complete a lab sheet (Appendix E), which will include their question, hypothesis, materials, procedure, results, and conclusion.

### **Lesson Three: Air's Journey to the Lungs (one day)**

#### **A. Daily Objectives**

1. Concept Objective(s)
  - a. Students will know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
  - b. Students will understand that science involves a particular way of knowing and understand common connections among scientific disciplines. (Colorado State Science Standard #6)
2. Lesson Content
  - a. Nose; throat; voice box; trachea (windpipe)
  - b. Bronchi, bronchial tubes; alveoli (air sacs)
3. Skill Objective(s)
  - a. Students will trace the path of airflow through the body and recognize which body parts are involved in the process.

#### **B. Materials**

1. *Encyclopedia of the Human Body* pp. 166-167, by Richard Walker
2. Appendix F: Respiratory System Parts Diagram (transparency and one copy per student)

#### **C. Key Vocabulary**

1. Epiglottis – a thin piece of cartilage that covers the trachea during swallowing
2. Esophagus – connects the pharynx with the stomach; also called food pipe or gullet
3. Trachea (windpipe) – main trunk of the system of tubes through which air passes to the lungs
4. Pharynx (throat) – connects the mouth and nasal passages with the esophagus and trachea
5. Larynx (voice box) – the upper part of the trachea containing vocal cords
6. Bronchi- the two main branches of the trachea
7. Bronchial tubes (bronchioles) – small tubes that branch from the bronchi and continue to branch until they end with the alveoli
8. Alveoli (air sacs) – tiny air pickets in the lungs that are covered with a net of blood vessels; gasses pass between the alveoli and blood vessels

#### **D. Procedures/Activities**

1. Ask students if they can recall from the first activity what the different parts of the respiratory system are. Most likely they will recall the nose, mouth, trachea, and lungs. Draw a picture of a body outline on the board, draw in these items, and label them.
2. Read pp. 166-167 from *Encyclopedia of the Human Body* showing a more detailed diagram and explanation of the system parts. (Note: Several picture books on the respiratory system and/or the human body have good illustrations of the system parts. These can definitely be substituted; just make sure they include all the items needed for the assessment (Appendix F) and are not excessively detailed as to be too confusing.)
3. Add system parts students are unfamiliar with to the drawing on the board. Repeat again the order in which the air travels through these different parts when entering the body.
4. Show transparency of Appendix F. Label the parts together and again repeat the order of air's path. Have students say the steps with you several times until it seems they have the process down.

5. Note: Appendix F is designed for use in both Lessons Three and Four. On the diagram are lines to also label the lungs, diaphragm, and ribs, which are reviewed in lesson four. For this lesson's assessment you will need to tell students to only label the lines indicated by numbers 1-8. Assessment will be most successful if done several days after this lesson, orally repeating the steps of air's travels through the body at the beginning of each subsequent lesson (this should only take the first five minutes of each lesson).

E. *Assessment/Evaluation*

1. Students will label a respiratory system diagram correctly identifying the nose, mouth, pharynx, larynx, trachea, bronchi, bronchioles (bronchial tubes), and alveoli (Appendix F).

**Lesson Four: Inside the Lungs (three days)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the processes of scientific investigation and design, conduct, communicate about, and evaluate such investigations. (Colorado State Science Standard #1)
  - b. Students will know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
  - c. Students will understand that science involves a particular way of knowing and understand common connections among scientific disciplines. (Colorado State Science Standard #6)
2. Lesson Content
  - a. Lungs; diaphragm; ribs
3. Skill Objective(s)
  - a. Students will locate where in the body the lungs, diaphragm, and ribs can be found.
  - b. Students will recognize that the lungs, diaphragm, and ribs work in conjunction with the rest of the system parts to help a person breathe.
  - c. Students will apply scientific process steps when constructing a workable lung model, recording information during the process.

B. *Materials*

1. Appendix F: Respiratory System Parts Diagram (transparency from Lesson Three)
2. Appendix G: Air in Lungs Experiment (one copy per student)
3. Air in Lungs Activity Materials:
  - a. One 2-liter pop bottle with lid
  - b. Tap water
  - c. One 1-gallon bowl, tub, or bucket
  - d. Six-seven flexible drinking straws
  - e. One 12-inch strip of masking tape
  - f. One black marker
4. Appendix H: Lung Model Experiment (one copy per student)
5. Lung Model Materials per student:
  - a. One pair of scissors
  - b. One 2-liter pop bottle
  - c. One 9-inch round balloon
  - d. One rubber band

6. Additional Lung Model Materials:
    - a. One roll of masking tape
    - b. Ten plastic trash bags
  7. *Breathing* pp. 4-9, by Anita Ganeri
  8. *Blood and Guts* p. 62, by Linda Allison
  9. Appendix I: Partner Check Activity (one copy per student)
- C. *Key Vocabulary*
1. Lungs – a pair of organs found in the chest that are the sites of oxygen absorption
  2. Diaphragm – muscular wall separating the chest from the abdomen
  3. Ribs – the twelve pairs of bones that curve around from the backbone to the chest, forming a protective cage around the heart and lungs
  4. Pleura – thin slippery membrane which covers the lungs and lines the chest cavity
- D. *Procedures/Activities*
1. Orally trace the path of air throughout the body as a quick review of system parts using transparency of Appendix F. Tell students that in the oral review, the air ended up in the lungs and that in this lesson they will learn more about the lungs, how they work, and where the air goes next.
  2. Tell students that each lung is about the size of a football and combined can hold about as much air as a basketball. Let them know that they will have a chance to test exactly how much air their lungs can hold. Hand out Appendix G: Air in Lungs Experiment.
  3. **Air in Lungs demonstration.** (Before doing this experiment one thing that needs prepared beforehand is a measurement scale on the side of a 2-liter bottle. Place a strip of masking tape vertically along one side of the bottle. Place two cups of water at a time in the bottle, making a mark for every two cups, until the bottle is filled up. Trace over these marks with a black marker. Holding the bottle upside down, label with the black marker beginning at the top “2 cups” next to the first line, “4 cups” next to the second line, and so on until you reach the mouth of the bottle. You now have a measuring scale for this activity.)
  4. Read through with students the question, materials, and procedure. Allow a few minutes to formulate and record a hypothesis. Following the procedure, demonstrate this activity at the front of the class, involving several volunteers to participate. Basically, students will empty their lungs by breathing deeply into a straw inserted inside an upside down 2-liter bottle immersed in water. They will notice the air breathed out collected at the top of the bottle displacing some of the water. Using the measuring scale on the side of the bottle, record various students’ amounts of air they exhaled. Repeat several times. It is a good idea to choose students of various ages and sizes and participate in this activity yourself.
  5. Check to make sure students have recorded their data under “results” on their sheets. Have them formulate conclusions and discuss these together. Explain that as you breathe out, the exhaled air forced the water out of the jug, and the amount that was forced out is equal to the amount of air in your lungs. You may use this time to reiterate the steps the air takes. As it enters through the nose and mouth, nose hairs filter and trap larger air particles, preventing them from entering the lungs. Mucus in the nose also helps to trap particles and keep the cells moist. Then the air travels down the trachea, after passing the pharynx and larynx, branches into the bronchi, which further branch into bronchioles, leading into each of the lungs. After branching into smaller and smaller tubes, the bronchioles reach the tiny air sacs (alveoli) where oxygen from the air is transferred into the blood and carbon dioxide is removed. After the gas exchange

- has taken place, the diaphragm moves back into resting position, pushing the lungs along with the deoxygenated air back up and out the nose and mouth.
6. Experiment conclusions will vary, however you might mention that the average 10-year old boy or girl has a lung capacity of about 10.8 cups of air. An adult, however, can breathe in a maximum volume of about 21 cups. (Therefore, if you participate in the experiment yourself, the results are more interesting because of the contrast in amounts.)
  7. Read aloud pp. 4-9 from *Breathing* about how the lungs and diaphragm work with the rest of the system parts for breathing. Point out the diagrams reviewing the system parts (p. 5) and the illustration showing how the chest cavity changes during inhalation and exhalation (p. 6).
  8. Have students place their hands under their ribcages. Ask them to take a deep breath and hold it for a few seconds. Discuss what happens. They should each feel their whole ribcage shift upward and outward, leaving their stomach flat. Explain that when they take a deep breath, their lungs expand, pushing the ribs outward. The diaphragm drops down to allow plenty of room for this expansion. Have them blow their breath back out and get feedback on what they feel. They will feel their whole chest cavity move downward. When the lungs deflate, like a balloon, the ribs settle back into resting position and the diaphragm moves back up since it no longer needs all that extra space.
  9. Inform students that they will have a chance to make their own lung models. Since they have worked with the scientific process and have followed the steps multiple times throughout this unit, they should now be ready to perform an experiment entirely on their own, following a set of procedures. Hand out Appendix H: Lung Model Experiment. Give the students a few minutes to read over these and answer a few general questions they may have before getting started. This activity works great as an independent homework assignment. (Just be sure to give students more than one day before the due date to allow time to gather necessary supplies. You may also wish to have a few extra materials gathered in case students are not able to get them at home.) However, this activity also works as an in-class project, but all necessary materials will need to be acquired beforehand. (If this option were taken, one suggestion would be to have each student bring in his/her own 2-liter bottle to cut down on expense.)
  10. Once students have completed their models, be sure to discuss conclusions together. Supporting information to include in this discussion might be as follows: The diaphragm is a sheet-like muscle separating your chest from your abdomen. As it drops down during inhalation, your chest cavity enlarges and the air pressure inside decreases. When air pressure inside your chest is less than that outside your body, air rushes into your lungs. Air movement into the lungs is called *inspiration*. The lung model works similarly. When the plastic sheet across the bottom is pulled down, air rushes in and fills the balloon. As the diaphragm moves up, your chest cavity decreases in size and the air pressure increases. The air is now forced out of your lungs because the pressure inside your chest is greater than outside your body. Air movement out of the lungs is called *expiration*.
  11. An optional assessment in conjunction with constructing the lung model might be to have students present their model to the class and orally explain the steps that air takes through the body into the lungs and/or how the diaphragm and lungs work together to assist breathing.
  12. (Lung Model Option: A more sophisticated variation to this lung model can be found on p. 62 of *Blood and Guts*. This should only be an option if the project is

assigned for homework. Since it is a little more technical it would be difficult to do in the classroom, however some students may enjoy working on this alternative with a little assistance with materials from parents at home).

E. *Assessment/Evaluation*

1. Students will construct a working lung model, which shows how diaphragm movement alters the shape of the lungs.
2. Students will work in pairs to draw an outline of the human body (on the back of Appendix I) in which they will draw in and label the following parts of the respiratory system: nose, mouth, pharynx, larynx, trachea, bronchi, bronchioles, alveoli, lungs, diaphragm, and ribs. When finished, each partner will take turns explaining to the other the path air takes when traveling throughout the body, using the system parts in the correct order. Partners may check each other's work using Appendix I.

**Lesson Five: Breathing Freely (three days)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will know and understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado State Science Standard #3)
  - b. Students will understand that science involves a particular way of knowing and understand common connections among scientific disciplines. (Colorado State Science Standard #6)
2. Lesson Content
  - a. Smoking; damage to lung tissue; lung cancer
3. Skill Objective(s)
  - a. Students will realize their own responsibility in keeping a healthy respiratory system by controlling the spread of germs when coughing and sneezing, avoiding smoke, and strengthening the lungs through exercise.
  - b. Students will correlate smoking with harmful effects on the respiratory system.

B. *Materials*

1. Particle Buildup Demonstration Materials:
  - a. Plain white index card
  - b. Honey
  - c. Knife
2. Spray Control Demonstration Materials:
  - a. Two facial tissues
3. *The Lungs and Breathing* pp. 28, 30-32, by Steve Parker
4. *The Lungs and Respiratory System* pp. 38-42, by Steve Parker
5. *Heart and Lungs* pp. 28-29, by Jane Saunderson (optional)
6. Smoking Advertisements from magazines (one for each group of four students)
7. Appendix J: Cigarettes and Advertising (one copy per student)
8. Advertisement Materials:
  - a. Poster board
  - b. Cereal cartons (half a class set of each)

C. *Key Vocabulary*

1. Tobacco – prepared leaves of certain related plants, used for smoking or chewing or snuff
2. Snuff – powdered tobacco taken into the nose

3. Nicotine – poisonous drug found in cigarette smoke, which can cause a type of addiction
4. Toxin – poisonous substance released into the body by a disease-causing bacterium
5. Emphysema – a disease in which the alveoli become fewer and larger, which causes breathing to become more and more difficult
6. Carbon monoxide – extremely poisonous colorless gas found in cigarette smoke and exhaust fumes from automobiles
7. Carcinogen – any substance or irritant that contributes to the development of cancer
8. Cancer – one of several diseases that develop when cell division gets out of control; cancer cells multiply to form a tumor, which can prevent an organ from working properly

D. *Procedures/Activities*

1. **Particle Buildup Demonstration:** One week before starting this lesson, spread a thin layer of honey on a plain white index card. Show students the card and then place it on a flat surface somewhere it won't get touched. After one week, observe the honey on the card again. Several particles of dust will be stuck to the honey. Explain that the air we breathe is not very clean. Fortunately our respiratory system has a way to filter out many of these particles before entering our body (cilia and mucus in our nose), but there are times where these germs do affect our bodies.
2. Read p. 28 from *The Lungs and Breathing* on how germs openly exposed in the air by coughing or sneezing can affect the respiratory system.
3. **Spray Control Demonstration:** Ask a volunteer to participate in this activity. Have the student hold the top two corners of a tissue against the end of his/her nose so that the tissue covers the nose and mouth. Have him/her cough and observe the movement of the tissue. Next have him/her hold the facial tissue about 4 inches in front of his/her face and cough into it. Notice the movement of the tissue even at this distance. Finally ask him/her to hold the tissue at arm's length and again cough into the tissue. Notice the tissue's movement, although less pronounced than before. Explain that you can easily catch a cold from small germs floating in the air. After a cough or sneeze, moist air containing cold germs is sprayed into the air. The tissue blew outward during the cough and sneeze showing the germ-filled air's movement. Without the tissue, the moist air would have sprayed several yards away from the body.
4. Discuss the fact that students have control over spreading such germs. Use this time to mention things like washing hands frequently, cleaning surfaces commonly touched (remind them of the dust buildup on the honey covered card), covering mouths when coughing or sneezing, getting extra rest, and drinking lots of water.
5. Brainstorm other things in the air that can affect the respiratory system and list these on the board.
6. Read pp. 38-42 from *The Lungs and Respiratory System* about various risks to the respiratory system. Have students list other things that can affect the respiratory system learned from the book. Add these items onto the board. Tell students that many of these risks are things we do not have control over and we are fortunate that modern medicine can now treat many of these risks effectively.
7. However we can have some control over several respiratory risks. Ask students what we can do to maintain a healthy respiratory system. Among ideas mentioned, make sure they include controlling the spread of germs, avoiding

smoke, and/or exercising frequently. Controlling the spread of germs was already explained above, however be sure to add extra information about the affects of smoke and exercise on the respiratory system. More information on these areas can be found on pp. 28-29 of *Heart and Lungs* or on pp. 30-32 of *The Lungs and Breathing* if needed.

8. Have students work in small groups to develop and perform skits that show one of these ways to keep the respiratory system healthy.
9. Review harmful effects of tobacco/smoking. Many of the long-term effects will have already been mentioned above and/or can be found in the books mentioned in step #7. Point out some additional short term effects of smoking such as bad breath, smelly clothes and hair, yellow teeth and fingers, dry skin that wrinkles easily, costly, messy (ashes, butts, holes in clothing), shortness of breath, and short term effects of chewing tobacco including bad breath, brown teeth, tobacco stains on clothing, clothes smelling like tobacco, sores in mouth, spitting tobacco juice, and gum disease. (You may also wish to show a picture of a healthy lung vs. a smoker's lung such as the one on p.31 from *The Lungs and Breathing*.) Remind them also of the impact smoking can have on the circulatory system: nicotine increases the heart rate and blood pressure, constricts blood vessels, decreasing delivery of oxygen to the heart, weakens the heart muscle, and may cause pulmonary heart disease.
10. Ask students why, if tobacco is so harmful and most people are aware of this fact, they think people continue using it. Write brainstorm answers on the board. Discuss ideas such as peer pressure, image, imitating adults, relaxation, and advertising.
11. Explain that tobacco companies spend billions of dollars each year to convince people that tobacco use is fun and glamorous and build off reasons such as those listed on the board. However, the reality of tobacco use is very different from what is depicted in expensive advertising campaigns.
12. Write the following information on the board:
  - a. Macho Image (shown as strong, tough, in good shape)
  - b. Glamour/ Good Looks (shown as young, attractive, and well dressed)
  - c. Low Tar
  - d. Romance
  - e. Good Taste
  - f. Friends
13. Explain that these are the top things that tobacco companies try to use in their advertisements to promote smoking.
14. Discuss the following questions:
  - a. What kind of people do you see in cigarette ads?
  - b. Are they young or old?
  - c. Beautiful or handsome?
  - d. Are they having a good time?
  - e. Do they usually have lots of friends?
  - f. Do you think some of these ideas are misleading?
15. Divide class into groups of four. Hand out Appendix J: Cigarettes and Advertising to each student. Also give each group a tobacco advertisement. Read through information on Appendix J together. Explain to students that they will be working as a group to study their ad and answer the questions on their sheet based on the ad. Give students about 15 minutes for this activity and then have groups share their ads and question answers to the rest of the class.

16. Meet back as a whole class. Relate that media will often use tactics such as the ones listed on the board (macho image, good looks, low tar, romance, good taste, and friends), even if misleading, to sell their products. Go through each of the tactics and discuss the following questions:
- a. **Macho Image**
    - i. Do you really think they are strong and in good shape?
    - ii. What does smoking do to your lungs?
  - b. **Good Looks**
    - i. Are smokers always glamorous?
    - ii. What about the yellow teeth and nails, wrinkles, and smelly breath?
    - iii. Are those things attractive?
  - c. **Low Tar**
    - i. Is it healthy for you to smoke cigarettes lower in tar?
    - ii. Do you still receive the harmful effects?
    - iii. Do you still have bad breath?
    - iv. Are your teeth yellow?
    - v. Do your clothes stink?
  - d. **Romance**
    - i. Do you enjoy being around people who smoke?
    - ii. Is smelling like an ashtray romantic?
  - e. **Good Taste**
    - i. Do cigarettes taste good?
    - ii. Don't people usually have to force themselves to smoke when they first start?
    - iii. Do cigarettes taste bitter and burn your mouth and lungs?
  - f. **Friends**
    - i. Do you need to smoke to have friends or to have a good time?
    - ii. Do you enjoy having smoke blown in your face?
    - iii. Do you like having smoke-smelling clothes?
    - iv. Are there other things you can do to still have a good time?
17. Reinforce that it is important for them to make up their minds about tobacco before ever entering the world of smoking. Remind them that they don't have to worry about ways to quit and the negative effects it can have on their body if they never even start.
18. Inform students that there are ways to use advertising in a positive way - to inform others about all the negative aspects of smoking. Advertising can take many forms: radio, television, magazines, newspapers, billboards, the mail, etc. Tell students that they will have a chance to make an advertisement showing the harmful effects of smoking. They may design either a poster or cigarette carton to do this. Each must have a catchy name (Ex: Cancerettes), slogan, the Surgeon General's warning, along with pictures or written information about what smoking can do to your body. Once completed have students present these to the class. (This assessment can be done individually or as a group. If students work in groups for these advertisements, fewer materials will be needed. Another alternative is to do the project at home. Then materials are the students' responsibilities.)
- E. *Assessment/Evaluation*
1. Students will dramatize ways to keep the respiratory system healthy through short skits. Students will work in small groups and demonstrate one of the

following ways: controlling the spread of germs, avoiding smoke, and/or exercising frequently.

2. Students will design either posters or cigarette cartons showing harmful effects of smoking. On each will be a catchy name or slogan and the Surgeon General's warning. (Ex: on box "Cancerettes")

## VI. CULMINATING ACTIVITY (three days)

- A. **Summary Skit:** Spend several days reviewing major concepts studied throughout this unit. Have students work in groups to develop skits showing what they learned about the respiratory system. Dramas must include the purpose and parts of the respiratory system, and how to keep this system protected. They may use props and/or visual aids to help them demonstrate this criterion.
- B. **Unit Test:** After students have reviewed unit material through the skits, give them the unit test (Appendix K). Optional: You may wish to make a study guide compiling material covered during the unit. This study guide can be given to students a week before they perform skits. This will help to review test material as well as keep skits a bit more focused. By the time students take their unit test, they will have revisited the material in a variety of ways.
- C. **Field Trip:** Take a field trip to the Denver Museum of Nature and Science and visit the "Hall of Life" Exhibit. This exhibit has lots of fun hands-on activities and information about the Circulatory and Respiratory Systems, along with various other body systems. (Note: This activity may not be applicable if living outside of Colorado. However, calling different museums to see if they have an exhibit relating to the respiratory system would definitely be worthwhile.)

## VII. HANDOUTS/WORKSHEETS

- A. Appendix A: Respiratory System Information
- B. Appendix B: Additional Respiratory System Notes
- C. Appendix C: Breathing Rate Activity
- D. Appendix D: Scientific Process Experiment Form
- E. Appendix E: Candle in the Jar Experiment
- F. Appendix F: Respiratory System Parts Diagram
- G. Appendix G: Air in Lungs Experiment
- H. Appendix H: Lung Model Experiment
- I. Appendix I: Partner Check Activity
- J. Appendix J: Cigarettes and Advertising
- K. Appendix K: Unit Test
- L. Appendix L: Unit Test Answer Key

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## Appendix A

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### RESPIRATORY SYSTEM INFORMATION

To live, you need a constant supply of oxygen. You get it by breathing air. The **respiratory system** is the body system that takes oxygen from the air and uses it to make energy for your body.

When you breathe in, you draw air in through your **nose** or **mouth**. The air then travels past your throat and vocal cords through a long tube called the **trachea** or windpipe. Then the trachea splits into two branches called **bronchi**, one of which enters each of your lungs. The bronchi split into smaller and smaller branches called **bronchioles** (similar to the way tree branches get smaller and smaller at the top).

Inside your lungs, air moves into millions of tiny air sacs called **alveoli** at the end of the smallest bronchioles. There, **oxygen** passes through the air sac walls into blood vessels. The blood vessels transport oxygen to all your body parts. **Carbon dioxide**, a waste gas, is forced out of your lungs, back up through the trachea, where it is then exhaled from your nose and mouth.

**Review Questions:** Use a **boldfaced** word to solve each respiratory riddle.

1. I am a waste gas that is exhaled. \_\_\_\_\_
2. I am a long tube connecting the nose and mouth to the lungs. \_\_\_\_\_
3. Air enters the body through us. \_\_\_\_\_
4. The trachea splits into two of us. \_\_\_\_\_
5. I am a gas the body uses to help make energy. \_\_\_\_\_
6. We are millions of tiny air sacs inside the lungs. \_\_\_\_\_
7. We are branchlike tubes that get smaller and smaller and end in air sacs. \_\_\_\_\_
8. I am the system that takes in oxygen to make energy. \_\_\_\_\_

## Appendix B

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### ADDITIONAL RESPIRATORY SYSTEM NOTES

1. **Automatic controlling system-**

- involuntary action - don't have to concentrate on breathing
  - brain does it for us
- medulla - part of brain that regulates breathing
  - keeps O<sub>2</sub> and CO<sub>2</sub> levels regulated for life

2. **Breathing rate** - the number of times you inhale (bring gases into the lungs) and exhale (expel gases from the lungs) in one minute

- inhaling takes 1-2 seconds, exhaling takes 2-3 seconds
- average person's breathing rate is 14-15 breaths per minute
- after exercise, rate can increase to 100 breaths per minute

3. **Respiration** - the process of bringing oxygen to your blood and picking up carbon dioxide from your blood so that your body can get rid of it

- happens when you breathe
- is important because it brings in O<sub>2</sub>, which is needed by all cells in the body
- O<sub>2</sub> is carried by the blood to your cells
  - there it combines with glucose (sugar molecule made from the food you eat) to produce CO<sub>2</sub> and H<sub>2</sub>O (waste gases breathed out) and energy which is needed to live and gives you power for activities

## Appendix C

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### BREATHING RATE ACTIVITY

#### Directions:

1. Chose who will be the first timekeeper. When you are timekeeper, watch the second hand of the clock and tell your partner when to go. Tell them to stop as soon as one minute is up.
2. When your partner is timekeeper and says, "go," silently count the number of times you inhale. (Make sure to inhale and exhale the same way you normally do.)
3. Fill in your breathing rate for question number one and wait until your teacher gives you further directions before going on.

TIMES INHALED IN 1 MINUTE	NUMBER OF STUDENTS
11 or fewer	
12 to 15	
16 to 18	
19 to 21	
22 or more	

#### Questions:

1. What was your breathing rate (the number of times you inhaled in one minute)? \_\_\_\_\_
2. Does everyone inhale at the same rate? \_\_\_\_\_
3. If not, what is the slowest rate? \_\_\_\_\_ What is the fastest rate? \_\_\_\_\_
4. Which group has the most students? \_\_\_\_\_

**Appendix D**

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

**SCIENTIFIC PROCESS EXPERIMENT FORM**

**Activity Title:** \_\_\_\_\_

**Question:** (What do you want to find out?) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Hypothesis:** (Predict what you will find out) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Materials:** (List items you will need for this experiment) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Procedure:** (List steps you will take to test your hypothesis)

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

**Results:** (What actually happened?) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Conclusion:** (What did you learn from this experiment?) \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Appendix E

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### CANDLE IN THE JAR EXPERIMENT

**Question:** How does holding your breath change the amount of oxygen and carbon dioxide that you exhale?

**Hypothesis:** \_\_\_\_\_  
\_\_\_\_\_

**Materials per group:** one beaker (1000 mL)  
one candle  
one stopwatch (or clock with second hand)  
matches (will be provided by your adult helper)

**Procedure:**

1. Light the candle and put the beaker over it. Record how many seconds it takes for the candle to go out.
2. Light the candle again. Take a deep breath, immediately exhale the air into the beaker, and quickly set it over the candle. Record how long it takes for the candle to go out.
3. Relight the candle. Hold your breath for 10 seconds, then exhale into the beaker, and quickly set it over the candle. Record how many seconds it takes for the candle to go out.
4. Repeat step #3, holding your breath for 20 seconds this time before exhaling into the beaker.
5. Repeat step #3, holding your breath for 30 seconds before exhaling into the beaker. (Be sure to let your breath out if you start feeling dizzy).

**Results:**

Holding Breath Time	Time Until Candle Goes Out (secs.)
Plain air	
0 seconds	
10 seconds	
20 seconds	
30 seconds	

**Questions:**

1. How long does it take the candle to go out with just the air in the room? \_\_\_\_\_  
\_\_\_\_\_
2. Does holding your breath increase or decrease the amount of oxygen in your lungs? How do you know? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Conclusion:**

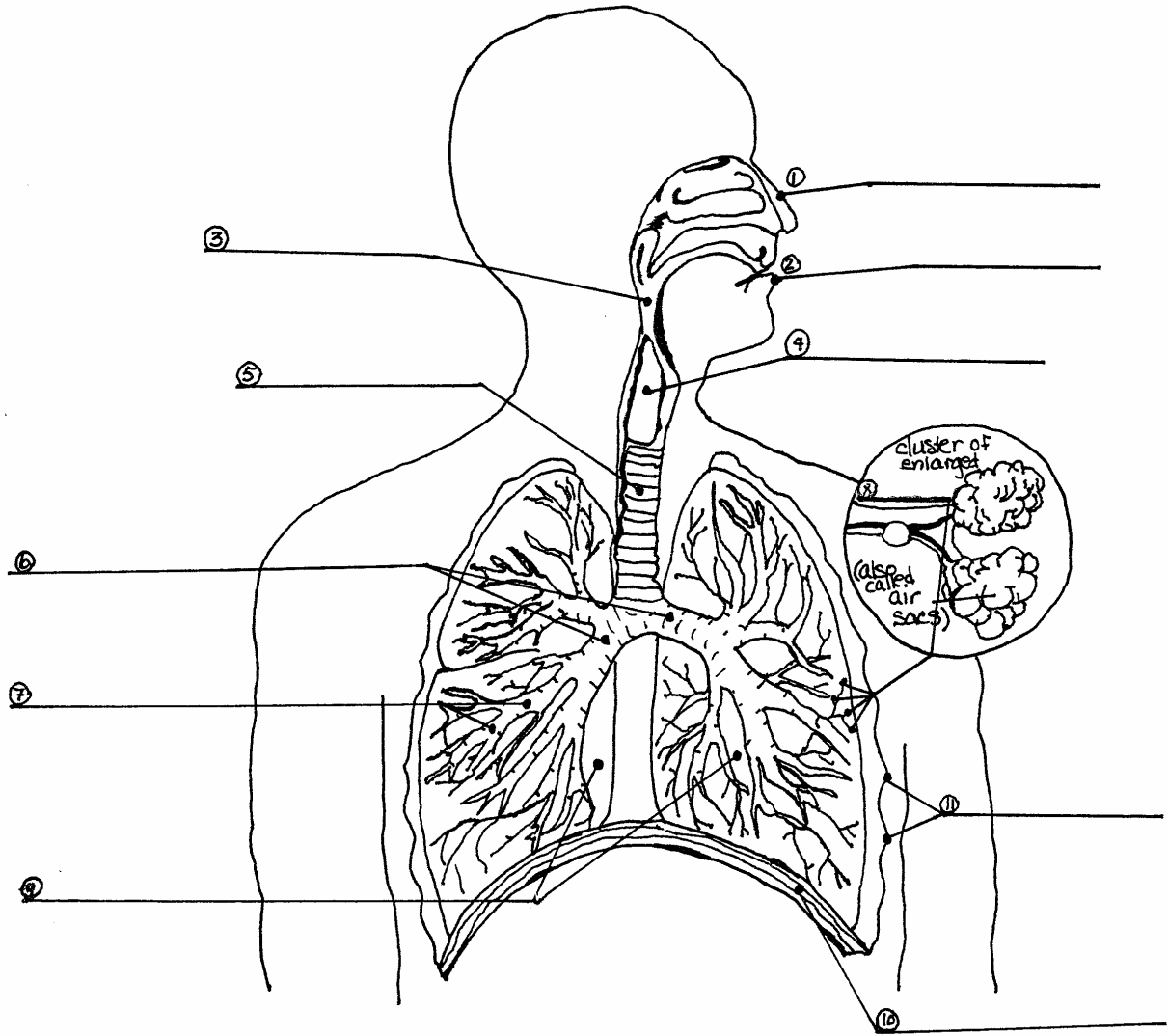
What do you think is happening in your lungs that results in the data you have? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# Appendix F

Name \_\_\_\_\_ # \_\_\_\_\_

Date \_\_\_\_\_

## RESPIRATORY SYSTEM PARTS DIAGRAM



## Appendix G

Name \_\_\_\_\_ # \_\_\_\_\_

Date \_\_\_\_\_

### AIR IN LUNGS EXPERIMENT

**Question:** How much air can your lungs hold?

**Hypothesis:** \_\_\_\_\_

**Materials:** one 2-liter pop bottle with lid  
tap water  
one 1-gallon bowl, tub, or bucket  
six-seven flexible drinking straw  
one 12-inch strip of masking tape marked with 2-cup increments

- Procedure:**
1. Turn the pop bottle upside down and place the masking tape vertically along the pop bottle so that the "2 cups" line is at the top (actually bottom when bottle is right side up.)
  2. Completely fill the bottle with tap water and screw on the lid.
  3. Fill the bowl about half full of water.
  4. Turn the bottle upside down in the water bowl, then unscrew the lid under the water.
  5. Place the short end of the straw into the neck of the upside down bottle.
  6. Take as big a breath as you can and exhale into the straw. (Make sure not to let the straw come out of the bottle.)
  7. Measure the amount of air you breathe out, using the change in water level on the tape.
  8. Replace the breathed out water and straw before the next person takes his/her turn.

**Results:** (What actually happened?) \_\_\_\_\_

**Conclusion:**

How much air does a person's lungs hold? \_\_\_\_\_

## Appendix H

Name \_\_\_\_\_ # \_\_\_\_\_

Date \_\_\_\_\_

### LUNG MODEL EXPERIMENT

**Question:** How does the lung model represent how our lungs work?

**Hypothesis:** \_\_\_\_\_

**Materials:** scissors  
2-liter pop bottle  
9-inch round balloon  
12" x 12" piece of plastic from a trash bag  
masking tape  
rubber band

- Procedure:**
1. Cut off and discard the bottom of the pop bottle (might need an adult helper for this.)
  2. Place the balloon inside the bottle, stretching the mouth of the balloon over the mouth of the bottle.
  3. Fold the plastic sheet in half twice. Beginning at the folded corner, twist a 1-inch section of the plastic sheet, and secure it with tape. This section will be the handle.
  4. Lay the plastic sheet on a flat surface and unfold it with the handle underneath.
  5. Set the open end of the bottle on the plastic sheet.
  6. Draw the edges of the plastic up around the bottle, securing them with the rubber band.
  7. Hold the bottle with one hand, and with your other hand, move the surface of the plastic sheet out and in by pulling and pushing on the handle. Watch what happens to the balloon.

**Results:** (What actually happened?) \_\_\_\_\_

### Conclusion:

How does the lung model represent how our lungs work? \_\_\_\_\_

## Appendix I

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### PARTNER CHECK ACTIVITY

#### Directions:

1. Be sure your partner has completed his/her diagram on the backside of this paper.
2. Hold this paper up so that your partner can see his/her diagram while explaining the path of airflow throughout the body.
3. Listen to his/her explanation of air's path through the body and check to make sure he/she mentions all the body parts in boldfaced type below. Also check that the steps are being given in the proper order. Use the steps below as a guide.

#### Air's Journey Through the Body

- a. Air goes in through the **nose** and **mouth**.
- b. It travels past the **pharynx**, past the **larynx**, and on down the **trachea**.
- c. The trachea branches into two **bronchi**, which branch into smaller **bronchioles**, and goes into the **lungs**.
- d. At the end of the smallest bronchioles are **alveoli**.
- e. There gas is exchanged in the bloodstream.
- f. The **diaphragm** then pushes the deoxygenated air back up the trachea and out the nose and mouth.
- g. There the process repeats again.

4. Record your partners score.

Number of boldfaced words mentioned: \_\_\_ / 10

Number of steps correct (do not count g): \_\_\_ / 6

Number of steps correct in order  
(not counting g): \_\_\_ / 6

Give an extra point for each if your partner mentioned **carbon dioxide** or **oxygen**. + \_\_\_

5. Record in the space below any extra information your partner added (if applicable):

6. Now switch turns with your partner, so that you are doing the labeling and retelling air's travels through the body to your partner.

## Appendix J

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### CIGARETTES AND ADVERTISING

Tobacco companies spend about three billion dollars in the United States each year trying to persuade you to start smoking. They know that if they can get you to start, you will be their customer (possibly even for life). If they can succeed, you would end up paying them money each day for the rest of your life.

Many cigarette ads are misleading and try to convince you that it is a good thing to start smoking. They usually show people enjoying the cigarettes. Many models and actors appear in these ads and are supposed to look like the type of person you would admire or want to imitate. (Many of these are actually nonsmokers in real life).

Study the magazine ad your group was given. Use it to answer the following questions:

1. Describe the picture used in the ad. \_\_\_\_\_  
\_\_\_\_\_
2. What is the ad saying about cigarettes? \_\_\_\_\_  
\_\_\_\_\_
3. What is the ad saying about people who smoke this brand of cigarette? \_\_\_\_\_  
\_\_\_\_\_
4. What sort of person do you think would like this ad? \_\_\_\_\_  
\_\_\_\_\_
5. Could the picture in this ad also be used to sell nonsmoking? If so, how? \_\_\_\_\_  
\_\_\_\_\_
6. What else could this ad picture be used to sell? \_\_\_\_\_  
\_\_\_\_\_
7. Take another close look at your ad. List at least three things you do not see in the picture that would normally be there in real life (ex: ashtrays). Why do you think these things were left out? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Appendix K, page 1

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### RESPIRATORY SYSTEM UNIT TEST

**TRUE/FALSE:** Read the statement and decide it is true or false. Write the word *true* if it is true and *false* if the statement is false.

1. \_\_\_\_\_ A person cannot talk and inhale at the same time.
2. \_\_\_\_\_ The average person's breathing rate is 24-25 breaths per minute.
3. \_\_\_\_\_ Respiration is a voluntary action.
4. \_\_\_\_\_ Pharynx is another name for the windpipe.
5. \_\_\_\_\_ Germs cause colds.
6. \_\_\_\_\_ The diaphragm becomes stronger with exercise.
7. \_\_\_\_\_ Cigarettes low in tar are not harmful.
8. \_\_\_\_\_ Tobacco companies spend billions of dollars each year on advertising.

**SHORT ANSWER:** Please answer the following questions with *complete sentences*.

1. What is the function of the respiratory system?
2. List at least five (body) parts of the respiratory system.
3. Which gases are used by our bodies during respiration?
4. How do the diaphragm and lungs work together while breathing?
5. Explain how smoking and alcohol intake can be damaging for the respiratory system.

## Appendix K, page 2

**MATCHING:** Match each term to its corresponding definition by writing the definition *letter* in the blank.

- |                         |   |
|-------------------------|---|
| _____1. Respiration     | A. connects the pharynx with the stomach; also called food pipe   |
| _____2. Carbon dioxide  | B. small tubes that branch from the bronchi and continue to branch until they end with the alveoli        |
| _____3. Oxygen          | C. the overall exchange of oxygen and carbon dioxide between the atmosphere, lungs, blood, and body cells |
| _____4. Trachea         | D. also called the windpipe   |
| _____5. Larynx          | E. gas breathed in and transported to every cell in the body through blood                                |
| _____6. Pharynx         | F. waste gas that is breathed out   |
| _____7. Bronchial tubes | G. connects the mouth and nasal passages with the esophagus and trachea                                   |
| _____8. Diaphragm       | H. muscular wall separating the chest from the abdomen  |
| _____9. Esophagus       | I. The upper part of the trachea containing vocal cords   |

**ESSAY QUESTION:** Explain the path that air takes when traveling throughout your body during respiration. Include in your explanation all major (body) parts included, while keeping the steps in proper order. Be sure to include a topic sentence, *at least* three supporting sentences, and a conclusion.

## Appendix L, page 1

Name \_\_\_\_\_ # \_\_\_\_\_  
Date \_\_\_\_\_

### RESPIRATORY SYSTEM UNIT TEST ANSWER KEY

**TRUE/FALSE:** Read the statement and decide if it is true or false. Write the word *true* if it is true and *false* if the statement is false.

1. **true** A person cannot talk and inhale at the same time.
2. **false** The average person's breathing rate is 24-25 breaths per minute.
3. **false** Respiration is a voluntary action.
4. **false** Pharynx is another name for the windpipe.
5. **true** Germs cause colds.
6. **true** The diaphragm becomes stronger with exercise.
7. **false** Cigarettes low in tar are not harmful.
8. **true** Tobacco companies spend billions of dollars each year on advertising.

**SHORT ANSWER:** Please answer the following questions with *complete sentences*.

1. What is the function of the respiratory system?

**The main function of the respiratory system is to take in oxygen and remove carbon dioxide.**

2. List at least five (body) parts of the respiratory system.

**Parts of the respiratory system include the nose, throat (pharynx), voice box (larynx), trachea (windpipe), bronchi, bronchial tubes, air sacs (alveoli), blood cells, lungs, diaphragm, and ribs.**

3. Which gases are used by our bodies during respiration?

**Our bodies use carbon dioxide and oxygen during respiration. We breathe in oxygen and breathe out carbon dioxide.**

4. How do the diaphragm and lungs work together while breathing?

**When inhaling, the lungs expand, pushing the ribs outward. The diaphragm drops down to allow plenty of room for this expansion.**

5. Explain how smoking and alcohol intake can be damaging for the respiratory system.

**Alcohol can lower resistance to infection in the lungs, and if high amounts are consumed, breathing may stop, causing death. Smoking causes chronic bronchitis, emphysema, and lung cancer.**

## Appendix L, page 2

**MATCHING:** Match each term to its corresponding definition by writing the definition *letter* in the blank.

- |                                 |   |
|---------------------------------|---|
| <u>  C  </u> 1. Respiration     | A. connects the pharynx with the stomach; also called food pipe   |
| <u>  F  </u> 2. Carbon dioxide  | B. small tubes that branch from the bronchi and continue to branch until they end with the alveoli        |
| <u>  E  </u> 3. Oxygen          | C. the overall exchange of oxygen and carbon dioxide between the atmosphere, lungs, blood, and body cells |
| <u>  D  </u> 4. Trachea         | D. also called the windpipe   |
| <u>  I  </u> 5. Larynx          | E. gas breathed in and transported to every cell in the body through blood                                |
| <u>  G  </u> 6. Pharynx         | F. waste gas that is breathed out   |
| <u>  B  </u> 7. Bronchial tubes | G. connects the mouth and nasal passages with the esophagus and trachea                                   |
| <u>  H  </u> 8. Diaphragm       | H. muscular wall separating the chest from the abdomen  |
| <u>  A  </u> 9. Esophagus       | I. The upper part of the trachea containing vocal cords   |

**ESSAY QUESTION:** Explain the path that air takes when traveling throughout your body during respiration. Include in your explanation all major (body) parts included, while keeping the steps in proper order. Be sure to include a topic sentence, *at least* three supporting sentences, and a conclusion.

**Answers vary. Check to make sure there are at least five sentences. Look for major parts of the respiratory system including nose, mouth, trachea, bronchial tubes, and lungs. Inclusion of additional system parts might be bonus points.**