

# The Human Body

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

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**Length of Unit:** 11 lessons (approximately 12 days, one day = 45 minutes)

## I. ABSTRACT

This unit is intended to provide fourth graders with an overview of the Circulatory and Respiratory Systems and to provide teachers with lessons to cover the requirements in the *Core Knowledge Scope and Sequence*. Through reading, class discussions, and activities, the students will gain a foundational knowledge of these two important systems of the human body. This unit uses a variety of approaches to learning, including writing, drawing and labeling diagrams, and creating a Science copybook (or notebook).

## II. OVERVIEW

- A. Concept Objectives
  - 1. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
- B. Content from the *Core Knowledge Sequence* (page 104)
  - 1. The Circulatory System
    - a. Pioneering work of William Harvey
    - b. Heart: four chambers (auricles/atria and ventricles), aorta
    - c. Blood
      - i. Red blood cells (corpuscles), white blood cells (leukocytes), platelets, hemoglobin, plasma, antibodies
      - ii. Blood vessels: arteries, veins, capillaries
      - iii. Blood pressure, pulse
      - iv. Coagulation (clotting)
    - d. Filtering function of the liver and spleen
    - e. Fatty deposits can clog blood vessels and cause a heart attack
    - f. Blood types (four basic types: A, B, AB, O) and transfusions
  - 2. The Respiratory System
    - a. Process of taking in oxygen and getting rid of carbon dioxide
    - b. Nose, throat, voice box, trachea (windpipe)
    - c. Lungs, bronchi, bronchial tubes, diaphragm, ribs, alveoli (air sacs)
    - d. Smoking: damage to lung tissue, lung cancer
- C. Skill Objectives
  - 1. Identify and list the three parts of the Circulatory System.
  - 2. Identify and list the four main parts of blood.
  - 3. Explain the purpose of coagulation.
  - 4. Create a diagram illustrating the four different blood types and to show how transfusions work among the four blood types.
  - 5. Define blood pressure.
  - 6. Take and record pulse.
  - 7. Accurately record information in a chart.
  - 8. Draw and label a diagram of the human heart.
  - 9. Explain the functions of the four chambers of the human heart.
  - 10. Explain ways to prevent heart attacks.
  - 11. Draw and web information on the liver and spleen.

12. Compare and contrast the old beliefs on the Circulatory System to the ones William Harvey proved to be true in the 1600's.
13. To correctly answer true/false and short answer questions on the Circulatory System.
14. To correctly label a diagram of the human heart.
15. Identify the three parts of the Respiratory System.
16. Draw and label the nose, mouth, throat, voice box, and trachea (windpipe).
17. Draw and label the different parts of the lungs.
18. Explain the dangers of smoking.
19. To correctly label a diagram of the Respiratory System.
20. To correctly explain the parts of the Respiratory System.
21. To explain why smoking is hazardous to ones health.

### III. BACKGROUND KNOWLEDGE

- A. For Teachers
  1. Hirsch, E. D. Jr. *What Your Fourth Grader Needs to Know*. New York, NY: Dell Publishing, 1992. (ISBN 0-385-31260-1)
  2. Ruiz, Andres Llamas. *Cycles of Life: Blood Circulation*. New York, NY: Sterling Publishing Co., Inc., 1996. (0-8069-9331-6)
  3. Sandeman, Anna. *Body Books: Blood*. Brookfield, CT: Copper Beech Books, 1996. (0-7613-0477-0)
  4. Silverstein, Alvin, Silverstein Virginia, Silverstein, Robert. *The Circulatory System*. New York, NY: Twenty-First Century Books, 1994. (9-8050-2833-1)
  5. Silverstein, Alvin, Silverstein, Virginia, Silverstein, Robert. *The Respiratory System*. New York, NY: Twenty-First Century Books, 1994. (0-8050-2831-5)
- B. For Students
  1. The students will have knowledge about the Human Body from studying its various aspects and systems in previous grades (starting in Kindergarten through third grade).

### IV. RESOURCES

- A. *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr. - a class set is highly recommended, but if this is not available, one copy for the teacher will suffice (Lessons One, Three, Four, Five, Eight, and Ten)
- B. Various materials for blood demonstration (Lesson One)
- C. Various materials for blood clotting demonstration (Lesson Two)
- D. *Body Books: Blood* by Anna Sandeman (Lessons Two and Three)
- E. *Cycles of Life: Blood Circulation* by Andres Llamas Ruiz (Lesson Five)
- F. *The Circulatory System* by Dr. Alvin Silverstein, Virginia Silverstein, and Robert Silverstein (Lesson Five)
- G. Various materials for lung activity (Lesson Nine)
- H. *Focus on Nicotine and Caffeine* by Robert Perry (Lesson Ten)
- I. Student copybooks - these are black and white composition books created by the students as individual History books; regular paper in a folder or notebook will also work (every lesson except Lessons Seven and Eleven)

## V. LESSONS

### Lesson One: Blood (approximately 45 minutes)

#### A. Daily Objectives

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
2. Lesson Content
  - a. Blood
    - i. Red blood cells (corpuscles), white blood cells (corpuscles), platelets, hemoglobin, plasma, antibodies
3. Skill Objective(s)
  - a. Identify and list the three parts of the Circulatory System.
  - b. Identify and list the four main parts of blood.

#### B. Materials

1. *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
2. Water
3. Yellow food coloring
4. Two small glass jars with lids
5. Hole punches (one/student if possible)
6. Several red plastic folders
7. White plastic grocery bag
8. Scissors (one pair for the teacher)
9. One sheet of brown construction paper

#### C. Key Vocabulary

1. Circulatory system – the system that carries blood around the body
2. Plasma – the watery part of the blood
3. Red blood cells – the part of the blood that carries oxygen
4. White blood cells – the part of the blood that helps the body fight infection
5. Platelets – the part of the blood that controls bleeding
6. Antibodies – proteins that attack invading germs
7. Hemoglobin – a red pigment that can combine with oxygen; it gives red blood cells their color

#### D. Procedures/Activities

1. Make a “KWL” chart about the Circulatory System (the heart, blood, and blood vessels). Create a chart with three columns on a piece of butcher paper. One column is for what students already Know, one is for what the Want to learn, and the third is for what they have Learned. As a class, fill out the first two columns, by letting the students state what they already know about the Circulatory System and what they hope to learn in this unit. The third one will be filled in as the unit progresses. Have students copy the chart into their copybooks.
2. On the next page of their copybooks, have students create a vocabulary page for this unit (they may need two pages for this). On the overhead, list the day’s vocabulary words and their definitions. Talk about the words to make sure students understand them.
3. As a class, read page 326 (“The Circulatory System” and “The Blood”) in *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr. Also, look at the pictures on page 327.
4. Discuss the parts of the Circulatory System (blood, blood vessels, and the heart). Ask what the blood is made up of (red and white blood cells, platelets, and plasma). Tell them that blood also contains antibodies, which fight germs.

- Finally, red blood cells contain hemoglobin, which helps them carry oxygen around the body (note – this is not in the book, but is needed information).
5. Complete the following activity (adapted from *The Incredible Human Body* by Ester Weiner).
  6. Fill one small jar with water and add a few drops of food coloring (do this ahead of time and keep out of sight until near the end of the activity).
  7. Tell students they will be making a model of blood. This will show them both the solid and liquid parts of blood. Make sure they realize in reality the solid part of blood is so small it cannot be seen without a microscope.
  8. Inform students that all living things are made of tiny building blocks called cells. We are made of different kinds of cells that do different things. Ask what kinds of cells they think cover them (skin cells). Ask: What kinds of cells do you think are rushing inside the blood vessels in your body? (blood cells).
  9. Have students create 1,000 red blood cells by punching out dots from the red plastic folders with hole punches (note – to save time, or if you cannot get enough hole punches, you can have part of these red blood cells punched out ahead of time). Challenge students to calculate how many red blood cells each student must make to reach the total number. They should place their red blood cells in the empty glass jar. To be sure students are not confused by the size of the model cells they are making, ask them to visualize the head of a pin. Then tell them about a million red blood cells would fit on it!
  10. Explain to the students that you, too, will contribute to the creation of the blood by making all of the white blood cells - all two of them! Tell students there are approximately two white blood cells for every 1,000 red blood cells. Cut out the white blood cells in amoebae-like shapes from the white plastic grocery bag. Make them several times larger than the red blood cells. Place them in the jar as well.
  11. Then have students make tiny cells called platelets by punching out 50 dots of brown construction paper. The 50 platelets should go in the jar as well.
  12. When all the cells are in the jar, ask students how they think solid blood cells could get around the body (a liquid part of the blood is needed). Show students the jar of yellow-colored water and inform them that this represents plasma, the liquid part of the blood. Pour the liquid into the jar, barely covering the cells, so the color still seems red. Now students will understand why the blood looks red - the hemoglobin in the red blood cells, when combined with oxygen, gives the blood its red color.

E. *Assessment/Evaluation*

1. Have a quick review with the students. Have them write (in their copybooks or notebooks) the three parts of the circulatory system (blood, blood vessels, and the heart) and the four main parts of the blood (red blood cells, white blood cells, platelets, and plasma). To grade, use Appendix A. The copybooks (or notebooks) can be graded after each lesson, or at the end of the unit.

**Lesson Two: Blood Clotting and Blood Types (approximately 45 minutes)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)

Lesson Content

- a. Blood

- i. Coagulation (clotting)
    - b. Blood types (four basic types A, B, AB, O) and transfusions
  - 2. Skill Objective(s)
    - a. Explain the purpose of coagulation.
    - b. Create a diagram illustrating the four different blood types and to show how transfusions work among the four blood types.
- B. *Materials*
  - 1. ½ pint jar (the smaller the mouth, the better)
  - 2. Water
  - 3. Scissors
  - 4. Cheesecloth
  - 5. Rubber Band
  - 6. Large bowl
  - 7. *Body Books: Blood* by Anna Sandeman (if this is not available, find another book that talks about the four blood types, such as *The Circulatory System* by Alvin Silverstein, Virginia Silverstein, and Robert Silverstein or *Reader's Digest: How the Body Works* by Steve Parker)
  - 8. Appendix A (one/student)
  - 9. Appendix B (one copy for the teacher)
  - 10. Copybooks (or notebooks)
- C. *Key Vocabulary*
  - 1. Coagulation (clotting) – the formation of a semisolid gel
  - 2. Clot – a gel-like, thickened plug that stops the flow of blood
  - 3. Fibrin – a protein that forms long, yellowish, sticky fingers which tangle together to make a cobweb-like mesh
- D. *Procedures/Activities*
  - 1. Quickly review the information studied in Lesson One (the three parts of the Circulatory System – blood, blood vessels, and the heart and the four part of blood – red and white blood cells, platelets, and plasma).
  - 2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
  - 3. Write the day's vocabulary words and their definition on the vocabulary page in student copybooks.
  - 4. Ask the students what happens when they get a cut (it bleeds, a scab forms). Tell them you are going to demonstrate how the scab forms.
  - 5. Demonstrate clotting (adapted from the book, *Play and Find Out About The Human Body* by Janice VanCleave) by following the procedures listed below.
  - 6. Fill the jar about half full of water.
  - 7. Cut three squares from the cheesecloth large enough to cover the mouth of the jar.
  - 8. Lay the cloth squares one at a time across the mouth of the jar. Position the cloth squares so that the threads crisscross, forming small openings between them.
  - 9. Put the rubber band over the cloth and around the neck of the jar so that the rubber band holds the cloth squares securely against the jar.
  - 10. Set the bowl on the table. Hold the jar upright over the bowl and then quickly turn the jar upside down. At first, some of the water will pour out of the jar, but most of it will stay inside.
  - 11. Explanation - this is what is called *coagulation*, or clotting. When you cut yourself, platelets start to fill the hole by sticking to the edges of the cut. They swell and release a substance that attracts other platelets. They clump together

and form a plug. If it is a small cut, the platelets can plug it completely. If the cut is large, the platelets help even further. A chain of chemical reactions begin which turn a blood plasma protein, fibrinogen, to fibrin, long, yellowish, sticky fibers which tangle together to form a cobweb-like mesh. Platelets and white and red blood cells get caught in this web and form a thickened web or clot. Once formed and the hole is plugged, the fiber shrinks and the clot hardens. A scab then forms to help keep germs out.

12. Read pages 26-27 (“Blood Groups”) in *Body Books: Blood* by Anna Sandeman. Note – if this book is not available, find another source that has information on blood types and transfusions – see the materials section or bibliography for more suggestions.
  13. Using Appendix B as an example, guide the students in making a page for their copybooks or notebooks on blood types and transfusions. Draw a diagram on the board or overhead using the information from Appendix B and have the students copy it into their copybooks or notebooks.
  14. As you are drawing the arrows, explain how transfusions work. Someone with A blood can donate either to someone else with A blood, or to someone with AB blood. Someone with B blood can donate either to someone with B blood or someone with AB blood. Someone with AB blood can donate only to someone else with AB blood. Someone with O blood can donate to someone with O blood, someone with A blood, someone with B blood, or someone with AB blood.
  15. Discuss with students the following questions:
    - a. Can someone with AB blood donate to someone with B blood? (No, AB can only donate to AB blood types).
    - b. Can an A blood type donate to an O blood type? (No).
    - c. Can an O blood type receive blood from a B blood type? (No, O blood types can only receive transfusions from others with O blood).
    - d. Can any blood type donate to another person who has that same blood type? (Yes).
  16. As a review, ask students what the purpose of coagulation (clotting) is (to form a plug, or clot, to keep out germs).
- E. *Assessment/Evaluation*
1. Students will be assessed by correctly completing the page on blood types and transfusions in their copybooks or notebooks (use Appendices A and B to grade).

### **Lesson Three: Blood Vessels (approximately 45 minutes)**

#### A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
2. Lesson Content
  - a. Blood
    - i. Blood vessels: arteries, veins, capillaries
    - ii. Blood pressure, pulse
3. Skill Objective(s)
  - a. Define blood pressure.
  - b. Take and record pulse.
  - c. Accurately record information in a chart.

B. *Materials*

1. *What Your Fourth Grader Needs to Know* by E. D. Hirsch Jr.
2. *Body Books: Blood* by Anna Sandeman
3. Appendix A (one/student)
4. Appendix C (one/student and one made into a transparency copy)
5. Colored pencils (needed by each student)
6. Copybooks or notebooks

C. *Key Vocabulary*

1. Blood vessels – tubes that carry blood around the body
2. Arteries – the blood vessels that carry blood away from the heart
3. Veins – the blood vessels that carry blood back to the heart
4. Capillaries – tiny blood vessels that connect arteries and veins
5. Blood pressure – the force exerted on the walls of the blood vessels
6. Pulse - the beating of the heart and the arteries that you can feel at places under your skin

D. *Procedures/Activities*

1. Quickly review the information studied in Lesson Two (clotting –when a small cut occurs, platelets start to fill the hole by sticking to the edges of the cut. If the cut is large, a chain of chemical reactions begin which turn a blood plasma protein, fibrinogen, to fibrin, long, yellowish, sticky fibers which tangle together to form a cobweb-like mesh. Platelets and white and red blood cells get caught in this web and form a thickened web or clot. Once formed and the hole is plugged, the fiber shrinks and the clot hardens. A scab then forms to help keep germs out). Also review the four blood types (A, B, AB, and O).
2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
3. Write the day’s vocabulary words and their definition on the vocabulary page in student copybooks.
4. Read page 328 (“The Blood Vessels”) in *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
5. Discuss the three types of blood vessels (arteries, veins, and capillaries). Remind students that arteries take blood away from the heart and veins take blood back to the heart.
6. For more information, read pages 18-21 in *Body Books: Blood* by Anna Sandeman out loud to the class. If this book is not available, find more information on blood vessels to read to the class from one of the books listed in the bibliography.
7. Talk about blood pressure. Demonstrate what “exerting a force” means by asking a student to hold his or her hand up against yours. Press gently against their hand. Tell students this is what the blood does to the walls of their blood vessels as it passes by. Doctors measure blood pressure in the same place – the main artery of the arm. In essence, blood pressure measures how quickly the blood is rushing through the blood vessels.
8. Ask students if they think they can tell how fast their heart is beating. The answer is yes – by taking their pulse! Read pages 22-23 in *Body Books: Blood* out loud to the class. If this book is not available, find more information on blood vessels to read to the class from one of the books listed in the bibliography.
9. When finished, demonstrate how to take your pulse by placing two fingers (not your thumb) on your wrist. Take it for 15 seconds and then multiply by four. Tell them their homework will be to take their pulse and the pulse of two other

family members after three different activities (such as running or doing jumping jacks). They will then complete a worksheet based on their findings (Appendix C).

10. Pass out Appendix C to the students. Have students glue the chart into their copybooks (or notebooks). Using a transparency copy of Appendix C, model for the students how to complete the chart.

E. *Assessment/Evaluation*

1. Students will be assessed on the completion of the pulse worksheet they did for homework (record grade on Appendix A).

**Lesson Four: Heart (approximately 45 minutes)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
2. Lesson Content
  - a. Heart: four chamber (auricles/atria and ventricles), aorta
3. Skill Objective(s)
  - a. Draw and label a diagram of the human heart.
  - b. Explain the functions of the four chambers of the human heart.

B. *Materials*

1. *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
2. Copybooks or notebooks
3. Red and blue colored pencils (needed by each student)
4. Appendix A (one/student)
5. Appendix D (made into an overhead transparency)
6. Appendix E (one copy for the teacher)
7. Appendix F (one copy made into an overhead)
8. Appendix G (one copy for the teacher)

C. *Key Vocabulary*

1. Heart – the organ which pumps blood around the body
2. Atrium (auricle) – one of the two upper chambers in the heart
3. Ventricle – one of the two bottom chambers in the heart
4. Aorta – the largest artery in the body

D. *Procedures/Activities*

1. Review the pulse worksheets the students did as homework. What were their findings? (They should include observations that the pulse rate was lower when resting then when exercising or running. They may also note that adult's pulse rate is slower than that of children).
2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
3. Write the day's vocabulary words and their definition on the vocabulary page in student copybooks.
4. Read pages 328-329 ("The Heart" and "Following the Circuit") in *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
5. Ask what the heart is responsible for (keeping blood pumping throughout the body). What happens if the cells of the body do not carry oxygen and nutrients to them? (The cells cannot live). Discuss what the blood that flows through the arteries contains (oxygen). What happens when the blood passes through the



capillaries? (Oxygen and nutrients are given to the cells, and picks up water and waste products which the veins carry back to the heart.) Where is the carbon dioxide exchanged for oxygen? (In the lungs.)

6. Put the transparency copy of Appendix D on the overhead, having students follow along by drawing one in their copybooks (or notebooks). Use the picture of the heart on page 328 of *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr. or Appendix E as a guide.
7. Label the four chambers (right and left atria/auricles, right and left ventricles, and the aorta).
8. Color the right atrium and right ventricle blue. This is to demonstrate that the blood coming in from the veins does not have any oxygen and therefore is a bluish color.
9. Color the left atrium, the left ventricle, and the aorta red. This is to demonstrate that the blood coming into the oxygen from the lungs and being taken to the rest of the body by the arteries is full of oxygen, and therefore a reddish color.
10. After finishing the diagram, put a transparency copy of Appendix F on the overhead. Have students answer these questions in their copybooks (or notebooks) and allow them to use the diagram of the heart they just completed. They do not have to write the questions, but they do need to answer them in complete sentences.

E. *Assessment/Evaluation*

1. Students will be assessed by the diagram of the heart in their copybooks or notebooks (see Appendices A and E to grade).
2. Students will be assessed by the correct completion of the questions in their copybooks or notebooks (see Appendices A and G to grade).

**Lesson Five: Health Issues and the Liver and Spleen (approximately 45 minutes)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
2. Lesson Content
  - a. Filtering function of liver and spleen
  - b. Fatty deposits can clog blood vessels and cause a heart attack
3. Skill Objective(s)
  - a. Explain ways to prevent heart attacks.
  - b. Draw and web information on the liver and spleen.

B. *Materials*

1. *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
2. Students copybooks or notebooks
3. *Cycles of Life: Blood Circulation* by Andres Llamas Ruiz (or other book with information on the liver or spleen – see bibliography for ideas)
4. *The Circulatory System* by Dr. Alvin Silverstein, Virginia Silverstein, and Robert Silverstein (or other book with information on the liver or spleen – see bibliography for ideas)
5. Appendix A (one/student)
6. Appendix H (one copy for the teacher)
7. Appendix I (one copy for the teacher)

C. *Key Vocabulary*

1. Clogged – to become blocked, or stopped up

2. Heart attack – a heart problem that occurs when the supply of blood to a part of the heart is cut off
3. Organs – body parts that perform certain jobs
4. Liver – a large, wedge-shaped organ that lies just below the lungs
5. Spleen – a spongy mass of tissue that is found on the left side of your stomach

D. *Procedures/Activities*

1. Review the previous lesson by putting Appendix D on the overhead. See if students can correctly label the parts of the heart without using their copybooks (or notebooks). Review the atria (upper chambers) and the ventricles (lower chambers). Review that blood from the body flows into the heart on the right side. This blood does not contain any oxygen. The oxygen rich blood flows out of the heart on the left side, and carries oxygen to the cells in the body.
2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
3. Write the day's vocabulary words and their definition on the vocabulary page in student copybooks.
4. Read page 330 in *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr. ("Stopping Up the System"). Ask what are two good ways for the students to prevent having heart attacks when they are older (eating foods that are low in fat and exercising regularly).
5. Read information to the students on the liver and spleen. Use *Cycles of Life: Blood Circulation* by Andres Llamas Ruiz, pages 28-29. (There is also some information in *The Circulatory System* by Dr. Alvin Silverstein, Virginia Silverstein, and Robert Silverstein on pages 51 and 67.) Also use the information in Appendix H to read to the students. Tell the students they need to pay close attention as you read.
6. On the board or overhead, draw a picture of the liver and the spleen. Have students do the same in their copybooks (or notebooks). After drawing these organs, web information about them around the pictures (see Appendix I as an example). Ask the students what they learned and what important facts should be included. These facts may vary depending on your students, but try to guide them into webbing at least three facts about the liver and the spleen, and should include at least some of the following facts:
  - a. Liver – wedge-shaped, weight about three pounds, located below the lungs, filters blood, builds materials (such as chemicals used in blood clotting), stores substances used to give the body energy, changes hemoglobin into bile, and produces heat.
  - b. Spleen – a spongy mass of tissue, bean-shaped, the size of your heart, located on the left side of your stomach, destroys old, worn-out red blood cells, produces white blood cells, filters out germs, and works by squeezing in and out.

E. *Assessment/Evaluation*

1. Students will be assessed by the completion of this page in their copybooks or notebooks (use Appendices A and I to grade).

## **Lesson Six: William Harvey (approximately 45 minutes)**

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

1. Concept Objective(s)
  - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
2. Lesson Content
  - a. Pioneering work of William Harvey
3. Skill Objective(s)
  - a. Compare and contrast the old beliefs on the Circulatory System to the ones William Harvey proved to be true in the 1600s.

### **B. *Materials***

1. Students copybooks or notebooks
2. Appendix A (one/student)
3. Appendix J (one/student)
4. Appendix K (one copy for the teacher)
5. Appendix L (one/student)

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

1. Pioneer – one who prepares the way for others
2. Anatomy – study of the form or structure of the body

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

1. Review the facts learned yesterday about preventing heart attacks (eat low-fat food and exercise regularly). Review the functions of the liver and spleen by going over the webs made in the students' copybooks (or notebooks).
2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
3. Write the day's vocabulary words and their definition on the vocabulary page in student copybooks.
4. Pass out Appendix J. Read the information on William Harvey out loud as a class.
5. Using Appendix K as an example, have students draw two hearts in their copybooks (or notebooks), labeling one "old beliefs" and one "William Harvey's beliefs."
6. Ask students what some of the old beliefs about the circulatory system were. Write these in the first heart. (The body has two different types of blood, the blood flows through the body and is used up, there are small holes, or pores in the heart which allowed the blood to flow from one side of the heart to the other, the heart pulled blood into itself, the arteries pumped themselves.)
7. Next, for each of the old beliefs, ask what William Harvey discovered to be true. It does not matter what order the old beliefs are written in, but make sure that William Harvey's beliefs are written so that they directly correspond to the old beliefs he proved to be wrong. (There is only one type of blood in the body, the blood continuously circles through the body, lungs, and heart, the blood flows from one side of the heart to the other by passing through the lungs, the heart is a muscle which contracts and relaxes, and the arteries throb, or "pump" as the heart beats.) Note – depending on the students, the teacher may want to model the first belief or two, and then let the students fill in the rest on their own.
8. Collect all the copies of Appendix J from the students in order to reuse them next year.

9. Pass out Appendix L, a review sheet for the quiz over the Circulatory System. Note: depending on how much time the students need to study, this may be passed out earlier in the unit.
- E. *Assessment/Evaluation*
1. Students will be assessed by the completion of this page in their copybooks or notebooks (use Appendices A and K to grade).

**Lesson Seven: Quiz - The Circulatory System Quiz (approximately 45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
  2. Lesson Content
    - a. The Circulatory System.
  3. Skill Objective(s)
    - a. To correctly answer true/false and short answer questions on the Circulatory System.
    - b. To correctly label a diagram of the human heart.
- B. *Materials*
1. Appendix M (one/student)
  2. Appendix N (one copy for the teacher)
- C. *Key Vocabulary*
- None
- D. *Procedures/Activities*
1. Pass out the quiz to each student (Appendix M).
  2. Go over the directions and answer any questions.
  3. Collect the quizzes when all students are finished.
- E. *Assessment/Evaluation*
1. Student will be assessed by their performance on the test (use Appendix N to grade).

**Lesson Eight: The Respiratory System (approximately 45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
  2. Lesson Content
    - a. The Respiratory System
      - i. Process of taking in oxygen and getting rid of carbon dioxide.
      - ii. Nose, throat, voice box, trachea (windpipe)
  3. Skill Objective(s)
    - a. Identify the three parts of the Respiratory System.
    - b. Draw and label the nose, mouth, throat, voice box, and trachea (windpipe).
- B. *Materials*
1. Appendix A (one/student)
  2. Appendix O (one copy made into a transparency)
  3. Appendix P (one copy for the teacher)
  4. Student copybooks (or notebooks)

5. *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
- C. *Key Vocabulary*
1. Respiratory System – the breathing system of the body
  2. Oxygen – a gas found in air and water that is important to all life
  3. Inhale – to breathe in
  4. Exhale – to breathe out
  5. Carbon Dioxide – a gas that is breathed out as a waste
  6. Voice box – is located at the top of the trachea (or windpipe); makes the sound of the human voice
  7. Throat – a large tube that leads to two different passageways
  8. Trachea – the muscular tube in the throat that leads to the lungs; also called the windpipe
- D. *Procedures/Activities*
1. Make a “KWL” chart about the Respiratory System (the lungs, windpipe/trachea, and diaphragm). Create a chart with three columns on a piece of butcher paper. One column is for what students already Know, one is for what the Want to learn, and the third is for what they have Learned. As a class, fill out the first two columns, by letting the students state what they already know about the Respiratory System and what they hope to learn in this unit. The third one will be filled in as the unit progresses. Have students copy the chart into their copybooks.
  2. Write the day’s vocabulary words and their definition on the vocabulary page in student copybooks.
  3. Before reading, tell students the three parts of the Respiratory System (the lungs, diaphragm, and the windpipe/trachea). Read pages 330-331 (“The Respiratory System”) in *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr. Have students participate in the “exercise “ listed on page 330. As you continue to read, ask what the Respiratory System does (it brings oxygen to your blood and gets rid of carbon dioxide from your body). Ask what two ways a body can take in air (through the nose and mouth). After air passes down the throat, where does it go? (Past the voice box, down the windpipe/trachea, and into tubes in your lungs).
  4. Put the transparency copy of Appendix O on the overhead. Have students draw this diagram.
  5. Label the mouth, nose, throat, voice box, and trachea/windpipe. Use Appendix P as a guide.
  6. Underneath the diagram in their copybooks (or notebooks), have the students list the three parts of the Respiratory System in a complete sentence (see Appendix P for an example).
- E. *Assessment/Evaluation*
1. Students will be assessed by the diagram of the nose and throat in their copybooks or notebooks (see Appendices A and P to grade).

**Lesson Nine: The Lungs (approximately 90 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
  2. Lesson Content
    - a. Lungs, bronchi, bronchial tubes, diaphragm, ribs, alveoli (air sacs)

3. Skill Objective(s)
    - a. Draw and label the different parts of the lungs.
- B. *Materials*
1. Appendix A (one/student)
  2. Appendix O (one copy made into a transparency)
  3. Appendix Q (one/student)
  4. Appendix R (one copy made into a transparency)
  5. Appendix S (one copy for the teacher)
  6. Appendix T (one copy for the teacher)
  7. Student copybooks (or notebooks)
  8. Large clear plastic bottles (quart or liter size) with the bottom cut off – have an adult do this prior to this lesson (one is needed for each student) – note: have the students bring these in from home
  9. Scissors for each student
  10. Two or three rubber bands per student (see step six in the Procedures/Activities section)
  11. Two or tree small balloons per student (see step six in the Procedures/Activities section)
  12. Clay (this is optional - see step six in the Procedures/Activities section)
  13. Three way hose connection per student (this is optional – see step six in the Procedures/Activities section)
  14. Small piece of plastic tubing per student (this is optional – see step six in the Procedures/Activities section)
- C. *Key Vocabulary*
1. Lungs – organs through which the body gets oxygen from the air
  2. Bronchial tubes – the two tubes that branch off from the trachea (windpipe)
  3. Bronchi – the smaller air tubes that branch off from the bronchial tubes
  4. Diaphragm – the curved sheet of muscle under the lungs that is involved in breathing
  5. Ribs – bones that form a cage around the lungs
  6. Alveoli – tiny air sacs at the end of bronchi tubes
- D. *Procedures/Activities*
1. Review the previous lesson by putting Appendix O on the overhead. Have the students label the different parts (nose, throat, voice box, etc.) without looking in their copybooks (or notebooks). Ask what the three parts of the Respiratory System are (lungs, trachea/windpipe, and diaphragm).
  2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
  3. Write the day’s vocabulary words and their definition on the vocabulary page in student copybooks.
  4. Put Appendix R on the overhead. Have students draw the diagram of the lungs.
  5. Pass out Appendix Q to each student. Read the information about the lungs. As the class reads out loud about each of the parts of the lungs, label them together on the diagram.
  6. Label the trachea (windpipe), the bronchial tubes, the bronchi, the alveoli, the right and left lung, the ribs, and the diaphragm, (this is the order that they are listed in Appendix Q).
  7. When they finished reading and labeling the diagram, have the students pass Appendix Q back in to the teacher so that it may be reused.

8. Make a model of the human lungs (due to time constraints, this may need to be done on another day). Depending on the resources of your school, there are two different models the students could make (see Appendix T for examples of both).
    - a. The first one is the most realistic, but is the most costly. Each student will need all of the materials listed above.
      - i. Push the plastic tube into one opening of the hose connector. Use the clay to make an airtight seal. Attach two balloons to the other opening with rubber bands to ensure an airtight fit.
      - ii. Place the balloon and connector inside the bottle, with the plastic tube coming out through the opening in the top. Seal the neck of the bottle with clay to make an airtight seal.
      - iii. Cut the top off of the other balloon. Gently stretch it across the bottom of the bottle. Seal it with a rubber band.
    - b. The second option is not quite as realistic, but is much less expensive. Each student will all of the listed material except they will only need two rubber bands, two balloons, and they will not need the three way hose connector, the clay, or the plastic tube.
      - i. Put one balloon through the bottle through the neck, stretching the top of the balloon over the mouth of the bottle. Secure with a rubber band.
      - ii. Cut the top off of the other balloon. Stretch it across the bottom of the bottle and seal it with a rubber band.
  9. After finishing these models, explain that the plastic tube represents the trachea (windpipe), the three-way connector (if used) represents the bronchial tubes, and the lower balloon represents the diaphragm. Pull it down as though you were inhaling. Air from the outside rushes in and the other balloon(s), which represent the lungs, expand. Push the lower balloon up as though you were exhaling and the balloons, like your lungs, deflate.
- E. *Assessment/Evaluation*
1. Students will be assessed by the diagram of lungs in their copybooks or notebooks (see Appendices A and S to grade).
  2. Students will be assessed by the model they made of the lungs (see Appendix A to grade).

### **Lesson Ten: Smoking (approximately 45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
  2. Lesson Content
    - a. Smoking: damage to lung tissue, lung cancer
  3. Skill Objective(s)
    - a. Explain the dangers of smoking.
- B. *Materials*
1. Appendix A (one/student)
  2. Appendix R (one copy made into a transparency)
  3. Appendix U (one/student)
  4. *What Your Fourth Grader Needs to Know* by E. D. Hirsch, Jr.
  5. *Focus on Nicotine and Caffeine* by Robert Perry (or other books on smoking – see the bibliography for ideas)

6. Markers, crayons, or colored pencils (for each student)
  7. Paper for each student (11" X 14" or larger is best)
- C. *Key Vocabulary*
1. Nicotine – a poisonous drug found in the leaves of the tobacco plant
  2. Tobacco – the plant from which nicotine comes; found in cigarettes and cigars
  3. Cigarettes – tobacco rolled in thin paper for smoking
  4. Tar – a gummy paste made up of chemicals produced by tobacco smoke; it gets stuck in a smoker's lungs
- D. *Procedures/Activities*
1. Review the previous lesson by putting Appendix R on the overhead. Have the students label the different parts (bronchial tubes, diaphragm, lungs, etc) without looking in their copybooks (or notebooks). Ask what the three parts of the Respiratory System are (lungs, trachea/windpipe, and diaphragm).
  2. Review KWL chart and add any needed information added (note: this will vary by each class, as some may have had more prior knowledge before beginning the unit than others).
  3. Write the day's vocabulary words and their definition on the vocabulary page in student copybooks.
  4. Read pages 331-332 ("A Health Tip") in *What Your Fourth Grader Needs to Know*. Point out the pictures of the lungs on page 332. Ask students what they can do to keep their lungs healthy (not smoke and exercise).
  5. Read from the book *Focus on Nicotine and Caffeine* by Robert Perry, especially pages 15-18, 22-27, 31-34, and 37-43. (If this book is not available, find another that talks about the dangers of smoking. See the bibliography for ideas.)
  6. Pass out Appendix U. This sheet contains some facts about smoking. Have the students complete a poster stating why someone should not start smoking (or should stop smoking) using at least one fact listed on the facts sheet. Make sure that this fact is listed on their poster and that they copy it into their copybook (or notebooks) as well.
  7. Pass out paper to students and let them get started creating their posters (due to time constraints, this may need to be finished as homework).
  8. At the end of class, collect Appendix U so that it may be reused at another time.
  9. Pass out the review sheet for the quiz (note – this may be passed out earlier if students need more time to study).
- E. *Assessment/Evaluation*
1. Students will be evaluated on the completion of their posters (use Appendix A to grade).

**Lesson Eleven: The Respiratory System Quiz (approximately 45 minutes)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (Colorado Science Standard 3)
  2. Lesson Content
    - a. The Respiratory System
  3. Skill Objective(s)
    - a. To correctly label a diagram of the Respiratory System.
    - b. To correctly explain the parts of the Respiratory System.
    - c. To explain why smoking is hazardous to ones health.



- B. *Materials*
  - 1. Appendix V (one/student)
  - 2. Appendix W (one copy for the teacher)
- C. *Key Vocabulary*  
None
- D. *Procedures/Activities*
  - 1. Pass out copies of the quiz to each student (Appendix V).
  - 2. Explain the directions and answer any questions about the quiz.
  - 3. Collect the quizzes when the students are finished.
- E. *Assessment/Evaluation*
  - 1. Students will be assessed by their performance on the quiz (use Appendix W to grade).

## **VI. CULMINATING ACTIVITY**

- A. To wrap up the study on the Circulatory System, have students dissect a sheep heart. Contact a local butcher or meat packing plant and ask if they will donate sheep hearts (not beef) to your school. Have students dissect the hearts in groups with a parent or teacher supervising each group. The students will be able to identify all four chambers of the heart and the aorta. To wrap up the unit on the Respiratory System, contact the American Heart and Lung Association. See if they have a local chapter in your area and would be willing to bring in examples of healthy lungs (from a non-smoker) and damaged lungs (from a smoker). This will be a great visual for the students to not only see what the lungs look like, but also to see first hand the dangers of smoking.

## **VII. HANDOUTS/WORKSHEETS**

- A. Appendix A: Assessment Tools
- B. Appendix B: Blood Types and Transfusions
- C. Appendix C: Worksheet on Pulse Rates
- D. Appendix D: Heart Diagram
- E. Appendix E: Heart Diagram Example
- F. Appendix F: The Heart Questions
- G. Appendix G: The Heart Answers
- H. Appendix H: Information on the Liver and Spleen
- I. Appendix I: Webs of the Liver and Spleen Example
- J. Appendix J: William Harvey's Beliefs
- K. Appendix K: William Harvey's Beliefs Example
- L. Appendix L: The Circulatory System Quiz Review
- M. Appendix M: The Circulatory System Quiz
- N. Appendix N: The Circulatory System Quiz Answer Key
- O. Appendix O: Nose and Throat Diagram
- P. Appendix P: Nose and Throat Diagram Example
- Q. Appendix Q: Notes on the Lungs
- R. Appendix R: The Lungs Diagram
- S. Appendix S: The Lungs Diagram Example
- T. Appendix T: Facts on Smoking
- U. Appendix U: Respiratory System Quiz Review
- V. Appendix V: Respiratory System Quiz
- W. Appendix W: Respiratory System Quiz Answer Key

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**Appendix A, page 1**  
**Assessment Tools**

**Circulatory System Review**

**Yes**

**No**

1. Three parts of the Circulatory System are listed
2. The four main parts of blood are listed

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Appendix A, page 2  
**Assessment Tools**

<b>Blood Types and Transfusions</b>					
<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Points</b>
<b>Neatness</b>	Work is neatly done.	Work has one or two areas that are sloppy.	Work has three or four areas that are sloppy.	Work is illegible.	
<b>Blood Types</b>	All four blood types are accurately drawn and labeled	Three blood types are accurately drawn and labeled	Two blood types are accurately drawn and labeled	One or none of the blood types are accurately drawn and labeled	
<b>Arrows</b>	All nine arrows are correctly placed.	Six to eight arrows are correctly placed.	Three to five arrows are correctly placed.	Less than three arrows are correctly placed.	
	<b>Total →</b>				
<b>Teacher Comments</b>					

**Appendix A, page 3**  
**Assessment Tools**

<b>Circulatory System Review</b>	<b>Yes</b>	<b>No</b>
1. Three subjects are listed	_____	_____
2. Three activities are listed	_____	_____
3. Pulse rates are filled in correctly	_____	_____

**Appendix A, page 4**  
**Assessment Tools**

<b>The Heart</b>					
<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Points</b>
<b>Neatness</b>	Work is neatly done.	Work has one or two areas that are sloppy.	Work has three or four areas that are sloppy.	Work is illegible.	
<b>Labels</b>	All three areas are correctly labeled: Atriums Ventricles Aorta	Two of the three areas are correctly labeled	One of the three areas are correctly labeled	None of the three areas are correctly labeled	
<b>Coloring</b>		The right side is colored blue and the left side is colored red	Only one side is correctly colored	Neither side is colored	
<b>Questions</b>	All five questions are correctly answered	Only four questions are correctly answered	Two or three questions are correctly answered	Less than two questions are correctly answered	
<b>Complete Sentences</b>	All five answers are in complete sentences	Four answers are in complete sentences	Two or three answers are in complete sentences	Less than two answers are in complete sentences	
	<b>Total →</b>				
<b>Teacher Comments</b>					

**Appendix A, page 5**  
**Assessment Tools**

<b>Liver and Spleen</b>					
<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Points</b>
<b>Neatness</b>	Work is neatly done.	Work has one or two areas that are sloppy.	Work has three or four areas that are sloppy.	Work is illegible.	
<b>Pictures</b>		Both the liver and the spleen are drawn	Only one was drawn	Neither the liver nor the spleen was drawn	
<b>Spleen</b>	Three facts are included about the spleen	Two facts are included about the spleen	One fact is included about the spleen	No facts are included about the spleen	
<b>Liver</b>	Three facts are included about the liver	Two facts are included about the liver	One fact is included about the liver	No facts are included about the liver	
	<b>Total →</b>				
<b>Teacher Comments</b>					

Appendix A, page 6  
**Assessment Tools**

<b>William Harvey</b>					
<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Points</b>
<b>Neatness</b>	Work is neatly done.	Work has one or two areas that are sloppy.	Work has three or four areas that are sloppy.	Work is illegible.	
<b>Old Beliefs</b>	Five beliefs are listed	Four beliefs are listed	Two to three beliefs are listed	Less than two beliefs are listed	
<b>Harvey's Beliefs</b>	Five beliefs are listed	Four beliefs are listed	Two to three beliefs are listed	Less than two beliefs are listed	
<b>Correspond</b>			Harvey's beliefs correspond with the old beliefs	Harvey's beliefs do not correspond with the old beliefs	
	<b>Total →</b>				
<b>Teacher Comments</b>					



Appendix A, page 7  
**Assessment Tools**

<b>The Nose and Throat</b>					
<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Points</b>
<b>Neatness</b>	Work is neatly done.	Work has one or two areas that are sloppy.	Work has three or four areas that are sloppy.	Work is illegible.	
<b>Labels</b>	All five areas are correctly labeled: Nose Mouth Throat Voice box Trachea	Three or four of the four areas are correctly labeled	One or two of the four areas are correctly labeled	None of the four areas are correctly labeled	
<b>Sentence</b>			Complete sentence listing the three parts of the Respiratory System is listed.	Complete sentence listing the three parts of the Respiratory System is not listed.	
	<b>Total →</b>				
<b>Teacher Comments</b>					

**Appendix A, page 8**  
**Assessment Tools**

<b>The Lungs</b>					
<b>CATEGORY</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>Points</b>
<b>Neatness</b>	Work is neatly done.	Work has one or two areas that are sloppy.	Work has three or four areas that are sloppy.	Work is illegible.	
<b>Labels</b>	The following seven areas are labeled correctly: Right lung Left lung Diaphragm Bronchial tubes Bronchi Alveoli Ribs	Five to six of the seven areas are correctly labeled	Two to four of the seven areas are correctly labeled.	Less than two of the seven areas are correctly labeled	
	<b>Total →</b>				
<b>Teacher Comments</b>					

**Model of the Lungs**

**Yes**

**No**

1. Student followed directions  
When completing the model

\_\_\_\_\_

\_\_\_\_\_

2. Student can demonstrate how the  
model represents breathing (inhaling and exhaling)

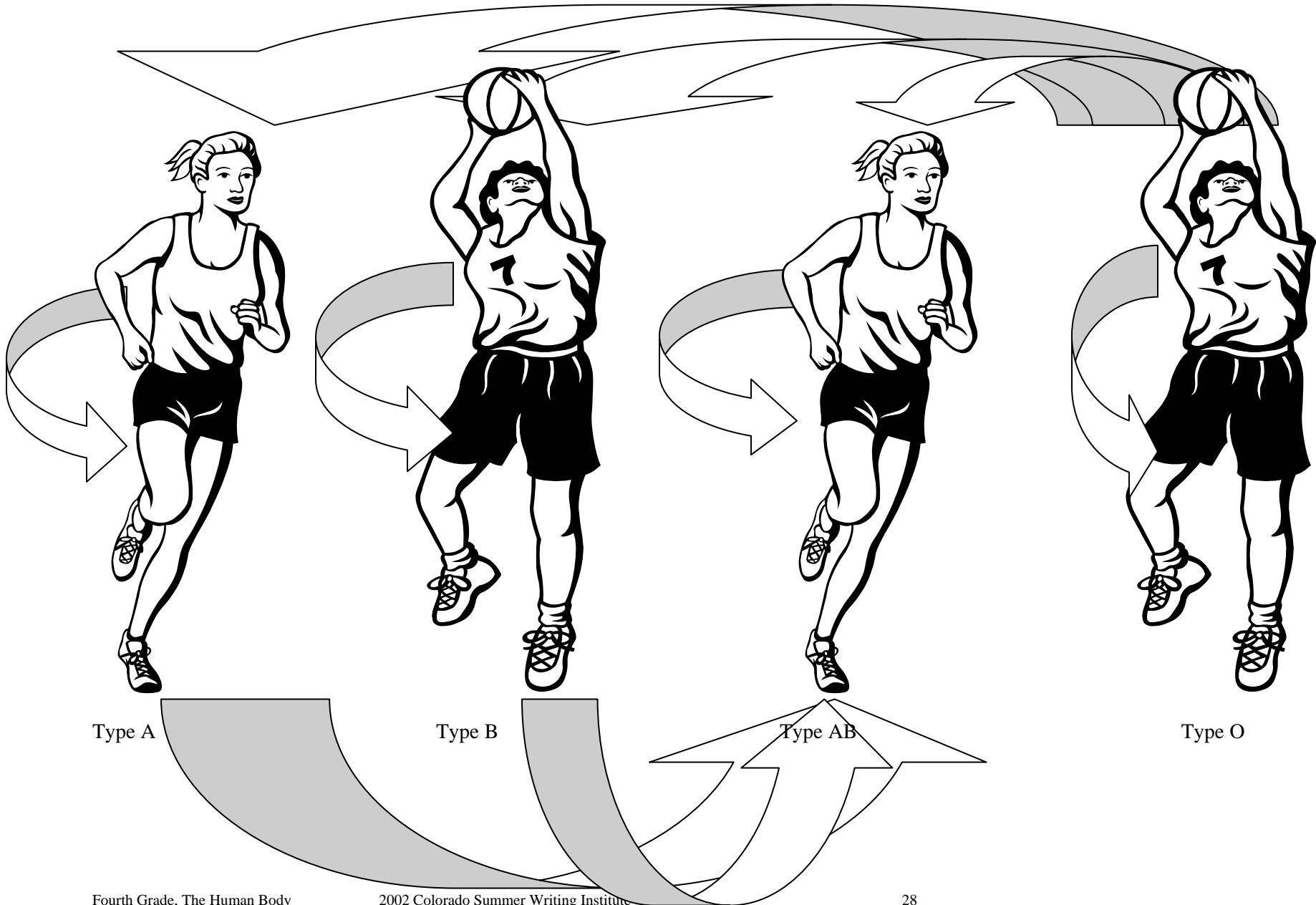
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**Appendix A, page 9**  
**Assessment Tools**

<b>Smoking Poster</b>	<b>Yes</b>	<b>No</b>
1. Poster is neat and colored	_____	_____
2. One fact about smoking is included on the poster	_____	_____
3. The fact is also listed in copybook (or notebook)	_____	_____

**Appendix B**  
**Blood Types and Transfusions**



Type A

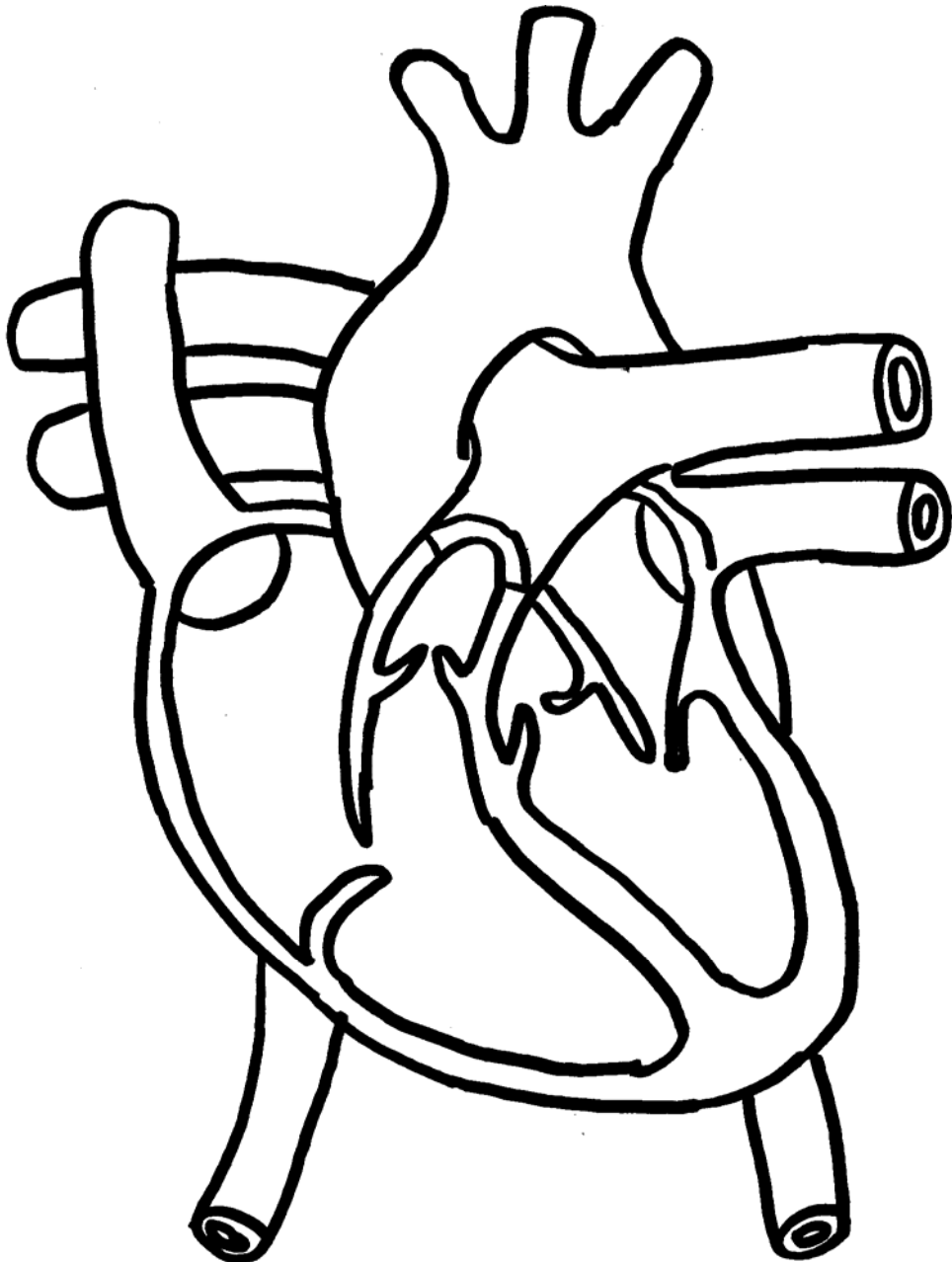
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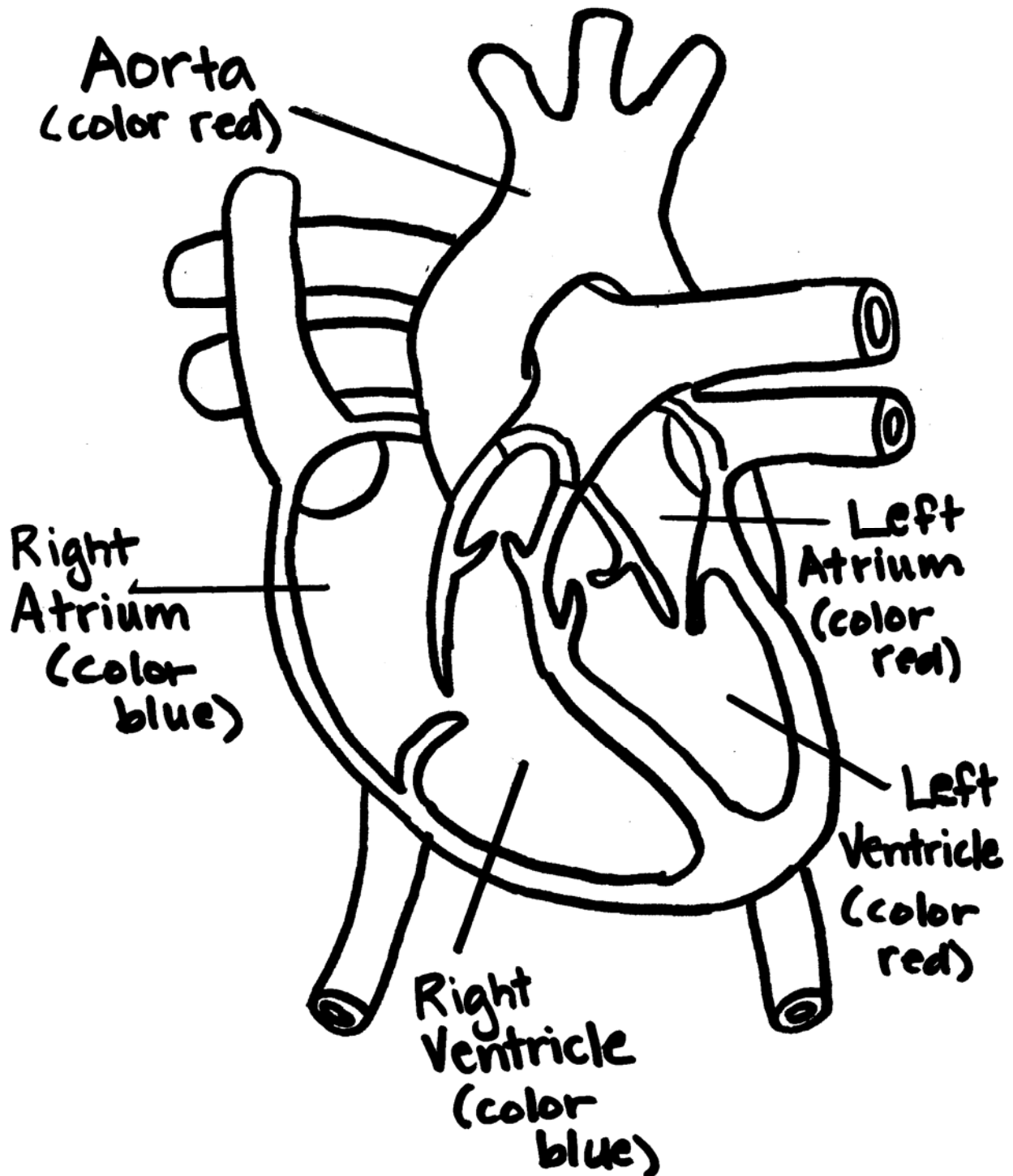
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**Appendix D  
Heart Diagram**



Appendix E  
Heart Diagram Example



**Appendix F**  
**The Heart Questions**

How many chambers does the human heart have?

What are the upper chambers of the heart called?

What are the lower chambers of the heart called?

Which chamber receives blood from the veins?

Which chamber pumps the blood to the cells in the rest of the body through the aorta?



**Appendix G**  
**The Heart Answers**

How many chambers does the human heart have?

**The human heart has four chambers.**

What are the upper chambers of the heart called?

**The upper chambers of the heart are called the atriums (or auricles).**

What are the lower chambers of the heart called?

**The lower chambers are called the ventricles.**

Which chamber receives blood from the veins?

**The upper right chamber (the right atrium) receives the blood from the veins.**

Which chamber pumps the blood to the cells in the rest of the body through the aorta?

**The lower left chamber (or left ventricle) pumps the blood to the cells through the aorta.**

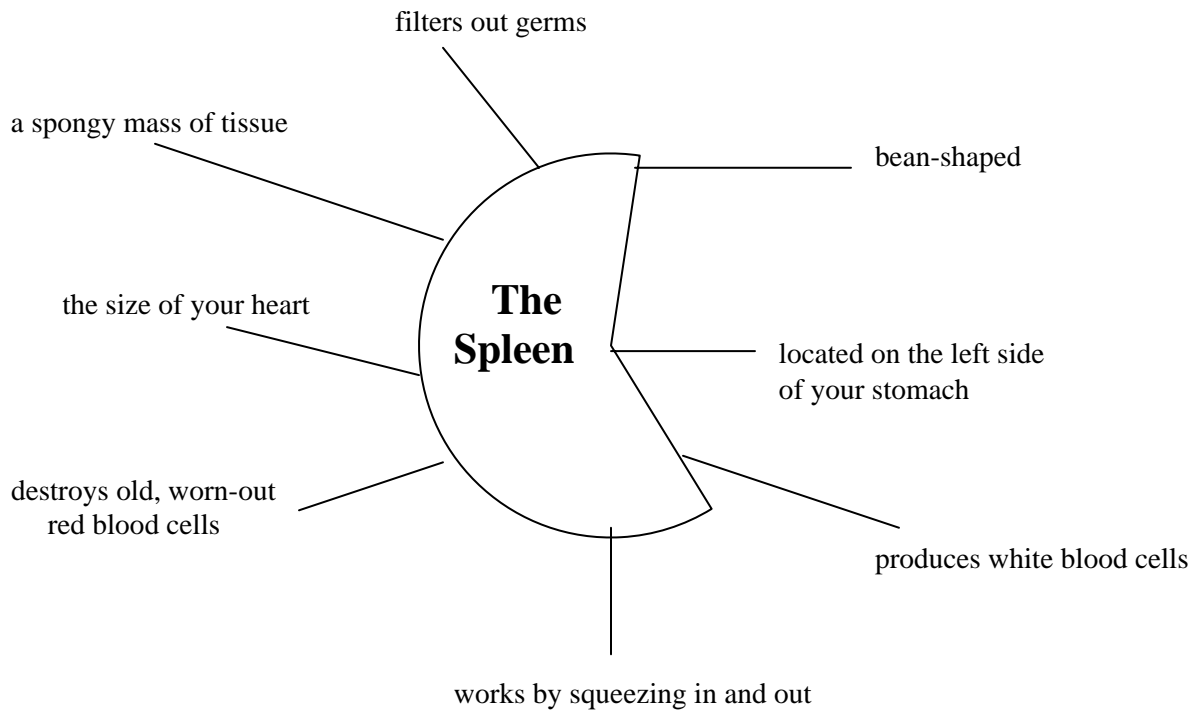
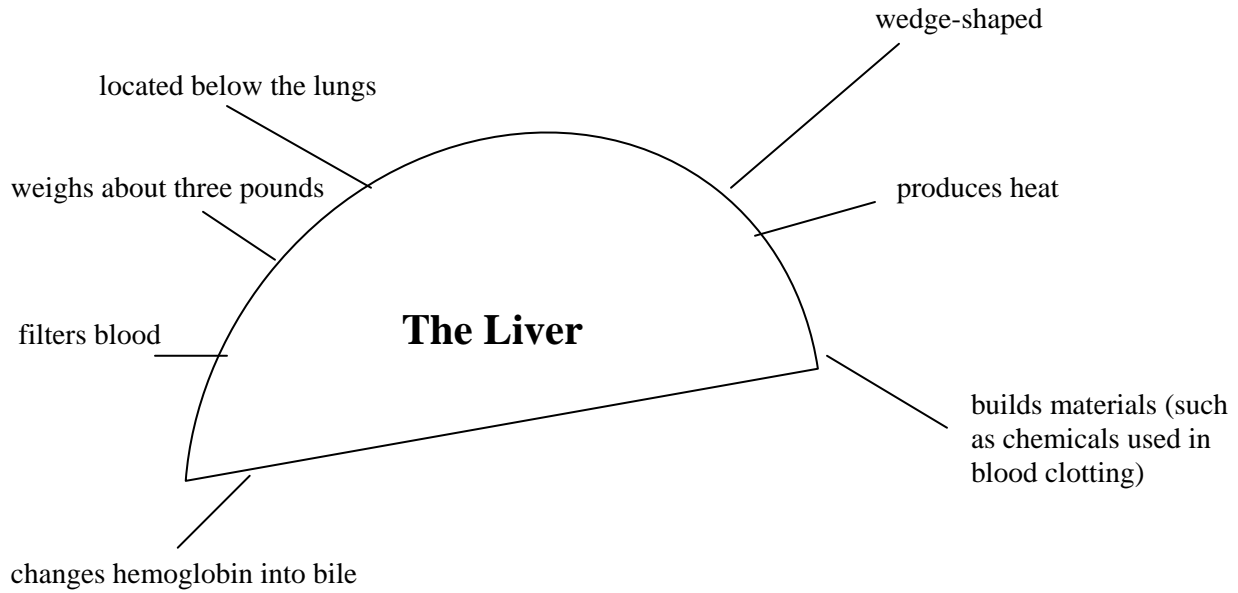
**Appendix H**  
**Information on the Liver and Spleen**

There are two more important organs in our body that are also a part of our Circulatory System that we will be learning about today. Organs are body parts that perform certain jobs. The two we will be studying today are the liver and the spleen.

The liver is a large, wedge-shaped organ that lies just below the lungs in your chest. It has three main jobs to perform. It builds materials, such as the chemicals which are used in blood clotting, it stores substances which are used to give the body energy, and changes hemoglobin from the red blood cells into green bile, which helps the body digest fat. The liver also produces a lot of heat. This heat is picked up by plasma and is then delivered to the skin. Therefore, the liver works with the plasma to even out the temperature in our body.

The spleen is a spongy mass of tissue that is found on the left side of your stomach. It is bean-shaped and is approximately the size of your heart. It destroys old, worn-out red blood cells, filters out germs, and produces white blood cells. The spleen works by squeezing in and out, which helps to control the amount of blood and blood cells flowing through the body.

**Appendix I**  
**Webs of the Liver and Spleen Example**  
(students must have at least three facts webbed)



## Appendix J William Harvey's Beliefs

(gathered from *Great Minds of Science: William Harvey, Discoverer of How Blood Circulates* by Lisa Yount)

William Harvey was born in England on April 1st, 1578 and would become a pioneer in the study of the Circulatory System. He studied medicine and anatomy at Cambridge University. In 1609, William was appointed the physician of St. Bartholomew's Hospital. While he was there, he treated many patients and conducted research on the heart and blood. In 1628, he wrote a book titled, *An Anatomical Essay on the Movement of the Heart and Blood in Animals*. He studied animals in order to have a better understanding of the human Circulatory System. Back then few doctors thought to study animals to learn more about humans. Dr. Harvey had many new ideas in this book and most physicians thought his ideas were wrong.

Back in the 1600's, doctors had many false views about the Circulatory System. They believed that the heart pulled blood into itself by swelling and that the arteries in your body pumped themselves. They also believed that the heart had tiny holes, or pores, which allowed blood to leak from one side of the heart to the other.

William Harvey was the first person to realize that the heart is a muscle, which squeezes (or contracts) and relaxes. First, the atria contract and blood flows into the ventricles. Then the ventricles contract and blood is pumped out into the arteries. When the heart relaxes, blood flows from the veins to the atria and the whole cycle starts again. William also learned that the arteries do not pump themselves, but rather the "beat" happens when the heart contracts. He also did not believe that there are pores in our hearts.

So how does blood get from one side of the heart to the other? Dr. Harvey believed the lungs were the answer to this puzzle. He said that blood makes a circle through the lungs and returns to the left atrium through the veins. However, he still was not sure how blood got from the arteries to veins inside the lungs. He guessed that it moved through tiny holes in the lungs. Unfortunately, he was wrong. Because we can now use microscopes to study the human body, we know that tiny blood vessels, called capillaries, connect the veins and the arteries.

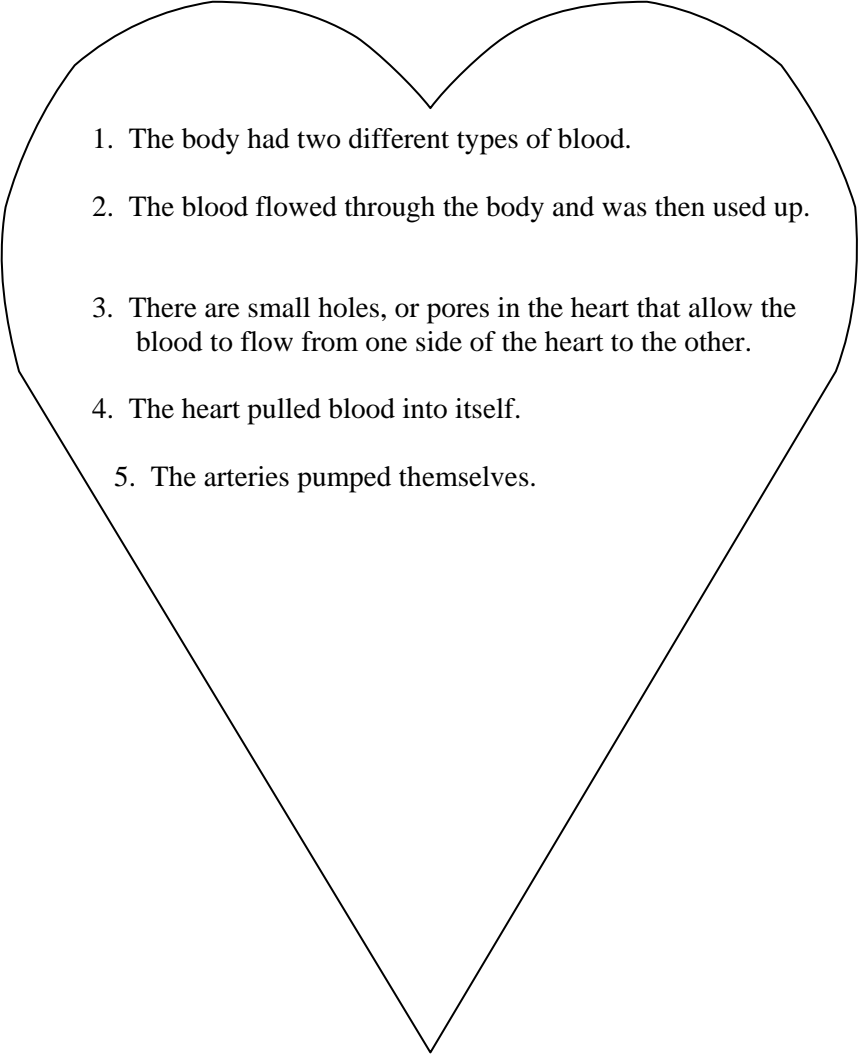
Dr. Harvey had another wrong belief. He thought the blood flowed through the lungs in order to get cooled down. This was not proven wrong until one hundred years later, when scientists learned that the blood flows through the lungs to pick up oxygen from the air.

However, many of Dr. Harvey's ideas were correct. For example, scientists at that time believed that our bodies contained two different types of blood, because some blood is bright red, while some is much darker. He showed that there was only one type of blood in the body (although at the time he did not know why it was two different colors, we know now that bright red blood has oxygen in it and the darker blood does not). Other scientists also believed that the liver made blood from food. It then flowed to the heart, where it was warmed up and "vital spirits" were added to the blood, which turned it bright red. They thought it then flowed to the rest of the body and was used up. Harvey once again proved these ideas were wrong. He believed that blood flowed in a circle throughout the body and returned to the heart to be pumped out again. He learned that blood flows from the left ventricle to arteries, which carry blood to the body. The arteries connect to veins and the blood flows back to the right atrium. It then flows out of the right ventricle to arteries, which carry it to the lungs. There, the arteries again connect with veins, which return to the left atrium. This process is a continuous cycle.

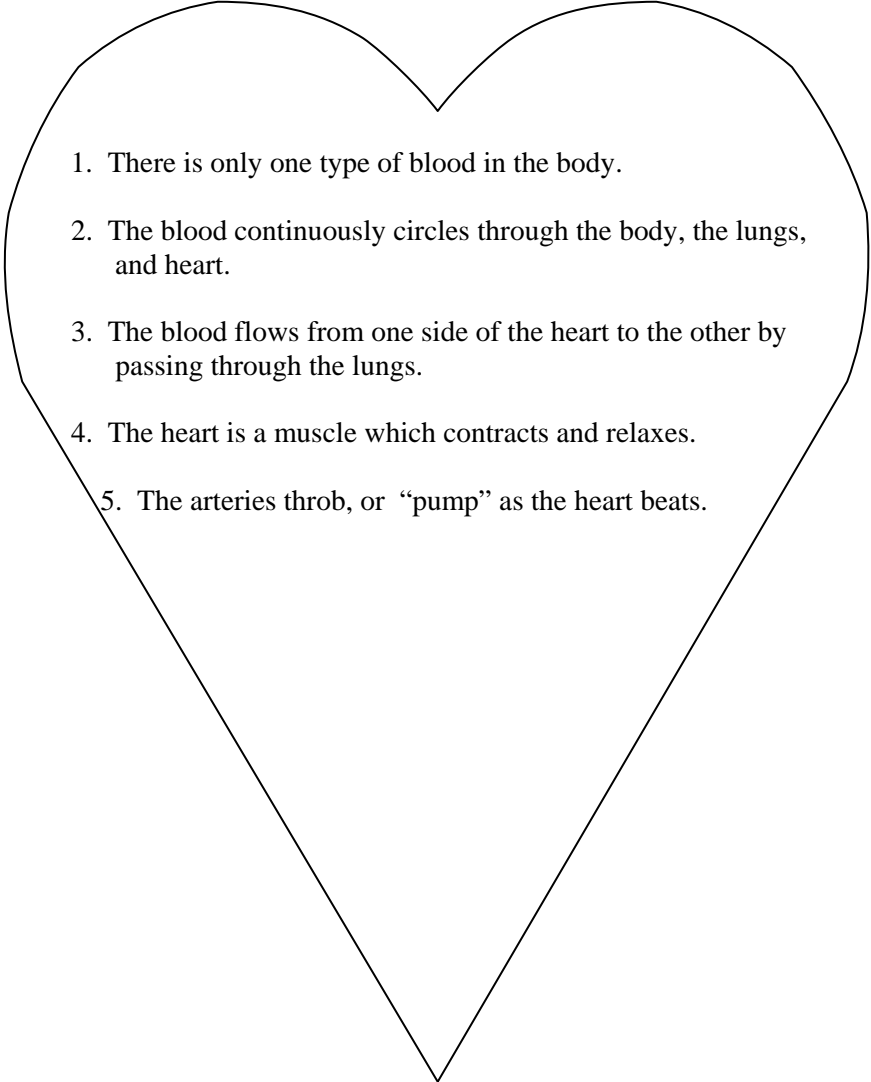
William Harvey's ideas were not very well accepted at first, and most doctors and scientists just ignored them, or told William he was wrong. Over time, however, they were gradually accepted and by the late 1640's most doctors agreed with Dr. Harvey. William Harvey died on June 3<sup>rd</sup>, 1657.

**Appendix K**  
**William Harvey's Beliefs Example**

Old Beliefs

- 
1. The body had two different types of blood.
  2. The blood flowed through the body and was then used up.
  3. There are small holes, or pores in the heart that allow the blood to flow from one side of the heart to the other.
  4. The heart pulled blood into itself.
  5. The arteries pumped themselves.

William Harvey's Beliefs

- 
1. There is only one type of blood in the body.
  2. The blood continuously circles through the body, the lungs, and heart.
  3. The blood flows from one side of the heart to the other by passing through the lungs.
  4. The heart is a muscle which contracts and relaxes.
  5. The arteries throb, or "pump" as the heart beats.

**Appendix L**  
**The Circulatory System Quiz Review**

Know the following:

- ❖ The three parts in The Circulatory System
- ❖ The four parts of blood
- ❖ The four different blood types
- ❖ William Harvey's beliefs

Know the following definition:

- ❖ White Blood Cells
- ❖ Red Blood Cells
- ❖ Plasma
- ❖ Platelets
- ❖ Pulse
- ❖ Clot
- ❖ Liver
- ❖ Veins
- ❖ Arteries

Be able to label the four chambers of the heart and the aorta

**\*\*\*All of the above information is in your Science copybooks or notebook!\*\*\***

**Appendix M**  
**The Circulatory System Quiz**

Name: \_\_\_\_\_

True or False: (one point each)

- \_\_\_\_\_ A clot is a gel-like, thickened plug that stops the flow of blood
- \_\_\_\_\_ William Harvey believed that blood flowed through the body and then was used up.
- \_\_\_\_\_ Veins take blood away from the heart.
- \_\_\_\_\_ The Liver is a large, wedge-shaped organ that lies just below the lungs
- \_\_\_\_\_ The pulse is the beating of the heart and the arteries that you can feel at places under your skin

Short Answer: (five points each) - use the back if more space is needed

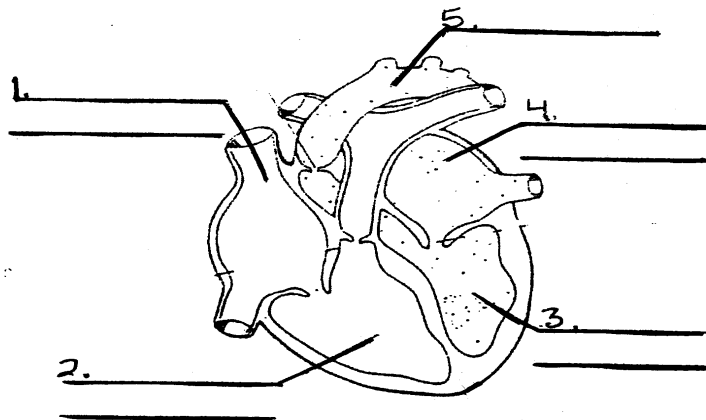
Name the three parts of the Circulatory System.

Name and define the four parts of blood.

Name the four blood types.

Label the diagram of the heart, using the words listed below:

left ventricle      aorta      right ventricle      left atrium      right atrium



**Appendix N**  
**The Circulatory System Quiz Answer Key**

Name: \_\_\_\_\_

True or False: (one point each)

- T   A clot is a gel-like, thickened plug that stops the flow of blood
- F   William Harvey believed that blood flowed through the body and then was used up.
- F   Veins take blood away from the heart.
- T   The Liver is a large, wedge-shaped organ that lies just below the lungs
- T   The pulse is the beating of the heart and the arteries that you can feel at places under your skin

Short Answer: (five points each) - use the back if more space is needed.

Name the three parts of the Circulatory System.

The three parts of the Circulatory System are the heart, blood, and blood vessels.

Name and define the four parts of blood.

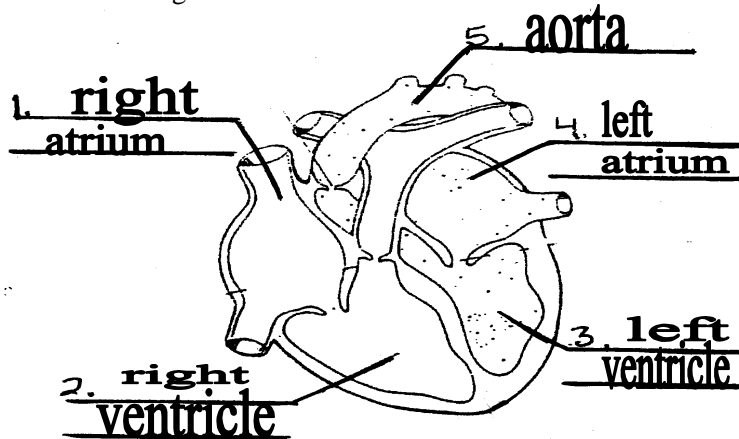
The white blood cells help the body fight infection, plasma is the watery part of the blood, red blood cells carry oxygen, and the platelets help control bleeding.

Name the four blood types.

The four blood types are A, B, AB, and O.

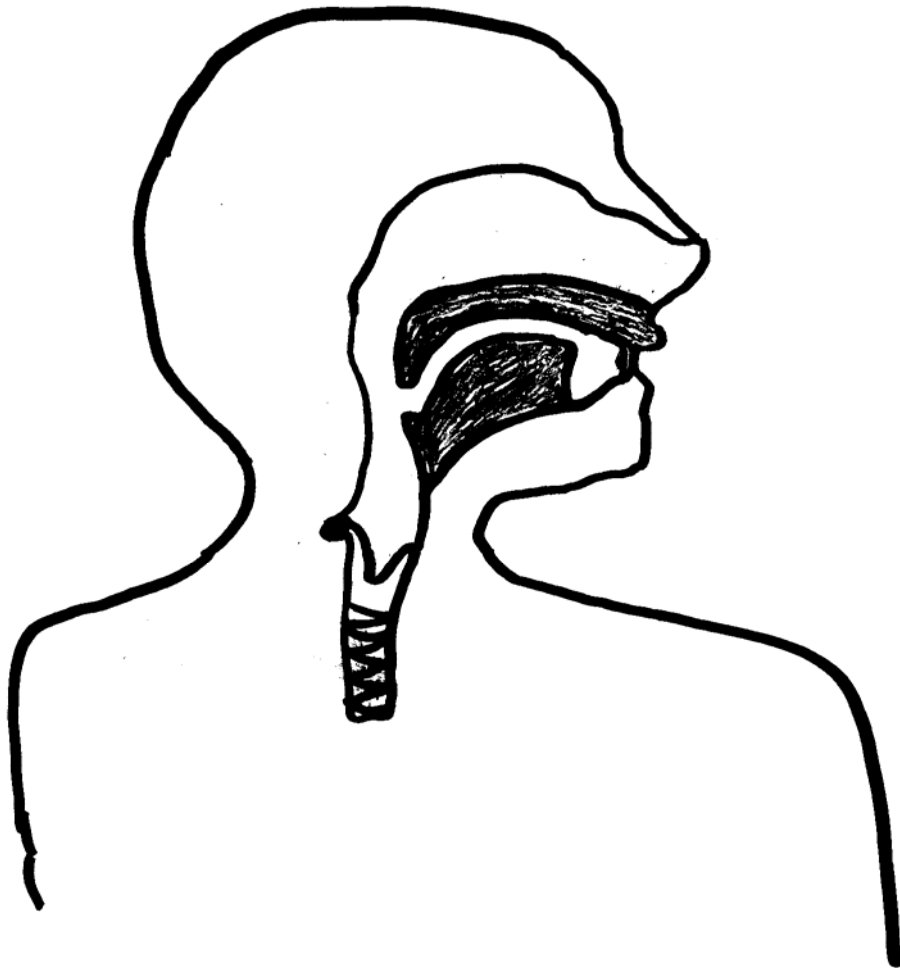
Label the diagram of the heart, using the words listed below:

left ventricle      aorta      right ventricle      left atrium      right atrium

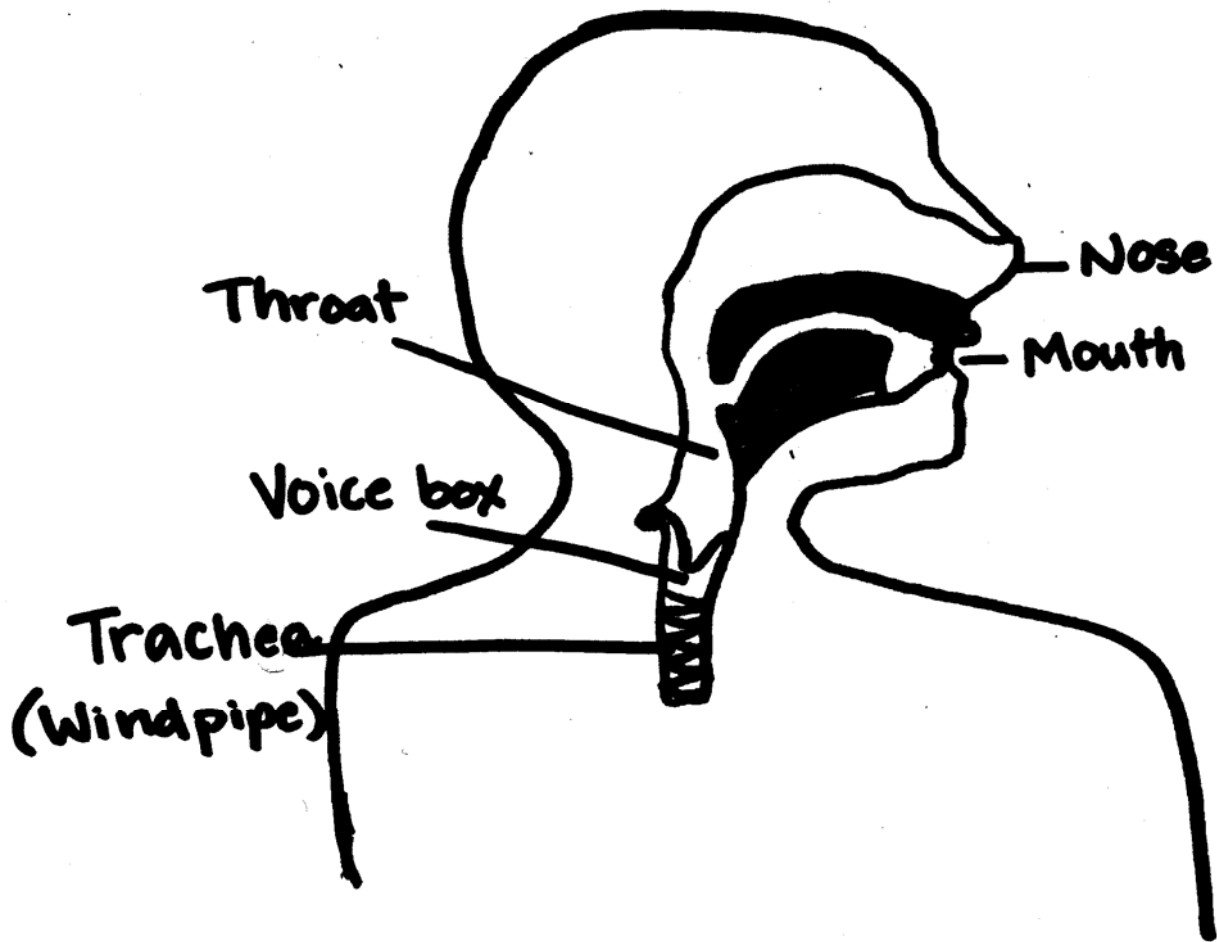




**Appendix O**  
**Nose and Throat Diagram**



Appendix P  
Diagram of the Nose and Throat Example



The three parts of the Respiratory System are the lungs, the trachea (or windpipe), and the diaphragm.

## **Appendix Q**

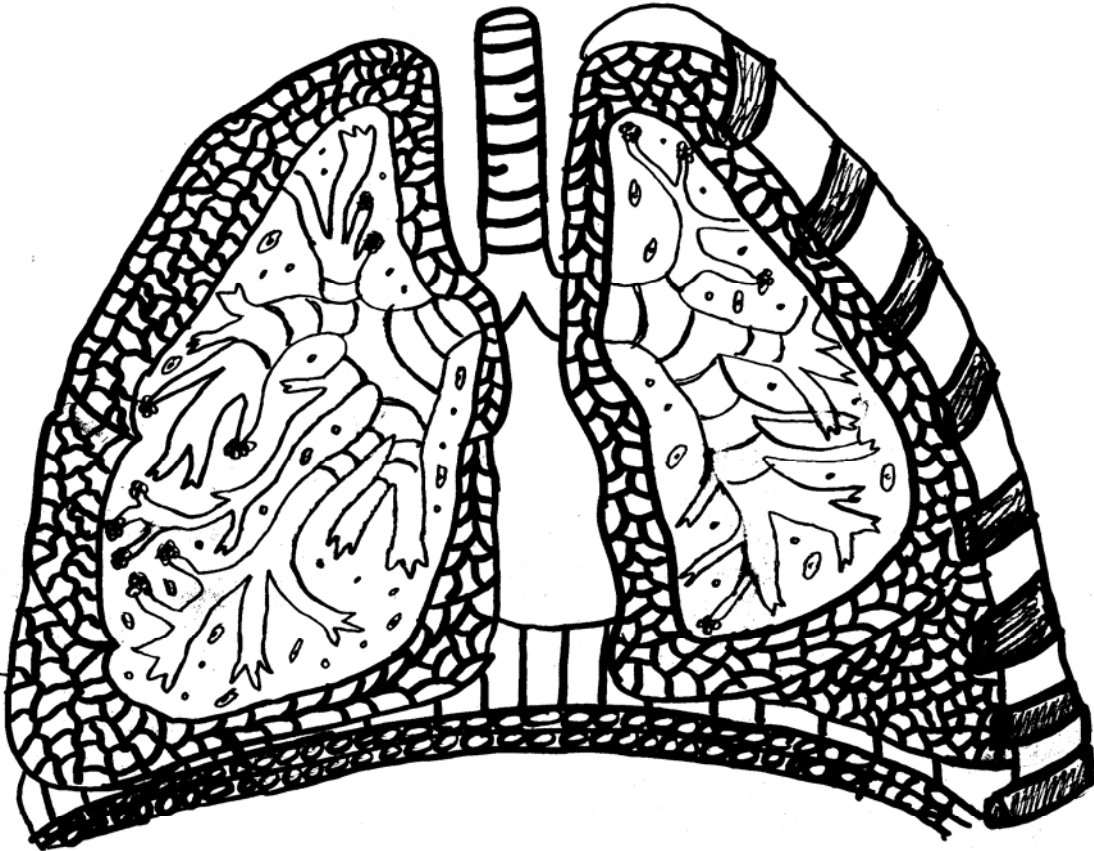
### **Information on the Lungs**

When someone inhales air through the nose or mouth, it moves down the trachea (or windpipe). The lower end of the trachea branches off into two smaller tubes, called bronchial tubes. The bronchial tubes divide into smaller branches called bronchi. The bronchi divide again and again into smaller and smaller tubes called bronchioles. Each end in tiny air sacs called alveoli. Each lung has 300-400 million alveoli, which are shaped like tiny balloons.

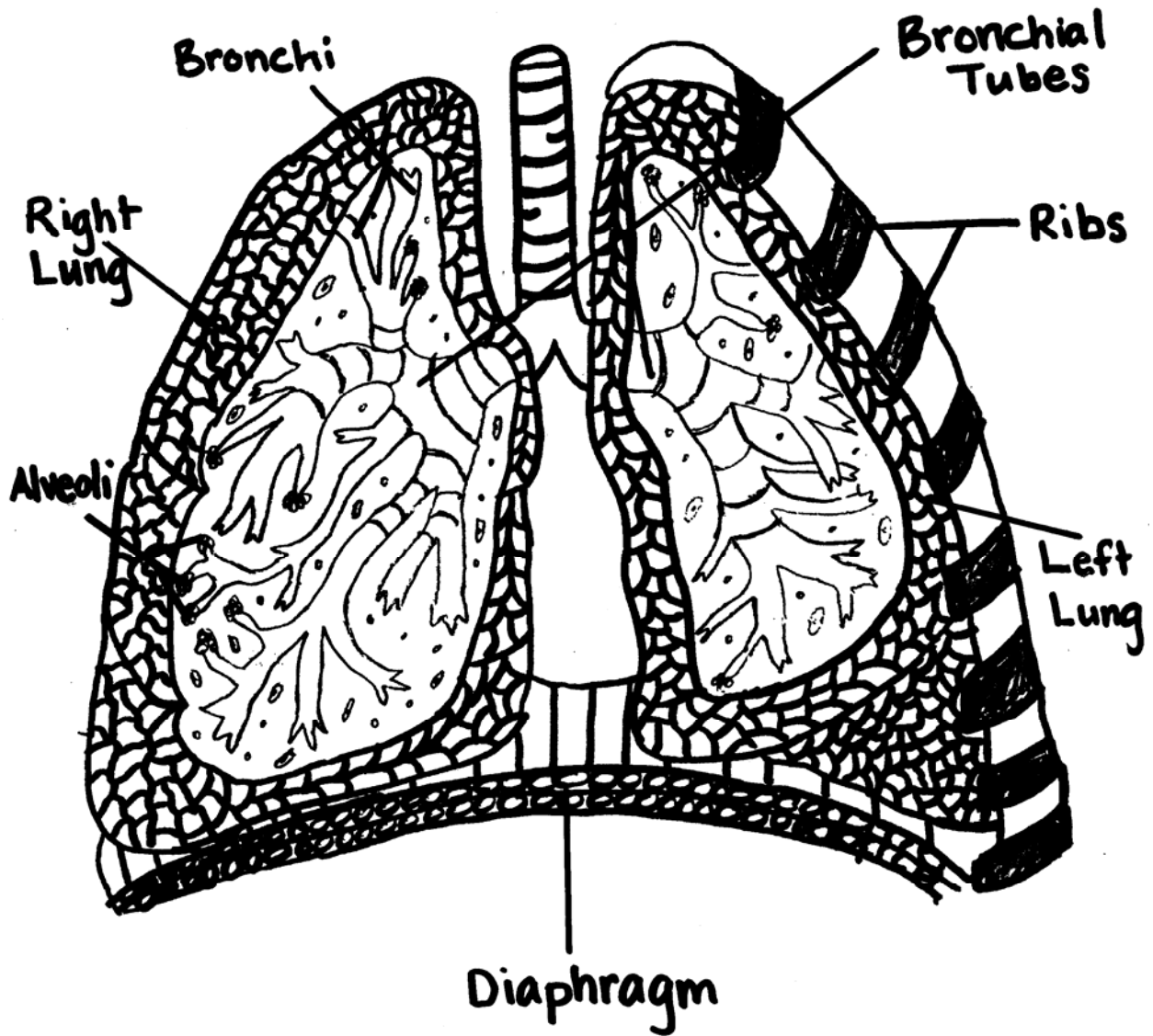
The lungs are two large, spongy organs that take up most of the space inside the upper chest. The right side has three lobes and is larger than the left side, which only has two lobes. We have twelve pairs of ribs that form a cage around the lungs. There are muscles between the ribs and when we take a deep breath, the muscles contract and the amount of space in the rib cage increases, and the lungs inflate. When the muscles relax, the rib cage returns to its normal shape.

The diaphragm is a strong, dome-shaped muscle that makes up the floor of the chest cavity. It curves upward into the chest cavity, following the line of the rib cage, just below the lungs. It separates the heart and lungs from the organs in the abdomen. When the diaphragm is relaxed, it curves upward. When we inhale, it tightens and moves downward, becoming flat. At the same time, the rib cage contracts and the chest cavity becomes larger. The lungs swell and air rushes into them until the pressure in the lungs is equal to the pressure in the room. When we exhale, the diaphragm relaxes until it curves upward again. The rib muscles relax, and the ribs move down, The chest cavity becomes smaller and the air is forced out of the lungs until it is once again equal to the pressure in the room.

**Appendix R**  
**Diagram of the Lungs**

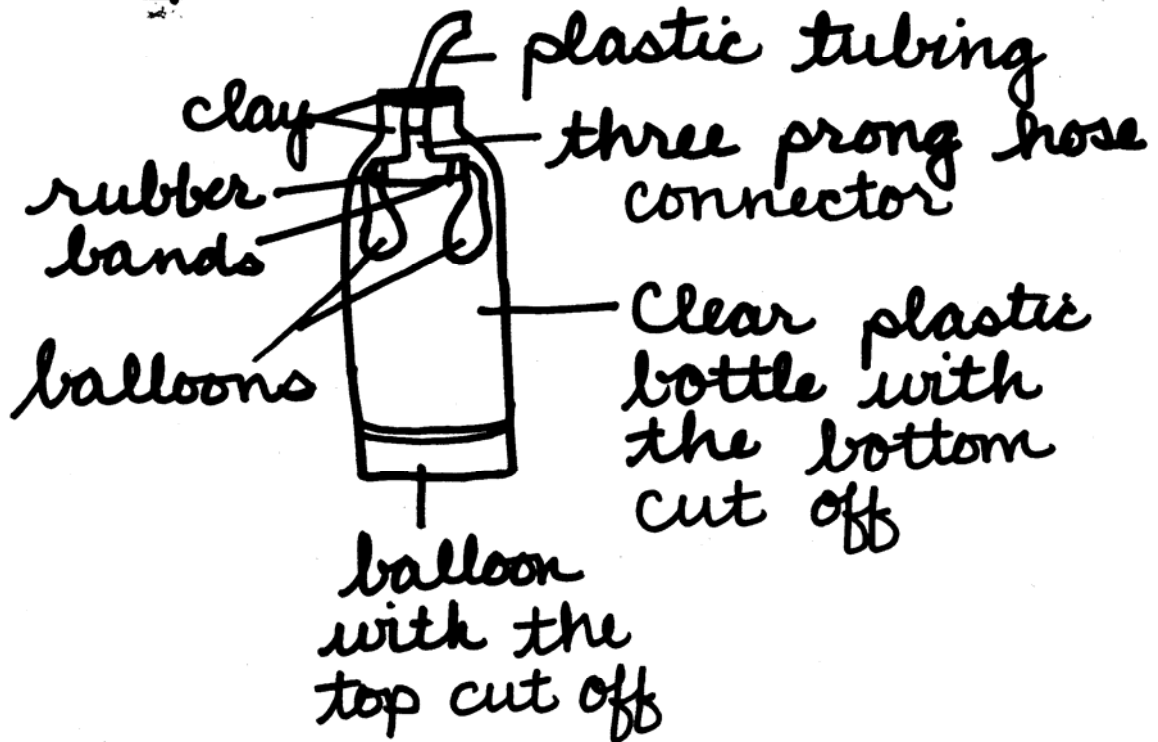


Appendix S  
Diagram of the Lungs Example



Appendix T  
Models of the Lungs Examples

Example One:



Example Two:



**Appendix U**  
**Facts About Smoking**

(gathered from *Focus on Nicotine and Caffeine* by Robert Perry)

- ❖ If the number of Americans who die from tobacco-related deaths in one year went on a field trip, it would take 10,854 busses to carry them
- ❖ With the money spent on tobacco advertising in the United States in the last year, you could feed one million people for a year, put 200,000 people through college, or build 25 hospitals.
- ❖ Every time a person smoke a cigarette, it takes five minutes off his or her life. If someone smokes a pack a day, by the end of his or her life, they have taken off enough time to go on 35 week long camping trips, attend 531 all day rock concerts, or read 1,062 books.
- ❖ If the number of Americans who die from smoking-related deaths in one year all had lunch at the same time, the line would be 164 miles long!
- ❖ 25% of all deaths through fires in the home come from fires started by burning tobacco products.
- ❖ Cigarettes contain a poison used in gas chambers and a chemical used to preserve dead frogs.
- ❖ In the last 60 minutes, more than 49 Americans have died from tobacco related deaths.

**Appendix V**  
**Respiratory Quiz Review**

Be sure to know the following definitions:

- ❖ Lungs
- ❖ Respiratory System
- ❖ Trachea (windpipe)
- ❖ Diaphragm

Know the three parts of the Respiratory System.

Study and know the diagram of the nose and throat.

Study and know the diagram of the lungs.

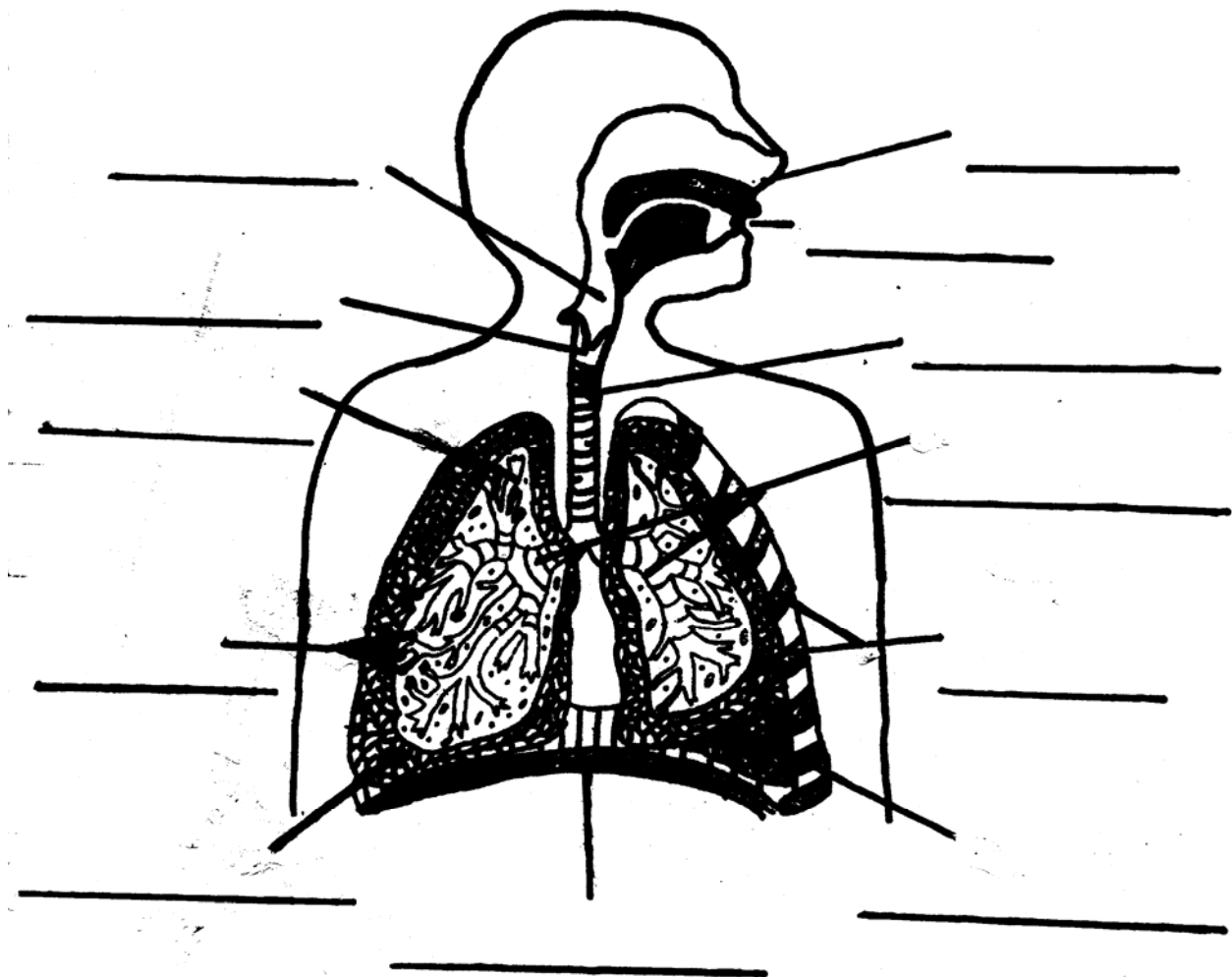
**\*\*\*All of the above information is in your Science copybooks or notebook!\*\*\***



**Appendix W  
Respiratory Quiz**

Label the diagram, using the words listed below:

nose	throat	left lung	trachea (windpipe)	ribs	alveoli
bronchi	right lung	voice box	diaphragm	mouth	bronchial tubes



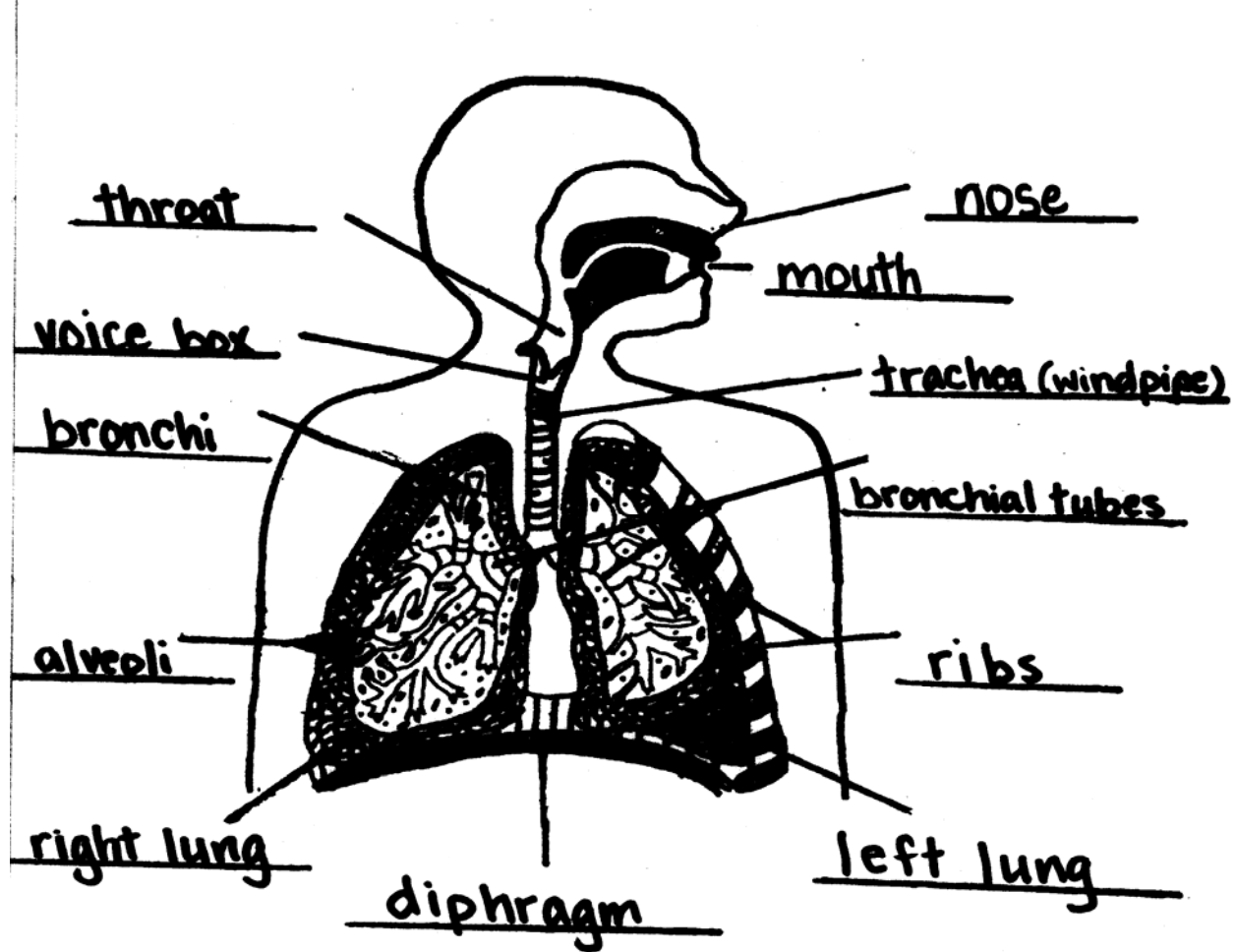
Write a paragraph on the Respiratory System. It must contain topic and concluding sentences, and must give one fact about each of the three parts of the Respiratory System.

One the back, list one reason why smoking is dangerous to your health. Be sure to use a complete sentence.

**Appendix X**  
**Respiratory System Quiz Answer Key**

Label the diagram, using the words listed below: (12 points)

nose	throat	left lung	trachea (windpipe)	ribs	alveoli
bronchi	right lung	voice box	diaphragm	mouth	bronchial tubes



Write a paragraph on the Respiratory System. It must contain topic and concluding sentences, and must give one fact about each of the three parts of the Respiratory System. (worth 10 points, graded for content and mechanics)

The Respiratory System has three main parts, the lungs, the trachea, and the diaphragm. The lungs are the organs through which the body gets oxygen from the air. The trachea, also called the throat, is the muscular tube in the throat that leads to the lungs. Finally, the diaphragm is a curved sheet of muscle under the lungs that is involved in breathing. All these parts work together to make up the Respiratory System.

One the back, list one reason why smoking is dangerous to your health. Be sure to use a complete sentence. (worth three points)

They may have listed any reason that was given on Appendix U.