# REAL WORLD SCIENCE

## The Respiratory & Circulatory Systems

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Congratulations!

You have chosen a learning program that will actively motivate your students and provide you with easily accessible and easily manageable instructional guidelines and tools designed to make your teaching role efficient and rewarding.

The AIMS Teaching Module (ATM) provides you with a video program correlated to your classroom curriculum, instructions and guidelines for use, plus a comprehensive teaching program containing a wide range of activities and ideas for interaction between all content areas. Our authors, educators, and consultants have written and reviewed the AIMS Teaching Modules to align with the Educate America Act: Goals 2000.

This ATM, with its clear definition of manageability, both in the classroom and beyond, allows you to tailor specific activities to meet all of your classroom needs.

Rationale

In today’s classrooms, educational pedagogy is often founded on Benjamin S. Bloom’s “Six Levels of Cognitive Complexity.” The practical application of Bloom’s Taxonomy is to evaluate students’ thinking skills on these levels, from the simple to the complex:

1. Knowledge (rote memory skills),
2. Comprehension (the ability to relate or retell),
3. Application (the ability to apply knowledge outside its origin),
4. Analysis (relating and differentiating parts of a whole),
5. Synthesis (relating parts to a whole)
6. Evaluation (making a judgment or formulating an opinion).

The AIMS Teaching Module is designed to facilitate these intellectual capabilities, and to integrate classroom experiences and assimilation of learning with the students’ life experiences, realities, and expectations. AIMS’ learner verification studies prove that our AIMS Teaching Modules help students to absorb, retain, and to demonstrate ability to use new knowledge in their world. Our educational materials are written and designed for today’s classroom, which incorporates a wide range of intellectual, cultural, physical, and emotional diversities.

Organization and Management

To facilitate ease in classroom manageability, the AIMS Teaching Module is organized in three sections:

I. Introducing this ATM

will give you the specific information you need to integrate the program into your classroom curriculum.

II. Preparation for Viewing

provides suggestions and strategies for motivation, language preparedness, readiness, and focus prior to viewing the program with your students.

III. After Viewing the Program

provides suggestions for additional activities plus an assortment of consumable assessment and extended activities, designed to broaden comprehension of the topic and to make connections to other curriculum content areas.
FEATURES
INTRODUCING THE ATM

Your AIMS Teaching Module is designed to accompany a video program written and produced by some of the world’s most credible and creative writers and producers of educational programming. To facilitate diversity and flexibility in your classroom and to provide assessment tools, your AIMS Teaching Module features these components:

Themes
This section tells how the AIMS Teaching Module is correlated to the curriculum. Themes offers suggestions for interaction with other curriculum content areas, enabling teachers to use the teaching module to incorporate the topic into a variety of learning areas.

Overview
The Overview provides a synopsis of content covered in the video program. Its purpose is to give you a summary of the subject matter and to enhance your introductory preparation.

Objectives
The ATM learning objectives provide guidelines for teachers to assess what learners can be expected to gain from each program. After completion of the AIMS Teaching Module, your students will be able to demonstrate dynamic and applied comprehension of the topic.

Preparation for Viewing
In preparation for viewing the video program, the AIMS Teaching Module offers activity and/or discussion ideas that you may use in any order or combination.

Introduction To The Program
Introduction to the Program is designed to enable students to recall or relate prior knowledge about the topic and to prepare them for what they are about to learn.

Introduction To Vocabulary
Introduction to Vocabulary is a review of language used in the program: words, phrases, and usage. This vocabulary introduction is designed to ensure that all learners, including limited English proficiency learners, will have full understanding of the language usage in the content of the program.

Discussion Ideas
Discussion Ideas are designed to help you assess students’ prior knowledge about the topic and to give students a preview of what they will learn. Active discussion stimulates interest in a subject and can motivate even the most reluctant learner. Listening, as well as speaking, is active participation. Encourage your students to participate at the rate they feel comfortable. Model sharing personal experiences when applicable, and model listening to students’ ideas and opinions.

Focus
Help learners set a purpose for watching the program with Focus, designed to give students a focal point for comprehension continuity.

Jump Right In
Jump Right In provides abbreviated instructions for quick management of the program.

After Viewing the Program
After your students have viewed the program, you may introduce any or all of these activities to interact with other curriculum content areas, provide reinforcement, assess comprehension skills, or provide hands-on and in-depth extended study of the topic.
SUGGESTED ACTIVITIES

The Suggested Activities offer ideas for activities you can direct in the classroom or have your students complete independently, in pairs, or in small work groups after they have viewed the program. To accommodate your range of classroom needs, the activities are organized into skills categories. Their labels will tell you how to identify each activity and help you correlate it into your classroom curriculum. To help you schedule your classroom lesson time, the AIMS hourglass gives you an estimate of the time each activity should require. Some of the activities fall into these categories:

Meeting Individual Needs
These activities are designed to aid in classroom continuity. Reluctant learners and learners acquiring English will benefit from these activities geared to enhance comprehension of language in order to fully grasp content meaning.

Curriculum Connections
Many of the suggested activities are intended to integrate the content of the ATM program into other content areas of the classroom curriculum. These cross-connections turn the classroom teaching experience into a whole learning experience.

Critical Thinking
Critical Thinking activities are designed to stimulate learners’ own opinions and ideas. These activities require students to use the thinking process to discern fact from opinion, consider their own problems and formulate possible solutions, draw conclusions, discuss cause and effect, or combine what they already know with what they have learned to make inferences.

Cultural Diversity
Each AIMS Teaching Module has an activity called Cultural Awareness, Cultural Diversity, or Cultural Exchange that encourages students to share their backgrounds, cultures, heritage, or knowledge of other countries, customs, and language.

Hands On
These are experimental or tactile activities that relate directly to the material taught in the program. Your students will have opportunities to make discoveries and formulate ideas on their own, based on what they learn in this unit.

Writing
Every AIMS Teaching Module will contain an activity designed for students to use the writing process to express their ideas about what they have learned. The writing activity may also help them to make the connection between what they are learning in this unit and how it applies to other content areas.

In The Newsroom
Each AIMS Teaching Module contains a newsroom activity designed to help students make the relationship between what they learn in the classroom and how it applies in their world. The purpose of In The Newsroom is to actively involve each class member in a whole learning experience. Each student will have an opportunity to perform all of the tasks involved in production: writing, researching, producing, directing, and interviewing as they create their own classroom news program.

Extended Activities
These activities provide opportunities for students to work separately or together to conduct further research, explore answers to their own questions, or apply what they have learned to other media or content areas.

Link to the World
These activities offer ideas for connecting learners’ classroom activities to their community and the rest of the world.

Culminating Activity
To wrap up the unit, AIMS Teaching Modules offer suggestions for ways to reinforce what students have learned and how they can use their new knowledge to enhance their worldview.
ADDITIONAL ATM FEATURES

Vocabulary
Every ATM contains an activity that reinforces the meaning and usage of the vocabulary words introduced in the program content. Students will read or find the definition of each vocabulary word, then use the word in a written sentence.

Checking Comprehension
Checking Comprehension is designed to help you evaluate how well your students understand, retain, and recall the information presented in the AIMS Teaching Module. Depending on your students' needs, you may direct this activity to the whole group yourself, or you may want to have students work on the activity page independently, in pairs, or in small groups. Students can verify their written answers through discussion or by viewing the video a second time. If you choose, you can reproduce the answers from your Answer Key or write the answer choices in a Word Bank for students to use. Students can use this completed activity as a study guide to prepare for the test.

Reproducible Activities
The AIMS Teaching Module provides a selection of reproducible activities, designed to specifically reinforce the content of this learning unit. Whenever applicable, they are arranged in order from low to high difficulty level, to allow a seamless facilitation of the learning process. You may choose to have students take these activities home or to work on them in the classroom independently, in pairs or in small groups.

Checking Vocabulary
The checking Vocabulary activity provides the opportunity for students to assess their knowledge of new vocabulary with this word game or puzzle. The format of this vocabulary activity allows students to use the related words and phrases in a different context.

Test
The AIMS Teaching Module Test permits you to assess students' understanding of what they have learned. The test is formatted in one of several standard test formats to give your students a range of experiences in test-taking techniques. Be sure to read, or remind students to read, the directions carefully and to read each answer choice before making a selection. Use the Answer Key to check their answers.

Additional AIMS Multimedia Programs
After you have completed this AIMS Teaching Module you may be interested in more of the programs that AIMS offers. This list includes several related AIMS programs.

Answer Key
Reproduces tests and work pages with answers marked.

JUMP RIGHT IN

Preparation
- Read The Respiratory & Circulatory Systems Themes, Overview, and Objectives to become familiar with program content and expectations.
- Use Preparation for Viewing suggestions to introduce the topic to students.

Viewing
- Set up viewing monitor so that all students have a clear view.
- Depending on your classroom size and learning range, you may choose to have students view The Respiratory & Circulatory Systems together or in small groups.
- Some students may benefit from viewing the video more than one time.

After Viewing
- Select Suggested Activities that integrate into your classroom curriculum. If applicable, gather materials or resources.
- Choose the best way for students to work on each activity. Some activities work best for the whole group. Other activities are designed for students to work independently, in pairs, or in small groups. Whenever possible, encourage students to share their work with the rest of the group.
- Duplicate the appropriate number of Vocabulary, Checking Comprehension, and consumable activity pages for your students.
- You may choose to have students take consumable activities home, or complete them in the classroom, independently, or in groups.
- Administer the Test to assess students' comprehension of what they have learned, and to provide them with practice in test-taking procedures.
- Use the Culminating Activity as a forum for students to display, summarize, extend, or share what they have learned with each other, the rest of the school, or a local community organization.
The Respiratory & Circulatory Systems

Themes

Your heart beats 100,000 times every day. You take approximately 20,000 breaths a day. As its major themes, The Respiratory and Circulatory Systems explores the complex body systems relative to these essential processes, their structures, and the functions of not only their component parts, but of each system as a whole. Emphasis is placed on how the respiratory and circulatory systems work both independently and together to keep us alive.

Objectives

• To define the human respiratory & circulatory systems
• To identify the key components of the respiratory system and explain their functions
• To explain what happens when we breathe in and breathe out
• To identify the key components of the circulatory system and explain their functions
• To explore how the respiratory system and the circulatory system work independently and together

Overview

Our bodies are like very intricate machines, and depend on many different systems in order to function properly. In this program, students will explore each important aspect of two key body systems: the respiratory and circulatory (or cardiovascular) systems.

Beginning with the respiratory system, the students will learn about the complex physical apparatus involved in the process of breathing, from our major air-intake passageway, the nose, to the smallest dead-end spaces of the lungs, called alveoli, where a vital exchange of oxygen and carbon dioxide occurs. It is here that the respiratory and circulatory systems meet, and the students will next explore the intricacy and function of the cardiovascular system. In this section of the program, students will learn about the anatomy of the heart and how it works, the structure and function of various blood vessels, the cellular components of blood and their purposes, as well as what blood pressure is and what it reveals. As the program concludes, students will examine the link between these two amazing body systems, and understand the importance of maintaining them through exercise and a healthy diet.

Introduction to the Program

Point out to the students that our bodies are the machines we depend upon to get us through each day. Even when at rest, they are working to keep us alive. This special machine relies on several different systems that work both separately and together. Ask students if they have any body parts that constantly move, even when they are sitting still or asleep. You may wish to list these responses on the board.

Next, have students place one hand on the middle of their chests to feel their heart beat. Then have them place one hand just below their ribs to feel the movement of their lungs, ribs, and diaphragm as they breathe. Ask students what they already know about their heart and lungs. You may wish to list these responses on the board, as well.

Introduction to Vocabulary

Write the following words on the board and explain that they will be referenced in the video. Ask the class to discuss the meaning of each word, and review the terms that are unfamiliar to students.

blood vessels, carbon dioxide, cell, cellular respiration, circulate, circulation, diaphragm, heart, lung, rib cage, oxygen, windpipe

Enrichment words: Explain to students that “ventricle” is a Latin word for “little belly”, and “atrium” is Latin for “entrance hall.” Clarify that these words are associated with the anatomy of the heart. With these clues in mind, ask students to guess the role that each of these elements plays in the circulatory system.

Discussion Ideas

Ask students to name things their bodies do involuntarily. What are their bodies doing when they sleep? When they eat? When they play? When they study? Ask students what part their heart plays in these activities. What is the function of their lungs during these same activities? How might their heart and lungs be working together?

Explain that the heart and lungs are key organs in the circulatory and respiratory systems of the body. Discuss with students the importance of maintaining the health of these vital organs and systems. Ask what things might put the heart or lungs at risk for damage or disease. Encourage students to think about ways to ensure the continued health of their own respiratory and circulatory systems in the years to come.

Focus

Before viewing the program, ask students to think about the demands they make on their bodies each and every day. Ask them to keep in mind, as they watch the program, the body systems and complex processes those physical demands involve, and the importance of keeping these systems in the best possible condition.
SUGGESTED ACTIVITIES

Meeting Individual Needs
Teach students how to measure their pulse rates. Model by placing a finger on the inside of the wrist or on the carotid artery of the neck (just below the lower jaw) to feel for the pulse, or beat. Tell students to place their fingers on their pulses, and silently count the beats while you measure one minute of time. Have students immediately write their pulse count on a piece of paper. Let students tell their pulse rates. Ask them what situations or activities might cause their pulse beat to increase, and what might slow down the beat. Discuss why the ability of the heart to make these adjustments is important.

Connection to Language Arts
Many songs and poems express emotions by referring to the heart or blood. Ask students to list examples they have heard or seen. Ask students one or more of the following questions to prompt a discussion: What do these phrases mean to them? Why is the circulatory system often used to represent strong feelings? What do phrases like “in cold blood”, “heart of stone”, “blood is thicker than water”, “blue-blooded”, or “light-hearted” mean? How did they most likely originate?

Writing
Ask students to write an explanatory paragraph describing, in their own words, how the human respiratory system works. Begin the writing process by reviewing the sequence of events as a class. Be sure the interaction with the circulatory system is noted. Write on the board any difficult words the students may need.

Next, the students should jot down the details of the process in their own words. Working from this list, they can write the first draft of their paragraph. If applicable, encourage them to review each other’s papers. Once any corrections are made, have the students write a final draft.

Critical Thinking
Explain to students that when body temperature rises, the flow of blood to the vessels in the skin increases; when body temperature lowers, the flow of blood to the skin is restricted. Ask students this question: Why does the blood flow react this way, and what is the effect? Help them to conclude that this self-adjustment is the body’s way of maintaining a constant temperature of 98.6°F. In a healthy individual, body temperature is kept constant (within a very small range), despite physical activity or changes in the temperature of the surroundings.

Link to the World
Have students research the Internet, books, and encyclopedias for information on the circulatory and respiratory systems of different animals. Encourage them to work in pairs or small groups to research a variety of animals. Generate a list of animals your students want to learn about, or assign animals such as these: the horse, chimpanzee, dolphin, octopus, sponge, fish, grasshopper, lizard, sparrow. Have students share their findings with the class. Discuss the similarities and differences between the circulatory and respiratory systems of each animal and those of humans.
Connection to Health
Discuss with students health risks to the respiratory system and circulatory system associated with smoking, lack of exercise, and environmental factors such as smog. Begin by having students take a deep breath and hold it for as long as possible, then ask why they could hold their breath for only a limited amount of time. Why do their bodies need oxygen? When they run, play soccer, or engage in any strenuous activity, why will they sometimes find themselves “out of breath?”

Help students understand that strong lungs, and a healthy heart and vascular system allow their lungs to take in large amounts of oxygen from the air around them, and help their circulatory system to efficiently deliver that oxygen to all parts of the body. Without sufficient oxygen, the body cannot work properly. Remind them that the heart is a muscle, and that muscles need oxygen. Smoking, lack of exercise, and environmental factors inhibit the body’s ability to process oxygen, which weakens the body by decreasing both muscular strength and endurance.

Extended Activity
Ask students to theorize about the cause of the “blush response.” (Caused by increased blood flow when blood vessels open up.) Why does the same blushed appearance occur when we are hot? How might the increased blood flow help to cool our bodies? (Blood vessels open to allow heat to be released.)

Why do people turn pale when they are frightened? (The sympathetic nervous system speeds the heart rate, narrows blood vessels, and raises blood pressure. The sympathetic nervous system is the “fight or flight” system; it allows us to respond to danger by fighting off an attacker or by running away. When danger threatens, the sympathetic nervous system increases heart and respiratory rates, increases blood flow to muscles, and decreases blood flow to other areas, such as skin, digestive tract, and limb veins.)

Why do people also turn pale when they are cold? On very cold days, which parts of the body turn pale first? Why?

Culminating Activity
Divide the class into two groups, one representing the respiratory system, the other representing the circulatory system. Give each group time to compose an equal number of questions about their assigned system. Using the questions, plan a Q&A game. The teacher will ask the respiratory system group questions composed by the circulatory system group, and vice versa. Each question will be worth 4 points. Add 4 points for correct answers; subtract 2 for wrong answers. Top score wins.
The vocabulary words listed below are from The Respiratory and Circulatory Systems. Read each definition. Fill in the number of each term next to its definition.

1. artery  
2. blood pressure  
3. carbon dioxide  
4. cell  
5. cellular respiration  
6. circulation  
7. diaphragm  
8. heart  
9. lung  
10. oxygen  
11. pulse  
12. vein

______ the smallest unit of an organism that can exist on its own
______ an invisible, odorless gas essential for breathing; air
______ muscular wall below the rib cage that contracts when we exhale
______ a colorless, odorless gas produced during respiration
______ the movement of the blood through the body
______ either of the paired respiratory organs, situated inside the rib cage, that transfer oxygen into the blood and remove carbon dioxide from it
______ the regular beat of blood flow caused by the heart pumping blood through the body
______ a hollow muscular organ that pumps blood around the body
______ a blood vessel that is part of the system carrying blood from the heart to the rest of the body
______ any of the blood vessels that carry blood to the heart
______ the process in which oxygen is delivered to the cells of the body and used to break down food; carbon dioxide and water are produced, and energy is released
______ the pressure exerted by the blood against the walls of blood vessels
COMPREHENSION - SHORT ANSWER

Answer the following questions in the space provided. Use a separate sheet of paper if necessary.

1. What is the main function of the respiratory system?

2. What part does the diaphragm play in the breathing process?

3. What is the main function of the circulatory system?

4. What are the main components of blood discussed in this program?

5. How do the respiratory system and the circulatory system work together?

6. What is cellular respiration?

7. Why is it important to maintain the health of the respiratory and circulatory systems?
BLOOD - AN AMAZING SUBSTANCE

Your body contains about 6 1/2 pints of blood. Blood is like a fluid conveyor belt that carries oxygen to every living cell in your body. Not only that, but it transports food substances, hormones, waste products, and heat. It also acts as your body’s main defense against disease.

If you look at a drop of blood, it seems to be just a red liquid. However, if you saw it under a microscope, you would see that the same drop of blood is packed with millions of cells that are floating in a watery fluid.

Using a dictionary, encyclopedia, science book, or Internet resources, identify the following components of blood. Explain the function of each and the importance of that function.

1. plasma

2. red blood cell

3. hemoglobin

4. white blood cell

5. platelet

6. fibrinogen
TRUE OR FALSE

Place a T next to statements that are true, and an F next to statements that are false.

1. _____ The primary passageway for air to enter the body is the mouth.

2. _____ Your lungs are surrounded by your ribs, and they sit on a dome of muscle called the diaphragm.

3. _____ The epiglottis is the main passageway or tube that carries air to and from the lungs.

4. _____ The exchange of oxygen and carbon dioxide between the respiratory and circulatory systems happens in the alveoli of the lungs.

5. _____ When you exhale, your diaphragm moves downward, squeezing air up through your windpipe.

6. _____ Blood transports oxygen, food substances, waste products, and heat.

7. _____ Plasma is the fluid part of the blood, and is made up of water, sugars, and proteins.

8. _____ Blood pressure is the regular beat of blood flow caused by the heart pumping blood through the body.

9. _____ Blood is the body's main defense against disease.

10. _____ The products of cellular respiration are oxygen and energy.

11. _____ To safely receive a blood transfusion, it’s important to know if your blood type is A, B, AB, or O.

12. _____ Platelets, fibrin, and red blood cells work together to form a scab, to seal and protect a wound.

13. _____ Veins carry blood away from the heart.

14. _____ White blood cells contain hemoglobin and carry oxygen to the cells and tissues of the body.

15. _____ Your heart is the strongest muscle in your body.
IT’S ALL GREEK (OR LATIN) TO ME

Many of the terms used to describe parts of the circulatory and respiratory systems are Greek or Latin in origin, and may seem difficult to understand or remember. Listed below are some of those terms. Use a dictionary, encyclopedia, science book, or Internet resources as needed to:

a) match each term to its definition, and b) identify the Greek or Latin origin of the word, including a rough translation.

(Note: Teachers may need to initially show students where to find the origins of words in a dictionary, and explain how to interpret them. “Cardiovascular” and “hemoglobin” require breaking into two parts: cardio/vascular and hemo/globin.)

1. alveoli
2. atrium
3. cardiovascular
4. cilia
5. diaphragm
6. epiglottis
7. hemoglobin
8. trachea
9. ventricle

— muscular wall below rib cage that separates the abdomen from the area around the lungs
— tiny, hair-like threads, such as those which line the inside of the nose
— the main tube that carries air to and from the lungs
— either of the two upper chambers of the heart that take blood from the veins and pump it into a ventricle
— an iron-containing protein in red blood cells that combines with oxygen and transports it from the lungs to body tissues
— either of the two lower chambers of the heart that receive blood from the upper chambers and pump it into the arteries
— a flap of tissue found at the base of the tongue that covers the opening to the air passages when we swallow, preventing food or liquids from entering the windpipe
— the tiny thin-walled air sacs found in large numbers in each lung, through which oxygen enters and carbon dioxide leaves the blood
— relating to both the heart and the blood vessels; may be used instead of “circulatory” in the term “circulatory system”
**GO WITH THE FLOW**

**Part A:** Below are the steps involved in the pumping action of the heart, but they are not in correct sequence. Put them in order, numbering them from 1 to 8.

1. Oxygen-rich blood enters the left atrium from the lungs.
2. Blood from the right ventricle goes to the lungs to pick up oxygen.
3. At the same time, oxygen-poor blood enters the right atrium.
4. Blood is squeezed into the ventricles.
5. The ventricles contract.
6. The heart muscle relaxes.
7. At the same time, blood from the left ventricle goes to the body to supply it with oxygen.
8. The heart muscle contracts.

**Part B:** Now, in the space provided below, write out these steps in their correct sequence.
IN WITH THE GOOD AIR, OUT WITH THE BAD

Part A: Below is the step-by-step path of air through the respiratory system, but the steps are not in correct sequence. Put them in order, numbering them from 1 to 8.

____ Air enters the alveoli.
____ Carbon dioxide passes out of the blood stream, and is eventually exhaled.
____ Cilia and mucus trap tiny particles found in the air, and warm and moisten the air.
____ Air moves through smaller and smaller passageways called bronchi.
____ The trachea, or windpipe, then carries the air to the lungs.
____ Air enters the nose.
____ Oxygen passes into the blood stream.
____ Air moves down the throat, or pharynx.

Part B: Now, in the space provided below, write out these steps in their correct sequence.

__________________________
__________________________
__________________________
__________________________
__________________________
__________________________
__________________________
__________________________
HAVE A HEART - JUST FOR FUN

In art, poetry, song, literature, and everyday life, the heart is an image of love. It has many other associations, as well. Below are a few examples. Do you know what they mean? Write your answer in the space provided.

1. have a heart

2. change of heart

3. to know something by heart

4. broken heart

5. heartfelt

6. have your heart in the right place

7. take heart

8. wear your heart on your sleeve

9. have your heart set on (something)

10. heartless

11. have a heart-to-heart talk

12. with all your heart

Why do you think the heart produces this kind of association? Can you think of other expressions like those above?
WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally, or backwards.

alveoli  heart  pulse
artery  hemoglobin  respiratory
blood  lungs  trachea
circulatory  oxygen  vein
diaphragm  plasma
fibrin  platelet

Q Z B T R A C H E A K L R W M
Y N G D L W X A P R B Z Q M G
R H R D Z C Q L V T K P D Y A
O E S Q X P D V B E R W Q Z R
T M S F H Z Y E L R G K L N H
A O T P K J X O O Y L X J M P
L G V E I N Z L O W Q U V Z A
U L Q Z W R H I D X H J N X I
C O T D M Y A L G D L W Q G D
R B P W X A L T Q E S L U P S
I I Y T T M P Y O H Y J W V Z
C N X J R S Z W G R M X V Q P
X Z H K Y A M N O X Y G E N J
P L A T E L E T W R Z X H K Q
K R Q W Z P T H X F I B R I N

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Circle the letter of the correct answer for each question.

1. Breathing is only one part of respiration. The second part is:
   a.) inhaling and exhaling.
   b.) cellular respiration.
   c.) circulation of blood throughout the body.
   d.) the movement of the diaphragm.

2.) In the process of cellular respiration:
   a.) oxygen and food molecules combine.
   b.) carbon dioxide and water are produced.
   c.) energy is released.
   d.) all of the above

3. The respiratory system consists of:
   a.) the lungs, throat, and passageways that lead to the lungs.
   b) the rig cage, diaphragm, and lungs.
   c.) the lungs, heart, and blood.
   d.) oxygen, carbon dioxide, water, and energy.

4.) The circulatory system consists of:
   a.) red and white blood cells, platelets, and fibrin.
   b.) the heart, blood vessels, and blood.
   c.) the heart, lungs, and blood.
   d.) the upper and lower chambers of the heart.

5.) Plasma is:
   a.) another name for blood.
   b.) the substance that helps to form a scab over a wound.
   c.) the body’s main defense against disease.
   d.) the fluid part of the blood, and is made up of water, sugars, and proteins.
6.) Red blood cells:
   a.) fight the pathogens, or germs, that enter our bodies.
   b.) contain hemoglobin and carry oxygen to the cells and tissues of the body.
   c.) carry carbon dioxide to the cells and tissues of the body.
   d.) are the fluid part of the blood.

7. Arteries are blood vessels that:
   a.) carry oxygen-poor blood to the heart from all parts of the body.
   b.) allow the gas exchange of O2 and CO2 to take place in the alveoli of the lungs.
   c.) carry oxygen-rich blood from the heart to all parts of the body.
   d.) are an important part of the respiratory system.

8. The respiratory system and circulatory system:
   a.) always work independently from one another.
   b.) work together to keep blood pumping to all parts of the body.
   c.) work together only when we are active, and never when we are resting or sleeping.
   d.) work together to deliver oxygen to cells and remove carbon dioxide from the body.

9.) When we exhale, we are getting rid of:
   a.) energy.
   b.) carbon dioxide and water.
   c.) oxygen.
   d.) all of the above

10. Another name for the circulatory system is:
    a.) the blood system.
    b.) the blood pressure system.
    c.) the heart system.
    d) the cardiovascular system.
ADDITIONAL AIMS MULTIMEDIA PROGRAMS

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#8385  How Your Body Works: Bone and Muscle
#8997  The Human Body: the Ultimate Machine
The vocabulary words listed below are from The Respiratory and Circulatory Systems. Read each definition. Fill in the number of each term next to its definition.

1. artery
2. blood pressure
3. carbon dioxide
4. cell
5. cellular respiration
6. circulation
7. diaphragm
8. heart
9. lung
10. oxygen
11. pulse
12. vein

4  the smallest unit of an organism that can exist on its own
10 an invisible, odorless gas essential for breathing; air
7 muscular wall below the rib cage that contracts when we exhale
3 a colorless, odorless gas produced during respiration
6 the movement of the blood through the body
9 either of the paired respiratory organs, situated inside the rib cage, that transfer oxygen into the blood and remove carbon dioxide from it
11 the regular beat of blood flow caused by the heart pumping blood through the body
8 a hollow muscular organ that pumps blood around the body
1 a blood vessel that is part of the system carrying blood from the heart to the rest of the body
12 any of the blood vessels that carry blood to the heart
5 the process in which oxygen is delivered to the cells of the body and used to break down food; carbon dioxide and water are produced, and energy is released
2 the pressure exerted by the blood against the walls of blood vessels
1. What is the main function of the respiratory system?
   
   **Answers will vary. Accept any that demonstrate understanding of the concept.**

2. What part does the diaphragm play in the breathing process?

3. What is the main function of the circulatory system?

4. What are the main components of blood discussed in this program?

5. How do the respiratory system and the circulatory system work together?

6. What is cellular respiration?

7. Why is it important to maintain the health of the respiratory and circulatory systems?
Your body contains about 6 1/2 pints of blood. Blood is like a fluid conveyor belt that carries oxygen to every living cell in your body. Not only that, but it transports food substances, hormones, waste products, and heat. It also acts as your body’s main defense against disease.

If you look at a drop of blood, it seems to be just a red liquid. However, if you saw it under a microscope, you would see that the same drop of blood is packed with millions of cells that are floating in a watery fluid.

Using a dictionary, encyclopedia, science book, or Internet resources, identify the following components of blood. Explain the function of each and the importance of that function.

1. Plasma

*Plasma is the fluid part of the blood, and is made up of water, sugars, and proteins. It is about 90% water.*

2. Red blood cell

*This is the red-colored cell in blood that contains hemoglobin and carries oxygen to the tissues.*

3. Hemoglobin

*Hemoglobin is the iron-containing protein in red blood cells that combines with oxygen and transports it from the lungs to body tissues. Hemoglobin gives red blood cells their color.*

4. White blood cell

*This is a large blood cell that has no pigmentation. It helps protect the body against infection by attacking pathogens, or germs, that enter the body.*

5. Platelet

*A platelet is a tiny particle found in great quantities in the blood. Platelets near a wound become sticky and join together to form a plug.*

6. Fibrinogen

*Fibrinogen is a blood protein that changes into fibrin. Fibrin forms a network of fibers in which red blood cells become trapped, producing a clot which then hardens to form a scab over a wound.*
TRUE OR FALSE

Place a T next to statements that are true, and an F next to statements that are false.

1.  F  The primary passageway for air to enter the body is the mouth.

2.  T  Your lungs are surrounded by your ribs, and they sit on a dome of muscle called the diaphragm.

3.  F  The epiglottis is the main passageway or tube that carries air to and from the lungs.

4.  T  The exchange of oxygen and carbon dioxide between the respiratory and circulatory systems happens in the alveoli of the lungs.

5.  F  When you exhale, your diaphragm moves downward, squeezing air up through your windpipe.


7.  T  Plasma is the fluid part of the blood, and is made up of water, sugars, and proteins.

8.  F  Blood pressure is the regular beat of blood flow caused by the heart pumping blood through the body.

9.  T  Blood is the body's main defense against disease.

10.  F  The products of cellular respiration are oxygen and energy.

11.  T  To safely receive a blood transfusion, it's important to know if your blood type is A, B, AB, or O.

12.  T  Platelets, fibrin, and red blood cells work together to form a scab, to seal and protect a wound.

13.  F  Veins carry blood away from the heart.

14.  F  White blood cells contain hemoglobin and carry oxygen to the cells and tissues of the body.

15.  T  Your heart is the strongest muscle in your body.
Many of the terms used to describe parts of the circulatory and respiratory systems are Greek or Latin in origin, and may seem difficult to understand or remember. Listed below are some of those terms. Use a dictionary, encyclopedia, science book, or Internet resources as needed to:

a) match each term to its definition, and b) identify the Greek or Latin origin of the word, including a rough translation.

(Note: Teachers may need to initially show students where to find the origins of words in a dictionary, and explain how to interpret them. “Cardiovascular” and “hemoglobin” require breaking into two parts: cardio/vascular and hemo/globin.)

1. alveoli
2. atrium
3. cardiovascular
4. cilia
5. diaphragm
6. epiglottis
7. hemoglobin
8. trachea
9. ventricle

5. muscular wall below rib cage that separates the abdomen from the area around the lungs

4. tiny, hair-like threads, such as those which line the inside of the nose

8. the main tube that carries air to and from the lungs

2. either of the two upper chambers of the heart that take blood from the veins and pump it into a ventricle

7. an iron-containing protein in red blood cells that combines with oxygen and transports it from the lungs to body tissues

9. either of the two lower chambers of the heart that receive blood from the upper chambers and pump it into the arteries

6. a flap of tissue found at the base of the tongue that covers the opening to the air passages when we swallow, preventing food or liquids from entering the windpipe

1. the tiny thin-walled air sacs found in large numbers in each lung, through which oxygen enters and carbon dioxide leaves the blood

3. relating to both the heart and the blood vessels; may be used instead of “circulatory” in the term “circulatory system”
GO WITH THE FLOW

Part A: Below are the steps involved in the pumping action of the heart, but they are not in correct sequence. Put them in order, numbering them from 1 to 8.

2. Oxygen-rich blood enters the left atrium from the lungs.
7. Blood from the right ventricle goes to the lungs to pick up oxygen.
3. At the same time, oxygen-poor blood enters the right atrium.
5. Blood is squeezed into the ventricles.
6. The ventricles contract.
1. The heart muscle relaxes.
8. At the same time, blood from the left ventricle goes to the body to supply it with oxygen.
4. The heart muscle contracts.

Part B: Now, in the space provided below, write out these steps in their correct sequence.

The heart muscle relaxes. Oxygen-rich blood enters the left atrium from the lungs. At the same time, oxygen-poor blood enters the right atrium. The heart muscle contracts. Blood is squeezed into the ventricles. The ventricles contract. Blood from the right ventricle goes to the lungs to pick up oxygen. At the same time, blood from the left ventricle goes to the body to supply it with oxygen.
IN WITH THE GOOD AIR, OUT WITH THE BAD

Part A: Below is the step-by-step path of air through the respiratory system, but the steps are not in correct sequence. Put them in order, numbering them from 1 to 8.

6. Air enters the alveoli.
8. Carbon dioxide passes out of the blood stream, and is eventually exhaled.
2. Cilia and mucus trap tiny particles found in the air, and warm and moisten the air.
5. Air moves through smaller and smaller passageways called bronchi.
4. The trachea, or windpipe, then carries the air to the lungs.
1. Air enters the nose.
7. Oxygen passes into the blood stream.
3. Air moves down the throat, or pharynx.

Part B: Now, in the space provided below, write out these steps in their correct sequence.

Air enters the nose. Cilia and mucus trap tiny particles found in the air, and warm and moisten the air. Air moves down the throat, or pharynx. The trachea, or windpipe, then carries the air to the lungs. Air moves through smaller and smaller passageways called bronchi. Air enters the alveoli. Oxygen passes into the blood stream. Carbon dioxide passes out of the blood stream, and is eventually exhaled.
HAVE A HEART - JUST FOR FUN

In art, poetry, song, literature, and everyday life, the heart is an image of love. It has many other associations, as well. Below are a few examples. Do you know what they mean? Write your answer in the space provided.

Answers will vary. Accept any that demonstrate understanding of the concept.

1. have a heart - be merciful
2. change of heart - change your mind
3. to know something by heart - memorize something
4. broken heart - to become very unhappy over something, often over lost love
5. heartfelt - deeply felt
6. have your heart in the right place - to be kind
7. take heart - have courage
8. wear your heart on your sleeve - to reveal your feelings openly
9. have your heart set on (something) - to want something badly
10. heartless - to be cruel
11. have a heart-to-heart talk - to have a serious, honest discussion
12. with all your heart - completely or very willingly

Why do you think the heart produces this kind of association? Can you think of other expressions like those above?

Answers will vary. Accept any that demonstrate understanding of the concept.
WORD SEARCH

The following words can be found in the maze below. The letters may be arranged horizontally, vertically, diagonally, or backwards.

<table>
<thead>
<tr>
<th>alveoli</th>
<th>heart</th>
<th>pulse</th>
</tr>
</thead>
<tbody>
<tr>
<td>artery</td>
<td>hemoglobin</td>
<td>respiratory</td>
</tr>
<tr>
<td>blood</td>
<td>lungs</td>
<td>trachea</td>
</tr>
<tr>
<td>circulatory</td>
<td>oxygen</td>
<td>vein</td>
</tr>
<tr>
<td>diaphragm</td>
<td>plasma</td>
<td></td>
</tr>
<tr>
<td>fibrin</td>
<td>platelet</td>
<td></td>
</tr>
</tbody>
</table>

Q Z B T R A C H E A K L R W M
Y N G D L W X A P R B Z Q M G
R H D Z C Q L V T K P D Y A
O E S Q X P D V B E R W Q Z R
T M S F H Z Y E L R G K L N H
A O T P K J X O O Y L X J M P
L G V E I N Z L O W Q U V Z A
U L Q Z W R H I D X H J N X I
C O T D M Y A L G D L W Q G D
R B P W X A L T Q E S L U P S
I I Y T T M P Y O H Y J W V Z
C N X J R S Z W G R M X L V Q P
X Z H K Y A M N O X Y G E N J
P L A T E L E T W R Z X H K Q
K R Q W Z P T H X F I B R I N
Circle the letter of the correct answer for each question.

1. Breathing is only one part of respiration. The second part is:
   a.) inhaling and exhaling.
   b.) cellular respiration.
   c.) circulation of blood throughout the body.
   d.) the movement of the diaphragm.

2. In the process of cellular respiration:
   a.) oxygen and food molecules combine.
   b.) carbon dioxide and water are produced.
   c.) energy is released.
   d.) all of the above.

3. The respiratory system consists of:
   a.) the lungs, throat, and passageways that lead to the lungs.
   b.) the rib cage, diaphragm, and lungs.
   c.) the lungs, heart, and blood.
   d.) oxygen, carbon dioxide, water, and energy.

4. The circulatory system consists of:
   a.) red and white blood cells, platelets, and fibrin.
   b.) the heart, blood vessels, and blood.
   c.) the heart, lungs, and blood.
   d.) the upper and lower chambers of the heart.

5. Plasma is:
   a.) another name for blood.
   b.) the substance that helps to form a scab over a wound.
   c.) the body’s main defense against disease.
   d.) the fluid part of the blood, and is made up of water, sugars, and proteins.
6.) Red blood cells:
   a.) fight the pathogens, or germs, that enter our bodies.
   b.) contain hemoglobin and carry oxygen to the cells and tissues of the body.
   c.) carry carbon dioxide to the cells and tissues of the body.
   d.) are the fluid part of the blood.

7. Arteries are blood vessels that:
   a.) carry oxygen-poor blood to the heart from all parts of the body.
   b.) allow the gas exchange of O2 and CO2 to take place in the alveoli of the lungs.
   c.) carry oxygen-rich blood from the heart to all parts of the body.
   d.) are an important part of the respiratory system.

8. The respiratory system and circulatory system:
   a.) always work independently from one another.
   b.) work together to keep blood pumping to all parts of the body.
   c.) work together only when we are active, and never when we are resting or sleeping.
   d.) work together to deliver oxygen to cells and remove carbon dioxide from the body.

9.) When we exhale, we are getting rid of:
   a.) energy.
   b.) carbon dioxide and water.
   c.) oxygen.
   d.) all of the above

10. Another name for the circulatory system is:
    a.) the blood system.
    b.) the blood pressure system.
    c.) the heart system.
    d.) the cardiovascular system.