



## Anatomy of the Human Heart Middle School/High School

This guide is for middle and high school students participating in the AIMS Anatomy of the Human Heart. Programs will be presented by an AIMS Anatomy Specialist. During this activity, students will become more familiar with the anatomical structures of the human heart by observing, studying and examining human specimens. The primary focus is on the anatomy and flow of blood through the heart. Included in this guide, you will find additional resources such as important terminology and pre/post tests for your students.

### National Science Education (NSES) Content Standards

Content Standard K-12	Unifying Concepts and Processes: systems order and organization; evidence, models and explanation; form and function (Grades 9-12)
Content Standard A	Science as Inquiry (Grades 9-12; Grades 5-8)
Content Standard C	Life Science: matter, energy and organization of living systems (Grades 9-12) Life Science: structure and function in living systems; diversity and adaptation of organisms (Grades 5-8)
Content Standard F	Science in Personal Health and Social Perspectives: personal and community health (Grades 9-12) Science in Personal Health and Social Perspectives: personal health (Grades 5-8)

### Show Me Standards (Science and Health/Physical Education)

Science 3	Characteristics and interactions of living organisms
Health/Physical Education 1	Structures of, functions of and relationships among human body systems
Health/Physical Education 2	Principles and practices of physical and mental health
Health/Physical Education 3	Diseases and methods for prevention, treatment and control
Health/Physical Education 4	Principles of movement and physical fitness
Health/Physical Education 5	Methods used to assess health, reduce risk factors, avoid high-risk behaviors
Health/Physical Education 6	Consumer health issues

### Missouri Learning Standards (Grades 5-8)

Life Sciences (6-8.LS1.A.1)	Organisms are made of cells; cells carry out all of the basic functions of life.
Life Sciences (6-8.LS1.A.3)	Multicellular organisms are organized by varying levels of complexity: cells, tissues, organs, organ systems.
Life Sciences (6-8.LS1.A.4)	Body systems interact to carry out key body functions.
Life Sciences (6-8.LS1.B.2)	Environmental and genetic factors influence the growth of organisms.

### Missouri Learning Standards (Grades 9-12)

Life Sciences (9-12.LS1.A.2)	Interacting systems that provide specific functions within multicellular organisms
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#### Lesson Objectives:

Students will participate in the use of a cadaver as a learning tool for health science education.  
Students will be able to identify the chambers, valves and major vessels of the heart.  
Students will be able to increase their understanding of those structures, functions and relationships associated with the circulatory and cardiopulmonary systems.  
Students will increase their understanding of the flow of blood and the cardiac cycle.  
Students will increase their understanding of the disease process and how nutrition, exercise and proper health habits can prevent and/or impact such outcomes.

#### Prerequisite Knowledge:

Students should be familiar with terms relating to the heart and circulatory system.

#### Materials:

Review of Terminology/Vocabulary Reference Guide  
Pre/Post Test

## Anatomy of the Human Heart

### Terminology/Vocabulary Reference Guide

<b>Aorta</b>	The main trunk of the systemic arterial circulation that arises from the left ventricle of the heart
<b>Aortic arch</b>	Curved portion between the ascending and descending portion of the aorta
<b>Aortic valve (semilunar)</b>	A valve at the opening between the left ventricle and the aorta, preventing the backflow of blood into the left ventricle
<b>Apex</b>	Pointed end of the heart consisting of muscle from the left ventricle
<b>Arteries</b>	Blood vessels that conduct blood away from the heart and into circulation
<b>Atherosclerosis</b>	Changes in the walls of large arteries consisting of lipid deposits on the artery walls; the early stage of arteriosclerosis
<b>Atrioventricular groove</b>	Coronary groove or sulcus of the heart which demarcates the borders of the underlying atria from the ventricles
<b>Atrioventricular (AV) node</b>	Specialized mass of conducting cells located at the atrioventricular junction in the heart
<b>Brachiocephalic trunk</b>	Branch of the aorta which splits apart to form the right subclavian artery and right common carotid artery
<b>Capillaries</b>	Tiny blood vessels where oxygen and nutrients are exchanged for carbon dioxide and waste
<b>Cardiac cycle</b>	Sequence of events encompassing one complete contraction and relaxation of the atria and ventricles of the heart
<b>Carotid arteries</b>	A pair of major blood vessels that supply oxygen-rich blood from the heart to the brain and face
<b>Chordae Tendineae</b>	Tendinous strings that extend from the cusps of the AV valves to the papillary muscles of the heart, thus preventing valve inversion; also known as your "heartstrings"
<b>Congestive Heart Failure (CHF)</b>	Condition in which the pumping efficiency of the heart is depressed so that circulation is inadequate to meet tissue needs
<b>Coronary arteries</b>	The two arteries that branch from the base of the aorta and supply the heart muscle with oxygenated blood
<b>Coronary Artery Disease (CAD)</b>	Results from narrowing of the coronary arteries over time because of atherosclerosis

## Anatomy of the Human Heart

### Terminology/Vocabulary Reference Guide (Continued)

<b>Coronary sinus</b>	A vein which drains blood from the myocardium and routes it into the right atrium
<b>Diastole</b>	Period of the cardiac cycle when either the ventricles or the atria are relaxing
<b>Fossa ovalis</b>	A shallow depression in the interatrial septum that marks the spot where an opening, the foramen ovale, existed in the fetal heart
<b>Heart murmur</b>	A finding on physical examination of the heart that can, in some cases, indicate the presence of cardiac disease. Murmurs result from vibrations set up in the bloodstream and the surrounding heart and great vessels as the result of turbulent flow.
<b>Hypertension</b>	An elevation in diastolic or systolic blood pressure
<b>Inferior vena cava</b>	Major vessel that returns oxygen-depleted blood to the right atrium of the heart from body regions inferior to the diaphragm
<b>Left anterior descending artery (LAD)</b>	A branch of the left coronary artery, which supplies blood to the interventricular septum and anterior walls of both ventricles; also known as the anterior interventricular artery or “widow maker”
<b>Left atrium</b>	Chamber on the left side of the heart that receives oxygenated blood from the pulmonary veins
<b>Left ventricle</b>	Inferiorly-located chamber on the left side of the heart that receives oxygenated blood from the left atrium and pumps it into the systemic circulation via the aorta
<b>Mitral or bicuspid valve (atrioventricular)</b>	The valve connecting the left atrium and the left ventricle of the heart; of the four heart valves, it is the only one with two cusps instead of three
<b>Myocardial Infarction (MI)/Heart Attack</b>	Condition characterized by dead tissue areas in the myocardium; caused by interruption of blood supply to the area
<b>Myocardium</b>	Layer of the heart wall composed of cardiac muscle
<b>Papillary muscles</b>	Cone-like projections on the ventricular walls to which the chordae tendineae are attached. The contraction of the papillary muscles and the tightening of the chordae tendineae prevent the valve flaps of the AV valves from everting into the atria.
<b>Pectinate muscles</b>	Prominent muscular ridges that run along the inner surface of the auricle and across the adjacent anterior atrial wall

**Anatomy of the Human Heart**  
**Terminology/Vocabulary Reference Guide (Continued)**

<b>Pericardium</b>	Double-layered membrane or serosa that surrounds the heart and roots of the great vessels; protects, lubricates and anchors heart
<b>Pulmonary artery/trunk</b>	Vessel that transports deoxygenated blood from the right ventricle and routes blood to the lungs where gas exchange occurs
<b>Pulmonary valve (semilunar)</b>	Valve situated between the right ventricle and pulmonary artery, which guards the base of the pulmonary trunk and prevents backflow of blood into the right ventricle
<b>Pulmonary veins</b>	Vessels which transport oxygenated blood from the lungs back to the heart
<b>Right atrium</b>	Chamber on the right side of the heart that receives oxygen-depleted blood returning to the heart from the superior vena cava, the inferior vena cava and coronary sinus
<b>Right ventricle</b>	Inferiorly-located chamber on the right side of the heart that receives oxygen-depleted blood from the right atrium and pumps it to the lung via the pulmonary artery
<b>Sinoatrial node (SA)</b>	Specialized myocardial cells in the wall of the right atrium that generate electrical impulses; the pacemaker of the heart
<b>Superior vena cava</b>	Major vessel that returns oxygen-depleted blood to the right atrium of the heart from body regions superior to the diaphragm
<b>Systole</b>	Period when either the ventricles or the atria are contracting
<b>Trabeculae carneae</b>	Muscular ridges projecting from the walls of the ventricles of the heart
<b>Tricuspid valve (atrioventricular)</b>	A three cusp valve that separates the right atrium from the right ventricle; it prevents backflow of blood into the right atrium when the right ventricle contracts
<b>Veins</b>	Blood vessels that return blood toward the heart from the circulation
<b>Vertebral arteries</b>	A pair of blood vessels that supply blood to the brain and spine

**Anatomy of the Human Heart**  
**Pre/Post Test**

1. The heart is composed of how many chambers? \_\_\_\_\_
2. The right side of the heart collects blood from the \_\_\_\_\_ and sends it to the \_\_\_\_\_.
3. This vein brings blood from the upper extremities, head, neck and brain and deposits it in the right atrium: \_\_\_\_\_
4. This valve sits between the left atrium and the left ventricle: \_\_\_\_\_ It is also known as \_\_\_\_\_.
5. The coronary arteries that supply the heart muscle with oxygenated blood originate off of this vessel known as the \_\_\_\_\_.
6. Significant blockage of a coronary artery will result in reduced blood flow to and eventual death of the cells of the heart. The result of this blockage is called a \_\_\_\_\_.
7. Name three factors, within each person's control, that greatly affects the long-term health of your heart.
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
8. The healthy adult heart normally beats approximately how many times each minute? \_\_\_\_\_
9. Which side of the heart generates the greatest force to move blood? \_\_\_\_\_
10. This waxy, fat-like substance is found in the body and may contribute to heart disease by sticking to the walls of arteries: \_\_\_\_\_
11. These vessels carry blood away from the heart \_\_\_\_\_ while these vessels carry blood toward the heart. \_\_\_\_\_
12. This is the name of a group of specialized cells, located within the wall of the right atrium, which initiates the human heart beat: \_\_\_\_\_

Bonus: Are you interested in a career in medicine, science or healthcare?

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**Anatomy of the Human Heart**  
**Pre/Post Test Answers**

1. four
2. body; lungs
3. superior vena cava
4. bicuspid or mitral valve
5. aorta
6. heart attack or myocardial infarction
7. diet, exercise, smoking
8. 72 bpm (beats per minute)
9. left
10. cholesterol
11. arteries, veins
12. SA node