

Cardiovascular System

Course

Anatomy &
Physiology

Unit V

Cardiovascular
System

Essential Question

*Why do I need a
cardiovascular
system?*

TEKS

130.206(c)
2E, 2F, 3F, 4D
7C, 10A

Prior Student Learning

General
introduction to
terminology
related to body
orientation

Estimated time

5 – 7 hours

Heart Model:

5 hours

Rationale

To pursue a career in health care, proficiency in anatomy and physiology is vital. The cardiovascular system is responsible for pumping blood through the body, transporting nutrients and oxygen to cells and removing waste products.

Objectives

Upon completion of this lesson, the student will be able to:

- Identify the main elements of the circulatory system
- Identify the basic anatomy of the cardiovascular system
- Define and decipher common terms associated with the cardiovascular system
- Describe the flow of blood through the heart
- Calculate target heart rate
- Calculate apical/radial pulse
- Recognize diseases/disorders of the cardiovascular system

Engage

Discuss the following:

According to the American Heart Association, your heart beats about 100,000 times in one day and about 35 million times in a year. During an average lifetime, the human heart will beat more than 2.5 billion times.

OR

A 54-year-old man is experiencing chest pain and shortness of breath. The pain started approximately 45 minutes ago. The patient states the pain, which feels like tremendous pressure, is mostly on the left side of his chest and radiating down his left arm. He has taken two Nitroglycerin tablets with no relief. You notice he is pale and diaphoretic. He is most likely experiencing...

Key Points

Key Points

I. Cardio Terms to Know

- A. Aneurysm -- weakening of vessel walls causing widening
- B. Angina -- choking pain
- C. Angi/o -- vessel
- D. Arteri/o -- artery
- E. Atri/o -- atrium

- F. Ather/o -- fatty plaque
- G. Cardi/o -- heart
- H. Cor/o OR coron/o -- heart
- I. Emia -- blood or blood condition
- J. Hem/a OR hem/o OR hemat/o -- blood
- K. Phleb/o -- vein
- L. Plasm/a OR plasm/o -- plasma (fluid within)
- M. Thromb/o -- clot
- N. Valv/o -- valve (leaf)
- O. Vas/o -- vessel
- P. Ven/o OR ven/a OR ven/i -- vein

II. Introduction to the heart

- A. Fully formed by the 4th week of embryonic development
- B. A hollow muscular organ that acts as double pump
- C. A continuous pump -- once pulsations begin the heart pumps endlessly until death.
- D. The fossa ovale is closed during pregnancy, and it is responsible for bypassing the pulmonary circulation. It will, however, open when child takes first breath allowing it from then on to depend on its own lungs for oxygen.

III. Heart Anatomy

A. General

- 1. Size -- approximately the size of a person's fist
- 2. Location -- in the mediastinum

B. Coverings -- pericardium

- 1. A double-layered sac
- 2. Contains 10-22 cc of pericardial fluid to reduce the friction of the beating heart
- 3. Parietal layer -- a fibrous membrane; the outer layer
- 4. Visceral layer -- serous membrane; also called the epicardium; attached to the myocardium

C. The Heart Wall

- 1. Myocardium -- heart muscle; thicker on the left side of the heart
- 2. Endocardium -- the lining of the heart chambers

D. Chambers

- 1. Atria
 - a. The two upper chambers of the heart
 - b. Have thin walls and a smooth inner surface
 - c. Responsible for receiving blood
 - d. The right atrium receives deoxygenated (oxygen poor) blood from the body through the superior and inferior

- vena cava
- e. The left atrium receives oxygenated (oxygen rich) blood from the lungs through the pulmonary veins
- 2. Ventricles
 - a. The two lower chambers of the heart
 - b. Have thicker walls and an irregular inner surface
 - c. Contain the papillary muscles and chordae tendineae (prevent the heart valves from turning inside out when the ventricles contract)
 - d. The left wall is 3 times as thick as the right wall; forms the apex of the heart
 - e. Responsible for pumping blood away from the heart
 - f. The right ventricle sends deoxygenated blood to the lungs via the pulmonary arteries
 - g. The left ventricle sends oxygenated blood to all parts of the body via the aorta.
- 3. Accessory Structures
 - a. Septum -- the muscular wall dividing the heart into right and left halves
 - b. Heart valves -- prevents the backflow of blood
 - c. Papillary muscles -- anchor the tiny tendons to the endocardium
 - d. Chordae tendineae -- tiny tendon chords that open and close the valves
- E. Great Vessels
 - 1. Superior and inferior vena cava -- the largest veins in the body; receive deoxygenated blood from all parts of the body
 - 2. Coronary sinus -- collection of veins joined together to form a large vessel that collects blood from the heart muscle
 - 3. Pulmonary arteries -- carry deoxygenated blood to the lungs from the right ventricle
 - 4. Pulmonary veins -- carry oxygenated blood to the left atrium from the lungs
 - 5. Aorta -- the largest artery in the body; carries oxygenated blood to distribute to all parts of the body
- F. The blood pathway through the heart and all body tissues
 - 1. Superior and inferior vena cava
 - 2. Right atrium
 - 3. Tricuspid valve
 - 4. Right ventricle
 - 5. Pulmonary semilunar valve
 - 6. Pulmonary arteries
 - 7. Lungs (O₂ and CO₂ exchange -- external respiration)
 - 8. Pulmonary veins
 - 9. Left atrium

10. Bicuspid / Mitral valve
11. Left ventricle
12. Aortic semilunar valve
13. Aorta -- all parts of the body via the arteries
14. Arterioles
15. Capillaries of the individual tissues (O₂ and CO₂ exchange – internal respiration)
16. Venules
17. Veins
18. Superior and Inferior Vena Cava

G. Cardiovascular Circuits

1. Pulmonary Circuit -- the transport of blood from the right side of the heart to the lungs and then back to the left side of the heart
2. Systemic circuit -- the transport of blood from the left side of the heart to all parts of the body and then back to the right side of the heart
3. Coronary circuit -- the transport of blood from the left side of the heart to the actual heart tissue and back to the right side of the heart

H. Valves

1. Tough fibrous tissues between the heart chambers and the major blood vessels of the heart
2. Gate-like structures to keep the blood flowing in one direction and prevent the regurgitation or backflow of blood
3. Atrioventricular valves -- when ventricles contract, blood is forced upward and the valves close; attached by papillary muscles and chordae tendineae
 - a. Tricuspid valve -- between the right atrium and the right ventricle
 - b. Bicuspid/mitral valve -- between the left atrium and the left ventricle
4. Semilunar valves – three half-moon pockets that catch blood and balloon out to close the opening
 - a. Pulmonary semilunar valve -- between the right ventricle and the pulmonary arteries
 - b. Aortic semilunar valves -- between the left ventricle and the aortic arch/aorta

I. Cardiac Circulation (The Blood Supply to the Heart)

1. Aorta → coronary arteries → capillaries in the myocardium → coronary veins → coronary sinus → right atrium
2. Blood in the chambers nourishes the endocardium
3. The coronary circuit opens only during the relaxation phase of the cardiac cycle

4. Occlusion of the coronary artery – a myocardial infarction (heart attack) occurs if collateral circulation is inadequate

IV. Heart Physiology

A. Nerve supply to the Heart

1. Alters the rate and force of cardiac contraction
2. Vagus nerve (parasympathetic nervous system) -- slows the heart rate
3. Sympathetic nerves -- increase the heart rate
4. Epinephrine/Norepinephrine – increase heart rate
5. Sensory (afferent) nerves -- detect atria being stretched and lack of oxygen (changes the rate of contraction)
6. Angina -- chest pain due to a lack of oxygen in coronary circulation

B. Intrinsic Conduction System

1. Enables the heart to contract rhythmically and continuously without motor nerve impulses
2. Arrhythmia -- myocardial cells leak sodium faster than the SA node, causing an irregular heartbeat
3. SA (sinoatrial) node -- known as the pacemaker; located where the superior and inferior vena cava enter the right atrium
4. AV (atrioventricular) node -- sends impulses to the ventricles
5. Bundle of His/bundle branches -- within the septum.
6. Purkinje fibers -- in the heart wall to distribute nerve impulses

C. Cardiac Cycle -- Generated in the Heart Muscle

1. One (1) contraction (systole = 0.3 seconds) + (1) relaxation (diastole = 0.5 seconds) at 75 beats per minute
2. Initiation of contraction -- impulses spread out over both atria causing them to contract together and force blood into both ventricles
3. Impulses from the SA node are sent to the AV node
4. Impulses from the AV node are sent to nerve fibers in the septum (bundle of His) which transmits the impulse via the right and left bundle branches to the Purkinje fibers – cause the ventricles to contract together and force blood out of the aorta and pulmonary arteries, and into the body and the lungs
5. The shift of ions along the conduction system = action potential
6. Periods of rest = repolarization
7. Periods of activity = depolarization – when an impulse is transmitted; and repolarization – when a slow shift back to

polarization occurs

D. EKG

1. Electrical changes during the cardiac cycle are recorded as an EKG
2. To estimate heart rate using an EKG strip, count the number of QRS complexes in a 6-second strip and multiply by 10
3. P wave
 - a. Impulse received by the SA node
 - b. The atria depolarize (contract)
 - c. Enlarged P wave = enlarged atrium or stenosed AV valve
4. QRS complex
 - a. Impulse passing through the ventricles (systole)
 - b. The ventricles depolarize (contract)
 - c. The atria repolarize (relax)
 - d. Enlarged Q = myocardial infarction
 - e. Enlarged R = enlarged ventricles
5. T wave
 - a. Repolarization of the ventricles (diastole)
 - b. Elevated = K⁺ level too high
6. PR interval
 - a. 0.12 – 0.2 seconds
 - b. Too long = rheumatic heart disease or hardening of the arteries; conduction problem or delay at the AV node
7. ST segment
 - a. Elevated = acute myocardial infarction
 - b. Depressed = insufficient oxygen to the heart

E. Stroke Volume and Cardiac Output

1. Cardiac output is the volume of blood pumped by the heart per minute which is measured by multiplying heart rate and stroke volume
2. Stroke volume is the volume of blood, in milliliters (ml), pumped out of the heart with each beat
3. Weak hearts have low stroke volume – they must pump faster to move an adequate amount of blood
4. Well-trained athletes have good stroke volume -- can pump slower to move an adequate amount of blood

V. Overview of Blood Vessels

A. General Composition and Function

1. Allow for circulation of blood and other bodily fluids to all the body's cells
2. Three layers
 - a. Tunica adventitia -- outer layer of tough fibrous tissue

- b. Tunica media -- smooth muscle which allows vessels to constrict and dilate
- c. Tunica intima -- smooth, inner elastic layer (lumen = internal diameter)

B. Arteries

- 1. Carry blood away from the heart
- 2. Thicker to withstand pressure exerted during systole
- 3. All but the pulmonary arteries carry oxygenated blood
- 4. Aorta -- the largest artery; 1 inch in diameter
- 5. Arterioles – the smallest arteries
- 6. Coronary arteries -- the most important; supply blood to the heart muscle
 - a. Left and right main coronary artery
 - b. Left coronary artery → left anterior descending → left circumflex branch
 - c. Right coronary artery → right atrium and right ventricle

C. Veins

- 1. Carry blood toward the heart
- 2. All but the pulmonary veins carry deoxygenated blood
- 3. Layers are much thinner, and less elastic
- 4. A series of internal valves that work against the flow of gravity to prevent reflux
- 5. Superior and inferior vena cava – the largest veins
- 6. Venules – the smallest veins

D. Capillaries

- 1. Tiny, microscopic vessels
- 2. Walls are one cell layer thick
- 3. Function – to transport and diffuse essential materials to and from the body's cells and the blood

VI. Pulse

- #### A. The pressure of the blood pushing against the wall of an artery as the heart beats – during systole

B. Common pulse sites

- 1. Temporal – at the side of the forehead
- 2. Carotid – at the neck; used to assess emergencies
- 3. Brachial – the inner aspect of the forearm at the antecubital space (the crease of the elbow); used for blood pressure measurement and common site for phlebotomy on adults
- 4. Radial – at the inner aspect of the wrist on the thumb side; conventional site to measure
- 5. Femoral – at the inner aspect of the upper thigh or groin
- 6. Dorsalis pedis – at the top of the foot arch; site used to assess circulation in diabetic feet

- VII. Blood Pressure
 - A. Systole -- the maximum pressure formed during a ventricular contraction
 - B. Diastole – the minimum pressure during ventricular relaxation (atrial contraction)
 - C. Measured in mm of Hg
 - D. $BP = CO \times PR$ (Blood Pressure = Cardiac Output x Peripheral Resistance)
 - E. Normal Ranges
 - 1. Systolic = 100 – 140 mm Hg
 - 2. Diastolic = 60 – 90 mm Hg
 - F. Hypotension – systolic < 90 mm Hg
 - G. Hypertension – systolic > 150 mm Hg and / or diastolic > 90 mm Hg
 - H. Must be lower in the pulmonary circuit to prevent fluid from filtering out into the alveoli
 - I. Factors affecting blood pressure
 - 1. Cardiac output
 - 2. Peripheral resistance
 - 3. Blood volume
 - J. Circulatory Shock
 - 1. Hypovolemic shock
 - 2. Vascular shock
 - 3. Cardiogenic shock
- VIII. Diagnostic Procedures for the Cardiovascular System
 - A. History and Physical
 - 1. Checking for symptoms of diseases
 - 2. Chest pain, shortness of breath, awareness of heartbeat (palpitation), fatigue, dizziness or loss of consciousness, edema, pain in the legs while walking (claudication)
 - B. Electrocardiogram – a tracing of the electrical activity of the heart
 - C. Phonocardiogram – an electrocardiogram with heart sounds
 - D. Echocardiogram -- ultrasound measures the size and movement of the heart structures.
 - E. Doppler ultrasound – measures blood flow
 - F. Arteriography – radiopaque dye injected into an artery and x-ray series are taken of blood circulated through vessels.
 - G. Cardiac catheterization
 - 1. Right side of heart – a catheter threaded into a vein, then the vena cava, then the heart, then through the pulmonary artery

2. Left side of heart – a catheter threaded into an artery, then the left ventricle, then the aorta, then the coronary vessels.
3. X-rays taken during the procedure
4. Dye is also injected

IX. Diseases of the Cardiovascular system

- A. Arteriosclerosis – hardening of the arteries due to calcium deposits
- B. Atherosclerosis
 1. Hardening of the arteries due to fatty deposits
 2. Causes
 - a. Increased blood lipids
 - b. High blood pressure
 - c. Smoking
 - d. Obesity
 - e. Physical inactivity
 - f. Tension
- C. Hypertension -- high blood pressure
 1. Essential Hypertension = 90% of cases; no specific cause
 2. 10% of cases = HT found as a symptom for another disease, i.e. an adrenal tumor or kidney disease
 3. Increases the workload of the heart
 4. Leads to hypertrophy of the left ventricle, then heart failure
 5. Accelerates the development of atherosclerosis
- D. Ischemic Heart Disease
 1. The oxygen supply to the heart is inadequate
 2. Atherosclerosis is a major cause
 3. Can lead to
 - a. Angina pectoris – a condition in which the coronary arteries are temporarily blocked caused by reduced blood supply to heart muscle causing chest pain
 - b. Myocardial Infarction – known as a heart attack caused by necrosis (tissue death) of the heart muscle due to severe, prolonged ischemia
 - c. Cardiac Arrest – cessation of normal cardiac contraction
- E. Cardiac Arrhythmias – an abnormality in the rate, rhythm, or conduction of the heart beat
- F. Bacterial Endocarditis
 1. An inflammation of the internal lining of the heart
 2. Also involves the heart valves
- G. Valvular Heart Disease
 1. Involves abnormalities of the heart valves
 2. Mitral and Aortic valves involved in most cases
 3. The leading cause – rheumatic fever with a hypersensitivity

- reaction to streptococcus antigens
- 4. Heart valves are scarred
- 5. Treatment – valve replacement
- H. Congenital Heart Disease
 - 1. Defects in the heart that occurred during embryological and fetal development
 - 2. Involves defective communication between the chambers, malformation of the valves and malformation of the septum
 - 3. Cyanotic – A bluish discoloration of the skin and mucous membranes resulting from inadequate oxygenation of the blood.
- I. Congenital Heart Failure (CHF)
 - 1. Pumping action of the heart is diminished
 - 2. Fluid accumulates and is retained in the tissues
 - 3. Compensations
 - a. Increased heart rate, greater force of contraction
 - b. Retention of fluid by the kidneys
 - c. Enlargement of the heart
- J. Cor Pulmonale
 - 1. Hypertrophy of the right ventricle due to hypertension in the pulmonary circulation
 - 2. Increased BP in the lungs → a reduction in blood flow and increased resistance in the lungs → pulmonary hypertension → increased pressure in the pulmonary arteries → blood backs up into the right ventricle → hypertrophy
- K. Peripheral Arterial Disease – decreased blood flow to the peripheral vessels
- L. Varicose Veins – enlarged veins due to chronic pooling of blood from standing or loss of elasticity of vessel wall
- M. Hemorrhoids – varicose veins of the rectal and anal area
- N. Aneurysm – a weak section in the wall of an artery that balloons out and ruptures from the pressure of the blood
- O. Phlebitis – inflammation of a vein due to an infection or clot
- P. Thrombus – a fixed clot composed of fatty plaques or calcium deposits
- Q. Stroke – brain infarct caused by decreased oxygen supply to the brain due to a clot or hemorrhage
- R. Raynaud's Disease – a circulatory problem causing abnormal constriction of the peripheral capillary supply resulting in cyanosis

- S. Esophageal Varices – varicose veins of the veins from chronic vomiting
- T. Tetralogy of Fallot – four different heart defects developed during pregnancy causing life-threatening problems to the fetus

Activity

- I. Complete the Cardiovascular System Worksheet.
- II. Complete the Cardiovascular system terminology.
- III. Complete the Draw the Heart activity. See multimedia presentation.
- IV. Complete the Calculating and Apical / Radial Pulse and Determining a Pulse Deficit Worksheet.
- V. Complete the Find your Pulse Points / Calculating your Target Heart Rate Worksheet.
- VI. Complete the Paper Mache Heart Model or Electronic Pathology Report.
- VII. Dissect a beef/sheep heart; use resources available online. See multimedia presentation.

Assessment

Successful completion of activities

Materials

Cardiovascular System Worksheet
Medical Terms Worksheet
Calculating an Apical / Radial Pulse and Determining a Pulse Deficit Worksheet
Find your Pulse Points / Calculate Your Target Heart Rate Worksheet
Cardiovascular System Terminology
KEY- Cardiovascular System Worksheet
KEY- Cardiovascular Terminology
KEY- Cardiovascular System Medical Terminology Worksheet
Heart Diagrams

Paper
Pencils
Fine tip colored markers (blue, red, green)
Optional: highlighter (pink or orange)

10 medium to large bowls (1 for every 3 students to share)
Large plastic bags (cut open to place on workstation to contain glue)
Paper towels

Small balloons (one per student)
Plastic recyclable bags (one per group to cover glue / paint for the week)
Internet access
Acrylic paint (2 navy blue, 2-crimson red, 1-dark yellow, 1- peach, 1 -black)
Sponge brushes -- medium to small size
Thin paint brushes
Recycled laundry soap cups – to use to hold paint
Recycled laundry soap boxes – large works best to hold all group materials for the week
Fan
Glue
Whole Newspaper cut in ½ - 1 inch strips

Cow or sheep hearts
Dissecting trays, kits
Plastic/latex gloves

American Heart Association - <http://www.heart.org>

The Franklin Institute -- <http://www.fi.edu/learn/heart/index.html>

NOVA – “Cut to the Heart” -- <http://www.pbs.org/wgbh/nova/heart/>

Accommodations for Learning Differences

For reinforcement the student will color code a diagram of the heart and label the anatomical parts and/or design a poster depicting the pathway of blood through the heart and all body tissues.

For enrichment, the student will research and report on advancements in cardiology treatments.

National and State Education Standards

HLC01.01 Academic Foundations

Health care workers will know the academic subject matter required (in their area. They will use this knowledge as needed in their role.

HLC10.01 Technical Skills

Health Care Workers will apply technical skills required for all career specialties. They will demonstrate skills and knowledge as appropriate.

TEKS

130.206 (c)(2)(E) plan and implement descriptive, comparative, and experimental investigations, including asking questions, formulating testable hypotheses, and selecting equipment and technology.

130.206 (c)(2)(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision using tools such as calculators, spreadsheet software, data-collecting probes, computers, standard laboratory glassware, microscopes, various prepared slides, stereoscopes, metric rulers, electronic balances, hand lenses, Celsius thermometers, hot plates, lab notebooks or journals, timing devices, Petri dishes, lab incubators, dissection equipment, meter sticks, and models, diagrams, or samples of biological specimens or structures.

130.206 (c)(3)(F) research and describe the history of science and contributions of scientists.

130.206 (c)(4)(D) analyze the effects of energy excess in disorders such as obesity as it relates to cardiovascular systems.

130.206 (c)(5)(B) investigate and report the uses of various diagnostic and therapeutic technologies.

130.206 (c)(7)(C) evaluate the application of advanced technologies such as electroencephalogram, electrocardiogram, bionics, transcutaneous electrical nerve stimulation, and cardioversion.

130.206 (c)(10) (A) analyze the relationships between the anatomical structures and physiological functions of systems, including the integumentary, nervous, skeletal, musculoskeletal, cardiovascular, respiratory, gastrointestinal, endocrine, and reproductive;

Texas College and Career Readiness Standards

English Language Arts

II. B. Understand new vocabulary and concepts and use them accurately in reading writing and speaking.

III. B. Develop effective speaking styles for both group and one-on-one situations.

IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings.

IV. B. 2. Listen actively and effectively in one-on-one communication situations.

Science

I. E.1. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.

I. E.2. Use essential vocabulary of the discipline being studied.

III. A.1. Use correct applications of writing practices in scientific communication.

NAME: _____

DATE: _____

The Cardiovascular System Worksheet

1. What is the protective membrane covering of the heart called? _____
2. Which chambers of the heart receive blood from the veins? _____
3. What chambers of the heart are known as pumping chambers? _____
4. What is the name of the blood vessel that brings venous blood from the head, neck, and arms to the right atrium? _____
5. What is the name of the blood vessel that brings venous blood from the abdomen and legs into the right atrium? _____
6. What is the name of the blood vessel that takes deoxygenated blood from the right ventricle to the lungs? _____
7. What is the name of the blood vessels that take oxygenated blood from the lungs to the left atrium? _____
8. The largest artery in the body is the _____
9. The valves are formed from the most inner heart layer, or the _____
10. The valve between the right atrium and the right ventricle is known as the _____ valve. The valve between the left atrium and the left ventricle is known as the _____ or also known as the _____ valve.
11. The valves between the ventricles and blood vessels are known as the _____.
12. Complete flow of blood through the heart. Blood entering the _____ atrium flows through the tricuspid valve and into the _____. From there, the deoxygenated blood flows past the _____ semilunar valve and in through the _____ and then to the lungs. Oxygenated blood leaves the lungs through the _____ and enters the _____.
13. What is the semilunar valve? _____.
14. What is the pacemaker of the heart? _____

15. List and describe the heart's cardiac conduction system location.

- a. _____

- b. _____

- c. _____

- d. _____

16. a. What is systole? _____
b. What is diastole? _____

17. If the patient has an elevated blood pressure we say they have _____

18. What is the stroke volume? _____
_____.

19. What is cardiac output? _____
_____.

20. a. What vessels carry blood away from the heart? _____
b. What vessels carry blood to the heart? _____
c. What vessels are responsible for gas and nutrient exchange within each of the body's cells? _____

21. Describe each of the following vessels:

- a. Arteries _____

- b. Veins _____

- c. Capillaries _____

22. What is a pulse? _____

23. Identify the location of the following pulse points:

- a. What pulse is felt on the upper surface of the foot? _____
- b. What pulse is felt on the antecubital space? _____
- c. What pulse is felt on the groin? _____
- d. What pulse is found on the neck area? _____
- e. What pulse is found on the wrist side of the arm? _____

24. Answer the following questions about blood pressure.

- a. What is the first measurement of blood pressure? _____
- b. What does it measure? _____
- c. What is the second measurement of blood pressure? _____
- d. What does it measure? _____

25. Answer the following questions about circulation routes.

- a. What circulation route takes deoxygenated blood to the lungs where it can pick up oxygen? _____
- b. What circulation route takes oxygenated blood through the body? _____

The Cardiovascular System Worksheet -- KEY

1. What is the protective membrane covering of the heart called? pericardium
2. Which chambers of the heart receive blood from the veins? atria
3. What chambers of the heart are known as pumping chambers? ventricles
4. What is the name of the blood vessel that brings venous blood from the head, neck, and arms to the right atrium? Superior Vena Cava
5. What is the name of the blood vessel that brings venous blood from the abdomen and legs into the right atrium? Inferior Vena Cava
6. What is the name of the blood vessel that takes deoxygenated blood from the right ventricle to the lungs? Pulmonary Artery
7. What is the name of the blood vessels that take oxygenated blood from the lungs to the left atrium? Pulmonary veins
8. The largest artery in the body is the Aorta
9. The valves are formed from the most inner heart layer, or the Endocardium
10. The valve between the right atrium and the right ventricle is known as the tricuspid valve. The valve between the left atrium and the left ventricle is known as the bicuspid or also known as the mitral valve.
11. The valves between the ventricles and blood vessels are known as the Semilunar valves.
12. Complete flow of blood through the heart. Blood entering the right atrium flows through the tricuspid valve and into the right ventricle. From there, the deoxygenated blood flows past the pulmonary semilunar valve and in through the pulmonary artery and then to the lungs. Oxygenated blood leaves the lungs through the Pulmonary veins and enters the left atrium.
13. What is the semilunar valve? 3- half-moon pockets that catch blood and balloon out to close the opening.
14. What is the pacemaker of the heart? SA Node

15. List and describe the heart's cardiac conduction system location.
- SA (sinoatrial) node: known as the pacemaker; located where the superior and inferior vena cava enter the right atrium
 - AV (atrioventricular) node: sends impulses to the ventricles
 - Bundle of His / bundle branches: in the septum
 - Purkinje fibers: in the heart wall to distribute nerve impulses
16. a. What is systole? Maximum pressure formed during a ventricular contraction
- b. What is diastole? Minimum pressure during ventricular relaxation (atrial contraction)
17. If the patient has an elevated blood pressure we say they have Hypertension
18. What is the stroke volume? Stroke volume is the volume of blood in milliliters (ml), pumped out of the heart with each beat.
19. What is cardiac output? The volume of blood pumped by the heart per minute, measuring the function of heart rate and stroke volume at once.
20. a. What vessels carry blood away from the heart? arteries
- b. What vessels carry blood to the heart? veins
- d. What vessels are responsible for gas and nutrient exchange within each of the body's cells? capillaries
21. Describe each of the following vessels:
- Arteries carry blood away from the heart. Thicker to withstand the pressure exerted during systole. All but the pulmonary arteries carry oxygenated blood
 - Veins carry blood toward the heart. All but the pulmonary veins carry deoxygenated blood. Layers are much thinner, less elastic. A series of internal valves that work against the flow of gravity to prevent reflux.
 - Capillaries tiny, microscopic vessels, with walls one-cell layer thick. Function is to transport and diffuse materials to and from the body's cells and the blood.
22. What is a pulse? The pressure of the blood pushing against the wall of an artery as the heart beats during systole.
23. Identify the location of the following pulse points:
- What pulse is felt on the upper surface of the foot? Dorsalis Pedis
 - What pulse is felt on the antecubital space? Brachial artery
 - What pulse is felt on the groin? Femoral

- d. What pulse is found on the neck area? Carotid
- e. What pulse is found on the wrist side of the arm? Radial

24. Answer the following questions about blood pressure.

- a. What is the first measurement of blood pressure? Systole
- b. What does it measure? Pressure as ventricles contract
- c. What is the second measurement of blood pressure? Diastole
- d. What does it measure? Pressure as ventricles relax

25. Answer the following questions about circulation routes.

- a. What circulation route takes deoxygenated blood to the lungs where it can pick up oxygen? Pulmonary circuit.
- b. What circulation route takes oxygenated blood through the body? Systemic circuit.

CARDIOVASCULAR SYSTEM TERMINOLOGY WORKSHEET

Angiocardiology	
Angioma	
Angioplasty	
Aortogram	
Arteriorrhhexis	
Arteriosclerosis	
Atherectomy	
Atherosclerosis	
Atrioventricular	
Bifurcation	
Bradycardia	
Cardiac	
Cardiodynia	
Cardiologist	
Cardiology	
Cardiomegaly	
Cardiomyopathy	
Coronary	
Coronary ischemia	
Coronary thrombosis	
Echocardiogram	
Electrocardiogram	
Electrocardiograph	
Electrocardiography	
Endarterectomy	
Endocarditis	
Endocardium	
Epicardium	
Femoral	
Hemostasis	
Homeostasis	
Hypercalcemia	
Hyperkalemia	
Hyperlipidemia	
Hypernatremia	
Hypertension	
Hypocalcemia	
Hypokalemia	
Hyponatremia	
Hypotension	
Interventricular	
Intraventricular	
Intravenous	

Ischemia	
Myocardium	
Pericardium	
Pericarditis	
Pericarditis	
Pericardiostomy	
Phlebitis	
Phlebotomy	
Stethoscope	
Subclavian	
Sphygmocardiograph	
Sphygmomanometer	
Tachycardia	
Thrombophlebitis	
Thrombosis	
Tibial	
Valvulitis	
Venogram	

CARDIOVASCULAR SYSTEM TERMINOLOGY WORKSHEET- **KEY**

Angiocardiology	Recorded picture of the heart and blood vessels
Angioma	Tumor of the vessels
Angioplasty	Repair of the vessels
Aortogram	Recorded picture of the aorta
Arteriorrhesis	Rupture of an artery
Arteriosclerosis	Abnormal hardening of an artery due to calcium deposits
Atherectomy	Surgical removal of fatty plaque from a vessel
Atherosclerosis	Abnormal hardening of an artery due to fatty plaque
Atrioventricular	Pertaining to the atria and ventricles
Bifurcation	A blood vessel branching or splitting into two branches
Bradycardia	Slow heart rate (less than 60 beats per minute)
Cardiac	Pertaining to the heart
Cardiodynia	Pain in the heart
Cardiologist	One who specializes in the study of the heart
Cardiology	Study of the heart
Cardiomegaly	Enlargement of the heart
Cardiomyopathy	Disease of the heart muscle
Coronary	Pertaining to the heart
coronary ischemia	The blocking or lack of blood in the heart
coronary thrombosis	Condition of having a blood clot in the heart
Echocardiogram	Using sound waves to record a picture of the heart
Electrocardiogram	Recording of the electrical activity of the heart
Electrocardiograph	An instrument that records the electrical activity of the heart
Electrocardiography	The process of taking a record of the electrical activity of the heart
Endarterectomy	Surgical removal of the inside lining of an artery
Endocarditis	Inflammation of the endocardium
Endocardium	Tissue lining the inside of the heart
Epicardium	Tissue lining upon the heart (also known as visceral pericardium)
Femoral	Pertaining to the femur (thigh bone)
Hemostasis	Stopping blood / maintaining level of blood
Homeostasis	Maintaining constant balance
Hypercalcemia	High blood calcium levels
Hyperkalemia	High blood potassium levels
Hyperlipidemia	High blood lipid levels
Hypernatremia	High blood sodium levels
Hypertension	High blood pressure
Hypocalcemia	Low blood calcium levels
Hypokalemia	Low blood potassium levels
Hyponatremia	Low blood sodium levels
Hypotension	Low blood pressure
Interventricular	Pertaining to between the ventricles

Intraventricular	Pertaining to within the ventricle
Intravenous	Pertaining to within the vein
Ischemia	A blockage of blood to muscle or organ
Myocardium	Muscle tissue of the heart
Pericardium	tissue surrounding the heart
Pericarditis	Inflammation of the tissue surrounding the heart
Pericardiostomy	Surgical opening into the tissue surrounding the heart
Phlebitis	Inflammation of the vein
Phlebotomy	Surgical incision of the vein
Stethoscope	Instrument to hear chest sounds
Subclavian	Pertaining to under the clavicle (collarbone)
Sphygmocardiograph	Instrument using thin device to record pressure of each pulse of the heart
Sphygmomanometer	Instrument using thin device to record the pressure of each pulse of arm or leg.
Tachycardia	Rapid heart beat
Thrombophlebitis	Inflammation of the vein due to a clot
Thrombosis	Abnormal condition having a clot
Tibial	Pertaining to the shin bone
Valvulitis	Inflammation of a valve
Venogram	A recorded picture of the vein

CALCULATING AN APICAL / RADIAL PULSE AND DETERMINING A PULSE DEFICIT

Materials and supplies: 1 Stethoscope per group, 1 Watch per person, 1 Pulse Deficit Worksheet / pen per person, bed or chair (laying down works best)

Assume the following roles:

Person A -- Patient / Resident	}	alternate roles
Person B -- Counts the apical pulse		
Person C -- Counts the radial pulse		

Instructions:

1. Class should be divided in groups of three
2. Students assume roles and get into position with watches, pen and paper
3. With Person A lying flat, Person B should locate the apical pulse under the left nipple region of the chest, between 5th and 6th rib (NOTE: please respect student's personal space and explain procedure as you would to an actual patient)
4. Person C should locate radial pulse located on the thumb side of the wrist, opposite from Person B
5. Person B taking apical pulse gives the signal to start counting
6. Count both pulse sites for one full minute
7. Record the apical and radial pulses. Subtract the radial pulse from the apical pulse for the pulse deficit. Note whether the pulse was regular or irregular.
8. Students then alternate roles until each person has served as a patient / resident.
9. When finished, take a separate measurement of the radial pulse for: 15 seconds and multiply by 4, then take it for 30 seconds and multiply by 2, then finally count the full minute all the while noting for any irregularities.

Data Results:

Patient Name	Apical pulse	Radial pulse	Pulse Deficit	Radial 15 sec	Radial 30 sec	Radial 60 sec
Ex. Smith, Holly	86	85	1	21 / 84/ reg	43 / 86 / reg	86 / reg
				/ /	/ /	/
				/ /	/ /	/
				/ /	/ /	/

Questions:

1. Should the pulses ever show a deficit?
2. Would the apical pulse ever be less than the radial?
3. What are some circumstances that could cause a pulse deficit?
4. When measuring the pulse rates for different spans of time, were the results essentially the same? If not, which measurement was likely to be the most inaccurate?

FIND YOUR PULSE POINTS

CALCULATE YOUR TARGET HEART RATE

Materials

Stethoscope, jump rope, worksheet and pencil

Instructions

- A. Select another person to be your partner. On his / her body find the following points and complete the table below.**

Pulse Point	Location
1. Carotid	
2. Brachial	
3. Radial	
4. Apical (use stethoscope)	
5. Popliteal	
6. Dorsalis pedis	
7. Femoral (locate pulse on self)	

B. CALCULATE YOUR TARGET HEART RATE

- Subtract your age from 220 $220 - \text{age} = \text{Maximum Heart Rate (MHR)}$
- Multiply your MHR by 0.6 $\text{MHR} \times 0.6 = \text{lower end of your target heart rate (THR)}$
- Multiply your MHR by 0.8 $\text{MHR} \times 0.8 = \text{upper end of your target heart rate (THR)}$

Student Name	Age	$220 - \text{age} = \text{MHR}$	Lower THR	Upper THR
Example: Maria Groonan	34	$220 - \text{age} = 186$	(112 bpm	149 bpm)
		$220 - \text{age} = \underline{\hspace{2cm}}$	()

Now take turns using the jump rope and jump long enough to fall within your Target Heart Rate range (NON-STOP and try to maintain that rhythm for 5 minutes). Always use the carotid pulse site to measure pulse during any exercise activity and do the math in beats per minute.

NOTE: If a person is to exercise safely and effectively, they should:

- Exercise within their Target Heart Rate range
- Exercise for 20-60 minutes each time
- Exercise 3-5 times per week

Therefore, Ms. Groonan, age 34, needs to target her heart rate to at least 112 beats per minute (bpm) and no more than 149 bpm during her daily jog to ensure she is effectively working out.

Heart Model Project Guidelines -- Teacher Handout

Rationale: Dr. Robert Jarvic, who created the first functional artificial heart model took thousands of hours just to study the anatomy and function of this amazing biological pump we know as the heart. The student will thoroughly learn the basic anatomical parts of the heart by creating a 3-dimensional paper mache heart and properly label all assigned parts.

Teacher Preparation: You can either assign this project for students to do at home or you can remind students well in advance to bring in supplies for this in-class activity that takes a whole school week for completion. In place of the heart model, the student could be assigned a heart or vascular pathology and complete an electronic Pathology report on a power point using both the Multi-media rubrics and Pathology Report template provided while the rest of class is working on the heart model.

Use your favorite resource, model or picture to project for students to use as a guide. Remind kids the day before project begins where to place all their personal items so they don't clutter their work area the whole week. And finally remind student they **MUST** have the strips cut **BEFORE** the 1st day of project.

Materials / Supplies:

For Teacher:

- 10 Medium to Large Bowls (1 for every 3 students to share)
- Large Plastic bags (can choose to cut open to place on workstation to contain glue)
- Paper towels
- Small balloons; one per student
- Plastic recyclable bags – one per group to cover glue / paint for the week
- Internet access
- *Optional Items *** (Can be assigned to student or provided by teacher)*
- Acrylic paint (2 Lg - navy blue, 2 - crimson red, 1 - dark yellow, 1- peach, 1- black)
- Sponge brushes - medium to small size
- Thin paint-brushes
- Recycled laundry soap cups – to use to hold paint
- Recycled Laundry soap boxes – large works best to hold all group materials for the week
- Fan

For Student:

- Shirt to wear as apron
- 1 large bottle of glue
- Whole Newspaper cut in ½ - 1 inch strips
- Plastic recycled bag or zip-bag (large) -- to store supplies for the week
- 1 Newspaper: cut paper in half at crease then cut in half again

CUT AHEAD OF TIME; THERE WILL BE NO TIME TO DO IT IN CLASS!!

(This will determine if student will complete model or Power point presentation)

TIMELINE of Heart Model Project:

Day 1: Blow up balloon and cover entire surface for pericardium.

Day 2: Create Superior Vena Cava (SVC), Inferior Vena Cava (IVC), Pulmonary Trunk with Right Left Pulmonary Arteries (RPA / LPA) Right / Left Pulmonary Veins (RPV / LPV) and Right and Left Auricles.

Day 3: Create Aortic Arch.

Day 4: Paint Myocardium, all external vessels and auricles; let dry.

Day 5: Visceral fat, coronary vessels; HOMEWORK: create labels

Day 6: Turn in labeled heart model.

Student Activity:

Day 1:

1. Cover up.
2. Work in groups of three and alternate roles:
 - Student A -- pick up materials / put away materials
 - Student B -- wipe down work area; assist student A
 - Student C -- rinse all brushes or dirty supplies
3. Group your desks together or pick a spot and lay your plastic bag on your workstation and write your names on it with permanent marker; gather your supplies.
4. Blow your balloon into the size of your fist and create your apex and base.
5. ONE STUDENT -- open only one large bottle of glue (1 per day) and pour into bowl and begin to fill with water until it feels like whole milk (not too thick) and begin to mix well with your hands.
6. Using the pre-cut strips, soak them and drain excess between your index and middle fingers; begin to wrap strips around the balloon smoothing out any wrinkles; wrap entire balloon with three layers.
7. Create your apex and base of the heart -- you're done.
8. When finished, leave your model to dry overnight on plastic bag at the designated space.
9. Place bowl with glue inside a recycled bag and seal it until tomorrow for use, label it; place all excess strips in the zip-lock bag.
10. Loosely fold your butcher paper and place all your group's items inside your box.

Day 2:

1. Gather materials and supplies -- DON'T FORGET YOUR PLASTIC BAG / NO GLUE ON DESKS!!
2. Stack 4-5 ½ to 1-inch strips, soak them all at once, and wrap them loosely around your thumb to create your SVC. Pinch shut one end while the other remains tubular.
3. Repeat the same process with 1 ½ - 2 inch wide strips to create a "T" for: Pulmonary trunk, RPA, LPA. DO NOT pinch the ends.
4. Repeat the same process to create your two sets of RPV / LPV, but make THINNER tubes. Pinch one end.
5. Create auricles: gather 4-5 layers of strips and get them wet and mold a "little ear."

6. Wet 8-10 individual strips and prepare to use them as tape to attach the vessels to model.
7. Starting with SVC, place the pinched end flat against the surface of the right atrium to place your SVC and “tape down” with your wet strips.
8. Repeat the process for placing the IVC on the surface of the Right Ventricle going downwards.
9. Repeat taping your Pulmonary Trunk “T” to the center area of the base, positioning it slightly anterior.
10. Finally tape the RPA and LPA to the trunk.
11. Let heart model dry overnight at the assigned spot.
12. Replace all materials and supplies. Assume your roles to clean work space before bell rings.

Day 3

1. Gather materials and supplies. DON'T FORGET YOUR PLASTIC BAG / NO GLUE ON DESKS!!
2. Create 8-10 tubes using stacks of 4-5 wet strips and wrap around thumb. Pinch one end.
3. Prepare 8-10 individual wet strips to tape down.
4. Start joining the pinched tubes and insert into the other tubes until you form an arch while molding and taping them over the pulmonary trunk and pulmonary arteries.
5. Attach your auricles.
6. Let heart model dry overnight at the assigned spot.
7. Replace all materials and supplies. Assume your roles to clean work space before bell rings.
8. Take home and dry thoroughly with a blow dryer on cold or place in a cold, dry place and bring it back tomorrow DRY!!

Day 4

1. Gather materials and supplies. DON'T FORGET YOUR PLASTIC BAG / NO PAINT ON DESKS!!
 - a. Each group will need 4 laundry soap cups for paint.
2. Prepare paint colors:
 - a. Cup 1: Maroon -- mix a drop of black into the red color
 - b. Cup 2: Dark Blue
 - c. Cup 3: Violet -- mix a drop or two of red into the dark blue color
 - d. Cup 4: Crimson Red
3. Paint time – use cups in order indicated
 - a. Cup 1: With small sponge brush, cover all of the pericardium excluding the vessels with two overall coats. Use blow drier or fan to dry paint while you are waiting for the other paint colors.

- b. Cup 2: Using small sponge brush, paint SVC and IVC; cover any and all newspaper print that might be visible in the dark navy blue color.
 - c. Cup 3: Color pulmonary trunk, RPA and LPA in a dark violet color to simulate mixture of oxygenated and deoxygenated blood
 - d. Cup 4: with a small sponge brush color the Aorta, and right and left pulmonary veins in crimson red
4. Use blow drier in between to speed up drying process, then let heart model dry overnight at the assigned spot.
 5. Cover any extra paint if large amount left in laundry scoop to prevent drying. Replace all materials and supplies as you have been doing. Assume your roles to clean work space before bell rings. Discard any glue into the sink and FLUSH THE SINK WITH LOTS OF WATER TO DRAIN.

Day 5:

1. DON'T FORGET YOUR PLASTIC BAG / NO PAINT ON DESKS!!
2. Prepare paint colors
 - a. Cup 1: Peach
 - b. Cup 2: Yellow / Beige
 - c. Cup 3: Dark Blue
 - d. Cup 4: Crimson Red
3. Paint Time: use cups in order indicated
 - a. Cup 1: Paint the auricles in peach; (they should look like "little ears" or aur-/icles.
 - b. Cup 2: Color on the visceral fat in a dark yellow color and dry as quick as you can.
 - c. Cup 3 & 4: Using fine paintbrushes or a disposable swab color on coronary arteries in bright red and the coronary veins in blue.
4. Let heart model dry at the assigned spot for the day AND PICK UP AFTER SCHOOL TO LABEL AT HOME!!
5. Replace all materials and supplies. Assume your roles to clean work space before bell rings. ASSIGNMENT: STUDENTS WILL LABEL ALL THE PARTS LISTED ON THE RUBRIC. Heart model is due Monday.

Heart Model Project Guidelines -- Student Handout

Rationale: Dr. Robert Jarvic, who created the first functional artificial heart model took thousands of hours just to study the anatomy and function of this amazing biological pump we know as a heart. The student will thoroughly learn the basic anatomical parts of the heart by creating a 3-dimensional paper mache heart and properly label all assigned parts.

Materials and Supplies

- 1 large bottle of glue
- Whole Newspaper in ½ - 1 inch strips (cut paper in half at crease then cut in half again)
- Shirt to wear as an apron
- Plastic shopping bag or zip-lock bag (large)

CUT AHEAD OF TIME; THERE WILL BE NO TIME TO DO IT IN CLASS!!

(This will determine if student will complete model or Power point presentation)

TIMELINE of Heart Model Project:

Day 1: Blow and cover entire balloon with three initial layers of strips

Day 2: Create Superior Vena Cava (SVC), Inferior Vena Cava (IVC), Pulmonary Trunk with Right Left Pulmonary Arteries (RPA / LPA)

Day 3: Create Aortic Arch, Right / Left Pulmonary Veins (RPV / LPV) and Right and Left Auricles

Day 4: Paint Myocardium, Vena Cava(s), Pulmonary Arteries and Pulmonary Veins; let dry

Day 5: Paint auricles; visceral fat, coronary vessels; HOMEWORK: create labels

Day 6: Turn in completely labeled

Student Activity:

Day 1:

1. Cover up.
2. Work in groups of three and alternate roles:
 - Student A -- pick up materials / put away materials
 - Student B -- wipe down work area; assist student A
 - Student C -- rinse all brushes or dirty supplies
3. Group your desks together or pick a spot and lay your plastic bag on your workstation and write your names on it with Sharpie marker; gather your supplies.
4. Blow your balloon into the size of your fist and create your apex and base.
5. ONE STUDENT -- open only one large bottle of glue (1 per day) and pour into bowl and begin to fill with water until it feels like whole milk (not too thick) and begin to mix well with your hands.
6. Using the pre-cut strips, soak them and drain excess between your index and middle fingers; begin to wrap strips around the balloon, smoothing out any wrinkles; wrap entire balloon with three layers.
7. Create your apex and base of the heart -- you're done.
8. When finished, leave your model to dry overnight on plastic bag at the designated space.
9. Place bowl with glue inside a recycled bag and seal it until tomorrow for use, label it; place all the excess strips in the zip-lock bag
10. Loosely fold your butcher paper and place all your group's items inside your box.

Day 2:

1. Gather materials and supplies -- DON'T FORGET YOUR PLASTIC BAG / NO GLUE ON DESKS!!
2. Stack 4-5 ½ to 1-inch strips, soak them all at once, and wrap them loosely around your thumb to create your SVC. Pinch shut one end while the other remains tubular.
3. Repeat the same process with 1 ½ - 2 inch wide strips to create a "T" for: Pulmonary trunk, RPA, LPA. DO NOT pinch the ends.
4. Repeat the same process to create your two sets of RPV / LPV, but make THINNER tubes. Pinch one end.
5. Create auricles: gather 4-5 layers of strips and get them wet and mold a "little ear."
6. Wet 8-10 individual strips and prepare to use them as tape to attach the vessels to model.
7. Starting with SVC, place the pinched end flat against the surface of the right atrium to place your SVC and "tape down" with your wet strips.
8. Repeat the process for placing the IVC on the surface of the Right Ventricle going downwards.
9. Repeat taping your Pulmonary Trunk "T" to the center area of the base, positioning it slightly anterior.
10. Finally tape the RPA and LPA to the trunk
11. Let heart model dry overnight at the assigned spot.
12. Replace all materials and supplies as you did yesterday. Assume your roles to clean work space before bell rings.

Day 3

1. Gather materials and supplies. DON'T FORGET YOUR PLASTIC BAG / NO GLUE ON DESKS!!
2. Create 8-10 tubes using stacks of 4-5 wet strips and wrap around thumb. Pinch one end.
3. Prepare 8-10 individual wet strips to tape down.
4. Start joining the pinched tubes and insert into the other tubes until you form an arch while molding and taping them over the pulmonary trunk and pulmonary arteries.
5. Attach your auricles.
6. Let heart model dry overnight at the assigned spot.
7. Replace all materials and supplies as you did yesterday. Assume your roles to clean work space before bell rings
8. Take home and dry thoroughly with a blow dryer on cold or place in a cold, dry place and bring it back tomorrow DRY!! We start painting tomorrow.

Day 4

1. Gather materials and supplies. DON'T FORGET YOUR PLASTIC BAG! NO PAINT ON DESKS
 - a. Each group will need 4 laundry soap cups for paint.
2. Prepare paint colors
 - a. Cup 1: Maroon -- mix a drop of black into the red color
 - b. Cup 2: Dark Blue
 - c. Cup 3: Violet -- mix a drop or two of red into the dark blue color
 - d. Cup 4: Crimson Red
3. Paint time – use cups in order indicated
 - a. Cup 1: With small sponge brush, cover all the pericardium excluding the vessels with two overall coats. Use blow drier or fan to dry paint while you are waiting for the other paint colors.
 - b. Cup 2: Using small sponge brush, paint SVC and IVC; cover any and all newspaper print that might be visible in the dark navy blue color.
 - c. Cup 3: Color pulmonary trunk, RPA and LPA in a dark violet color to simulate mixture of oxygenated and deoxygenated blood.
 - d. Cup 4: With a small sponge brush color the Aorta, and right and left pulmonary veins in crimson red.
4. Use blow drier in between to speed up drying process, then let heart model dry overnight at the assigned spot.
5. Cover any extra paint if large amount left in laundry scoop to prevent drying. Replace all materials and supplies as you have been doing. Assume your roles to clean work space before bell rings. Discard any glue into the sink and FLUSH THE SINK WITH LOTS OF WATER TO DRAIN.

Day 5:

1. DON'T FORGET YOUR PLASTIC BAG / NO PAINT ON DESKS!!
 2. Prepare paint colors
 - a. Cup 1: Peach
 - b. Cup 2: Yellow / Beige
 - c. Cup 3: Dark Blue
 - d. Cup 4: Crimson Red
 3. Paint Time – use cups in order indicated
 - a. Cup 1: Paint the auricles in peach; (they should look like “little ears” or aur- / -icles.
 - b. Cup 2: Color on the visceral fat in a dark yellow color and dry as quick as you can.
 - c. Cup 3 & 4: Using fine paintbrushes or a disposable swabs color on coronary arteries in bright red and the coronary veins in blue.
 - d. Let heart model dry at the assigned spot for the day AND PICK UP AFTER SCHOOL TO LABEL AT HOME!!
- Replace all materials and supplies as you did yesterday. Assume your roles to clean work space before bell rings.

ASSIGNMENT: STUDENTS WILL LABEL ALL THE PARTS LISTED ON THE RUBRIC...AT HOME!! Heart model is due Monday.

Student Name _____

Heart Model Project Rubric

Objective:

There is no better way to fully understand the heart than through dissection or by creating working models. In this lesson students will create a 3-D paper mache heart model and label all the major external structures with the emphasis on keeping the model as anatomically correct as possible.

Project Begins on: _____ Project Due on: _____ Turned-in on: _____

Scoring Criteria	Points Worth		Points Earned
Originality / Anatomically Correct	0-50 points		
*Parts Labeled	0-160 points		
Parts of the Heart	✓ <i>Part present</i>	<i>Part not labeled</i>	<i>0-10 points each</i>
a. Apex			
b. Base			
c. Pericardium			
d. Superior Vena Cava			
e. Inferior Vena Cava			
f. Right Pulmonary Artery			
g. Left Pulmonary Artery			
h. Right Pulmonary Vein			
i. Left pulmonary vein			
j. Aorta			
k. Auricles			
l. Right atrium			
m. Left ventricle			
n. Left coronary blood vessels			
o. Right coronary blood vessels			
p. Visceral fat			
Follows Instructions: <ul style="list-style-type: none">• Project submitted on time• Neat	0 – 40 points		
Comments:			
TOTAL POINTS:	Up to 250 points		
FINAL GRADE:			

Pathology Report

Disease

Alternate names

Definition

Etiology

Signs & Symptoms

Diagnostic Tests

Treatment

Complications

Prognosis

Student Name _____ Date _____

Electronic Pathology Report Rubric Cardiovascular System

Objective:

There is no better way to fully understand the heart than through dissection or by creating working models. In this lesson students will create an electronic Pathology Report in power point presentation with at least 5 illustrations or charts.

Project Begins on: _____ Project Due on: _____ Turned-in on: _____

Disease Assigned: _____

Scoring Criteria	Points Worth		Points Earned
Originality	0-50 points		
Pathology Dissected	0-90 points		
	✓ Defined	Illustration	0-10 points each
Disease			
Alternate names			
Definition			
Etiology			
Signs & Symptoms			
Diagnostic Tests			
Treatment			
Complications			
Prognosis			
Follows Instructions: <ul style="list-style-type: none">Clearly and effectively communicates ideaClearly communicated content throughoutIntegrated graphics & designHeld audience attentionGood timing between slidesImage and font was legible	0 – 30 points		
Comments:			
TOTAL POINTS:	Up to 170 points		
FINAL GRADE:			

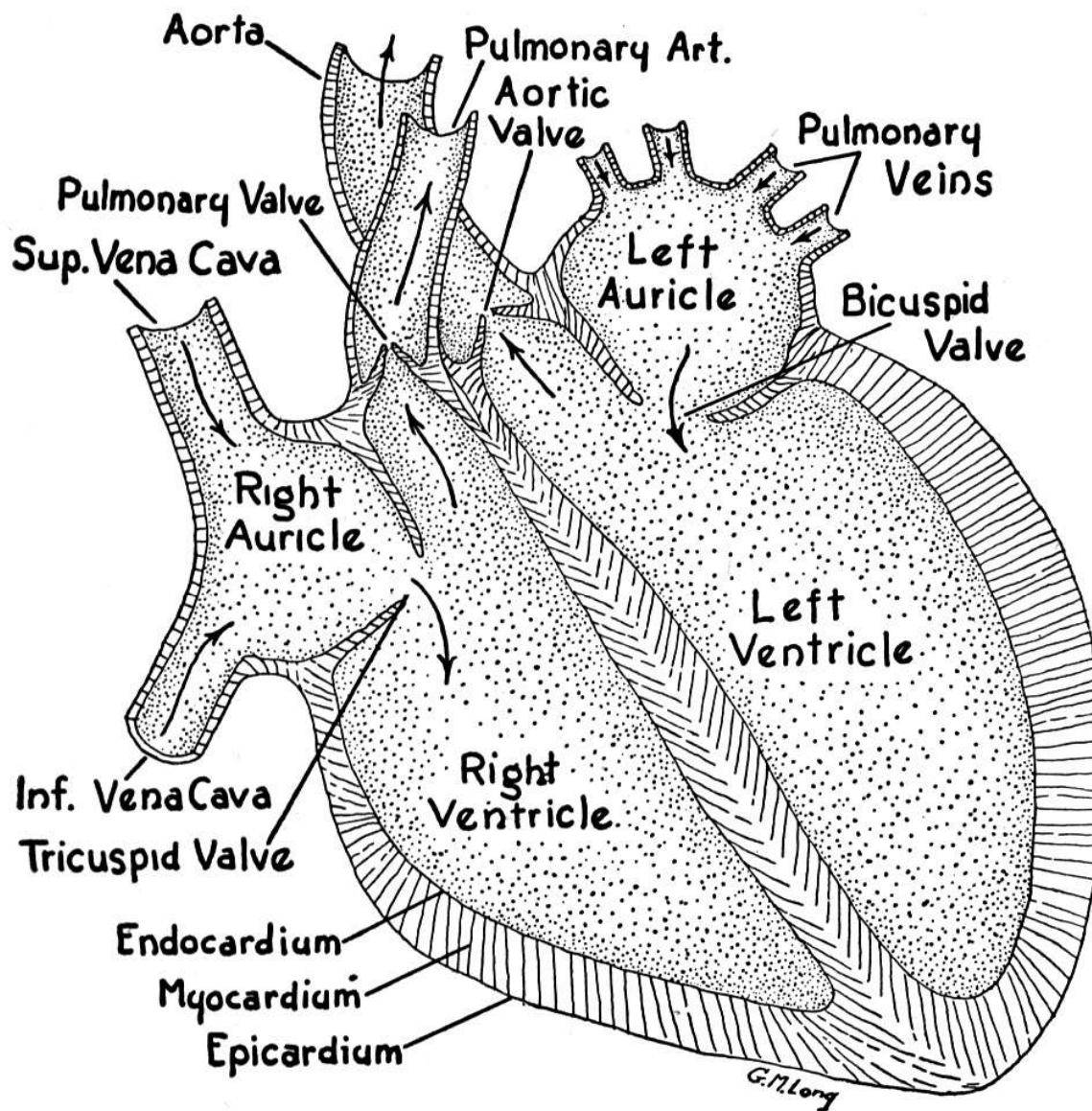


Figure 22.—Diagram of the Heart.

<http://www.clipart.com/>

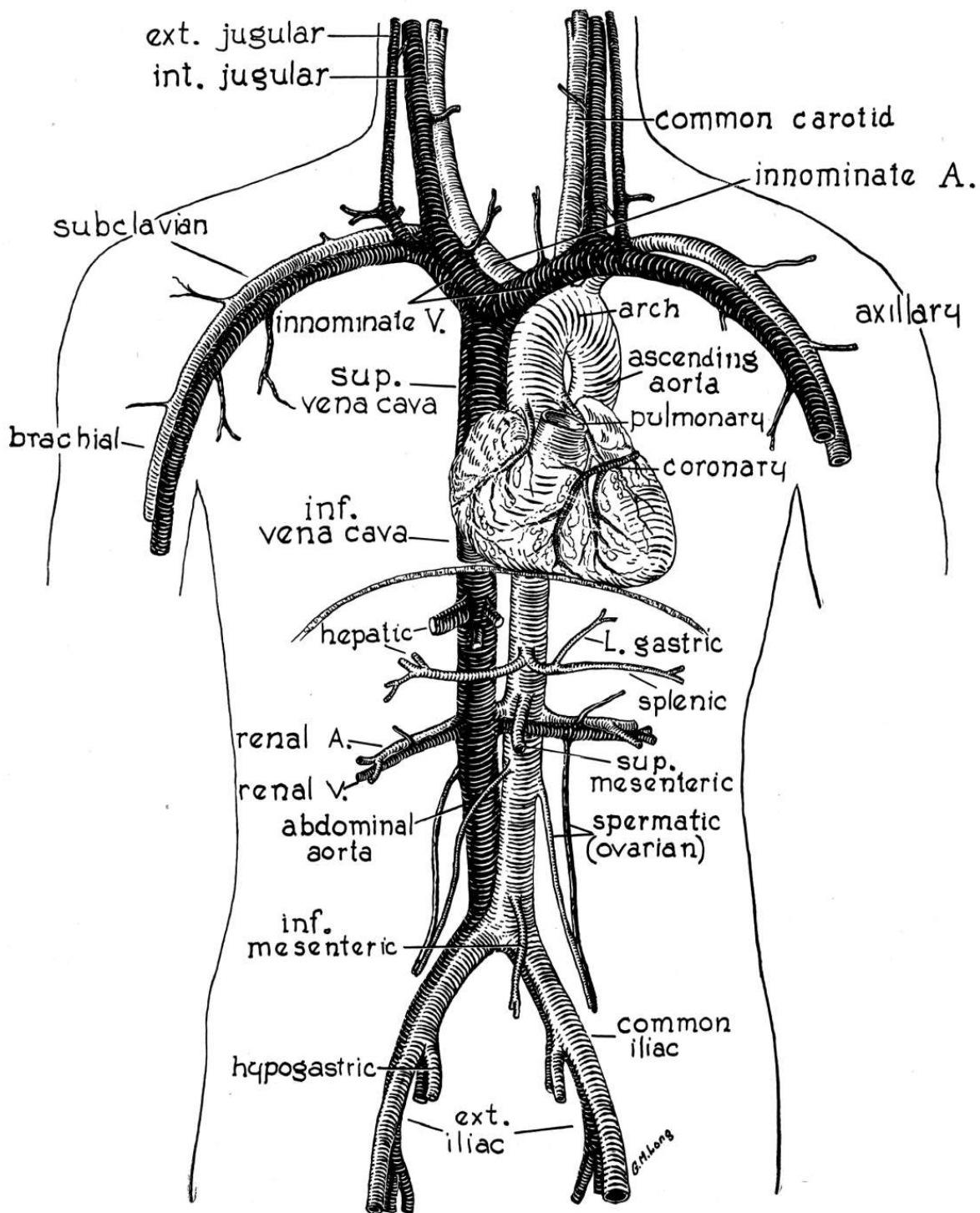
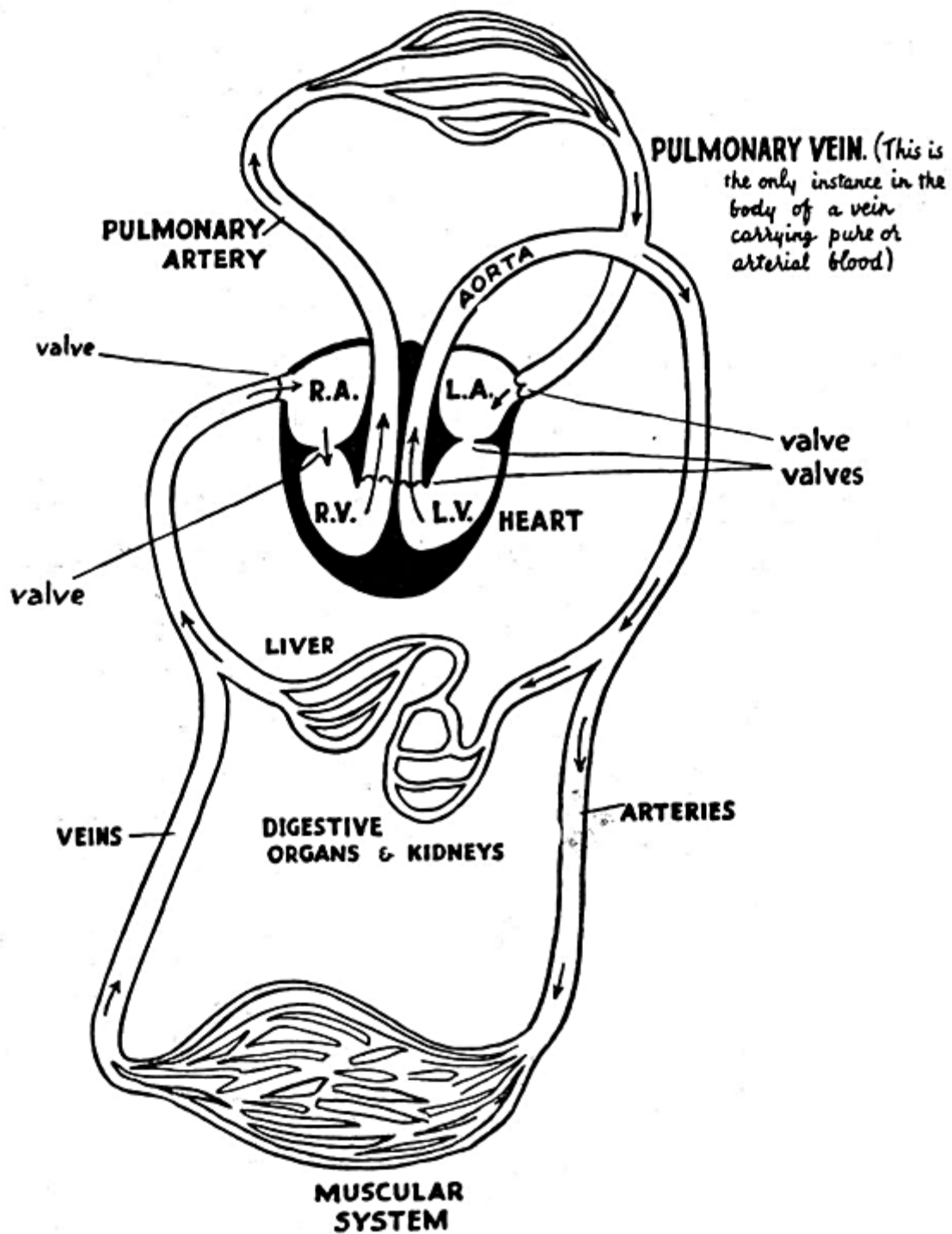
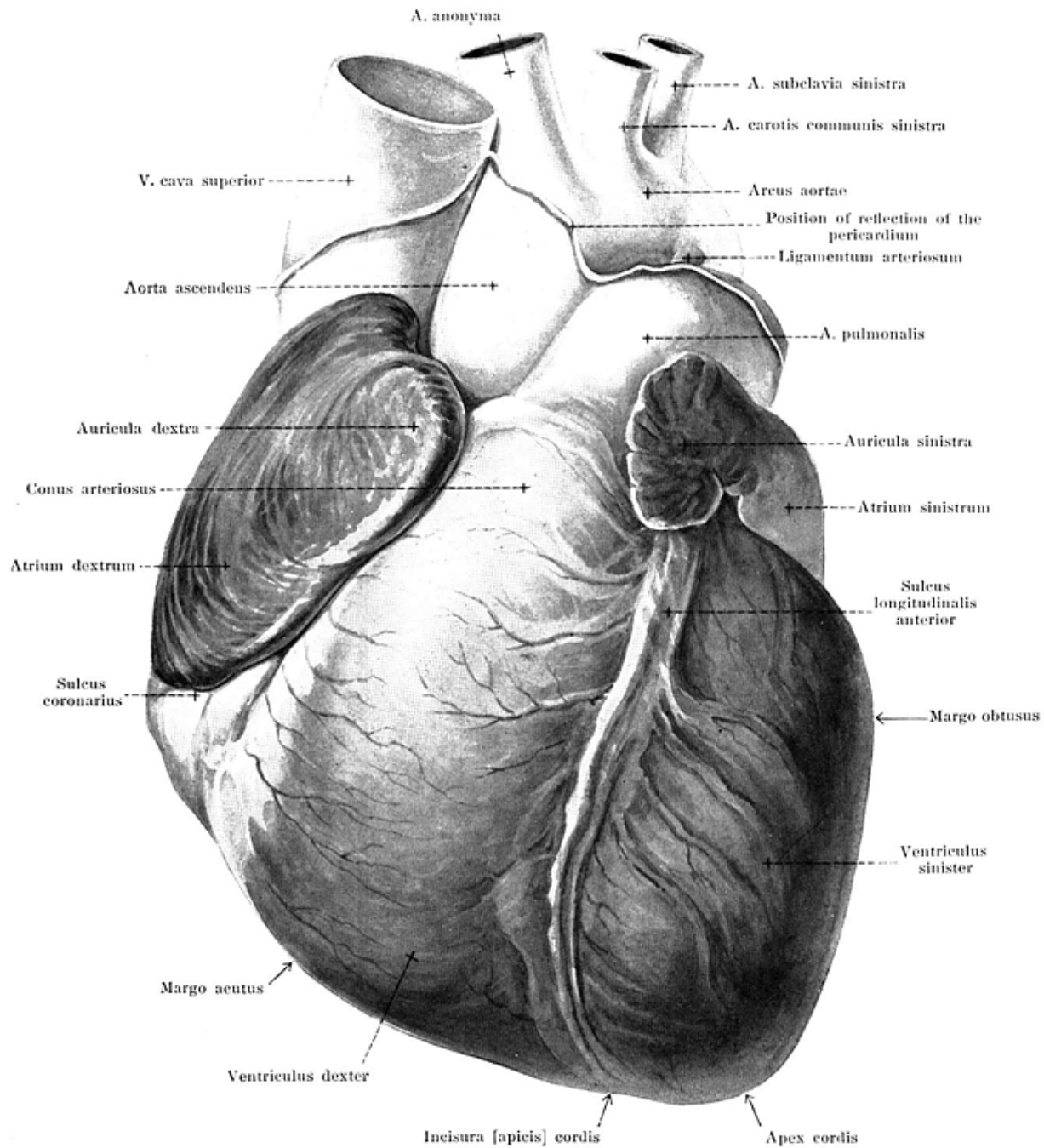


Figure 23.—Arteries and Veins of Torso.

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<http://www.clipart.com/>



<http://www.clipart.com/>