

Chapter 18 – The Heart

Names _____

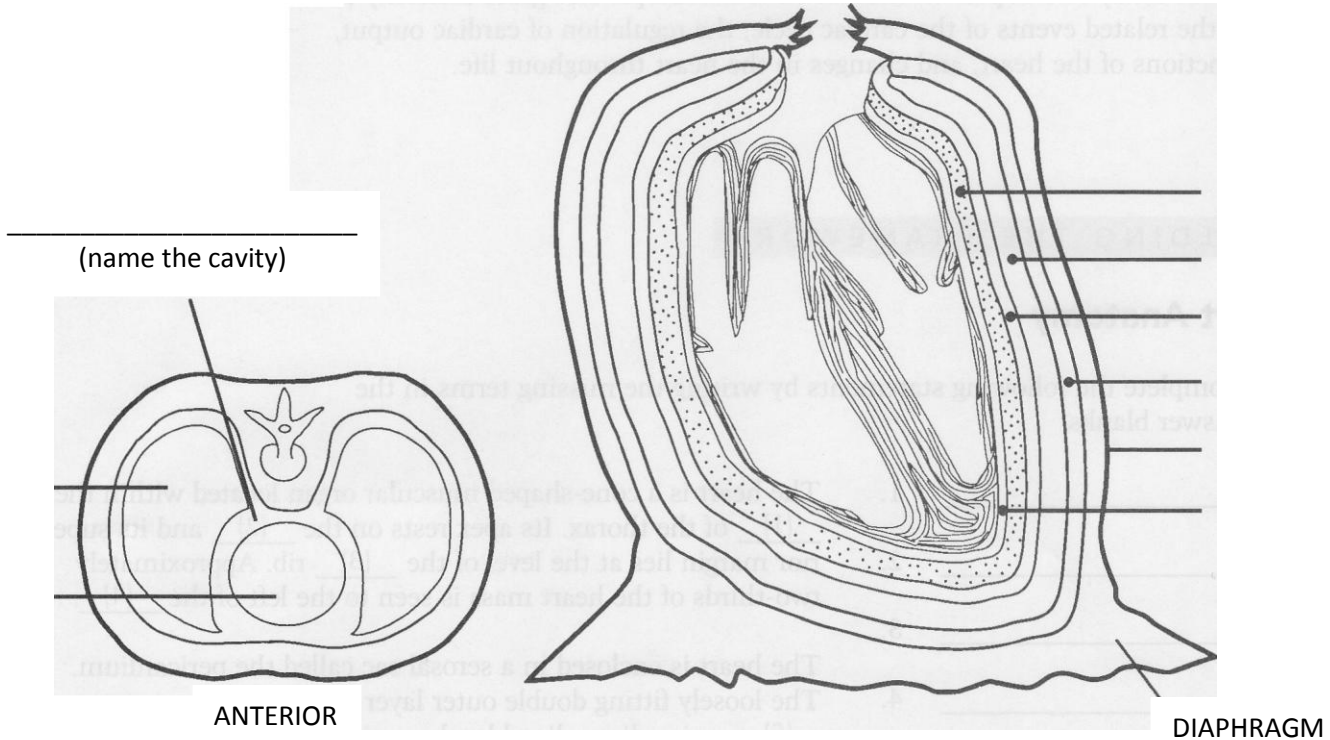
Period _____

The figure on the right below is a transverse section through the thorax. Label the structures that have leader lines. The figure on the left below is a longitudinal section through the heart wall and pericardium. Select colors for each structure listed below; color the corresponding coding circles and the structure on the figure.

- ☐ Fibrous pericardium
- ☐ Parietal layer of serous pericardium

- ☐ Endocardium
- ☐ Myocardium
- ☐ Pericardial cavity

- ☐ Visceral layer of serous pericardium
- ☐ Diaphragm (epicardium)



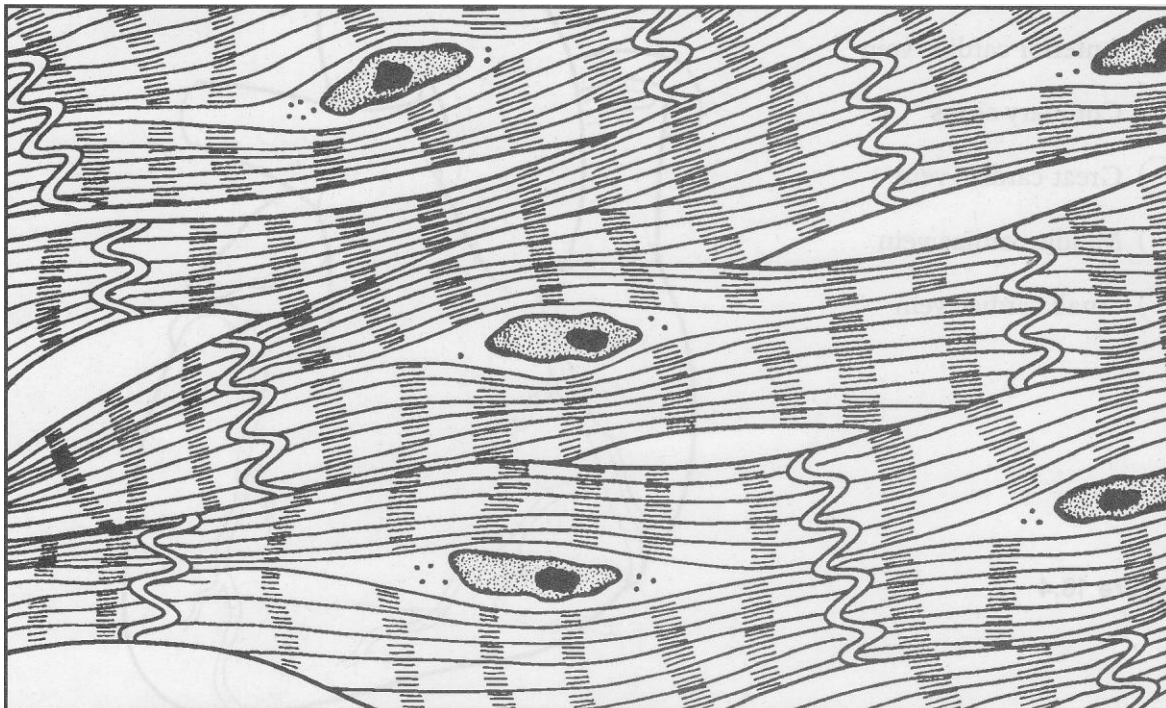
The figure below is a drawing of the microscopic structure of cardiac muscle. Using different colors, color the coding circles of the structures listed below and the corresponding structures on the figure. Then answer the questions that follow the figure.

- ☐ Nuclei (with nucleoli)

- ☐ Intercalated discs

- ☐ Striations

- ☐ Muscle fibers



Name the loose connective tissue that fills the intercellular spaces. _____

What is the function during contraction of the desmosomes present in the intercalated discs? (Note: The desmosomes are not illustrated.) _____

What is the function of the gap junctions (not illustrated) also present in the intercalated discs? _____

What term describes the interdependent, interconnecting cardiac cells? _____

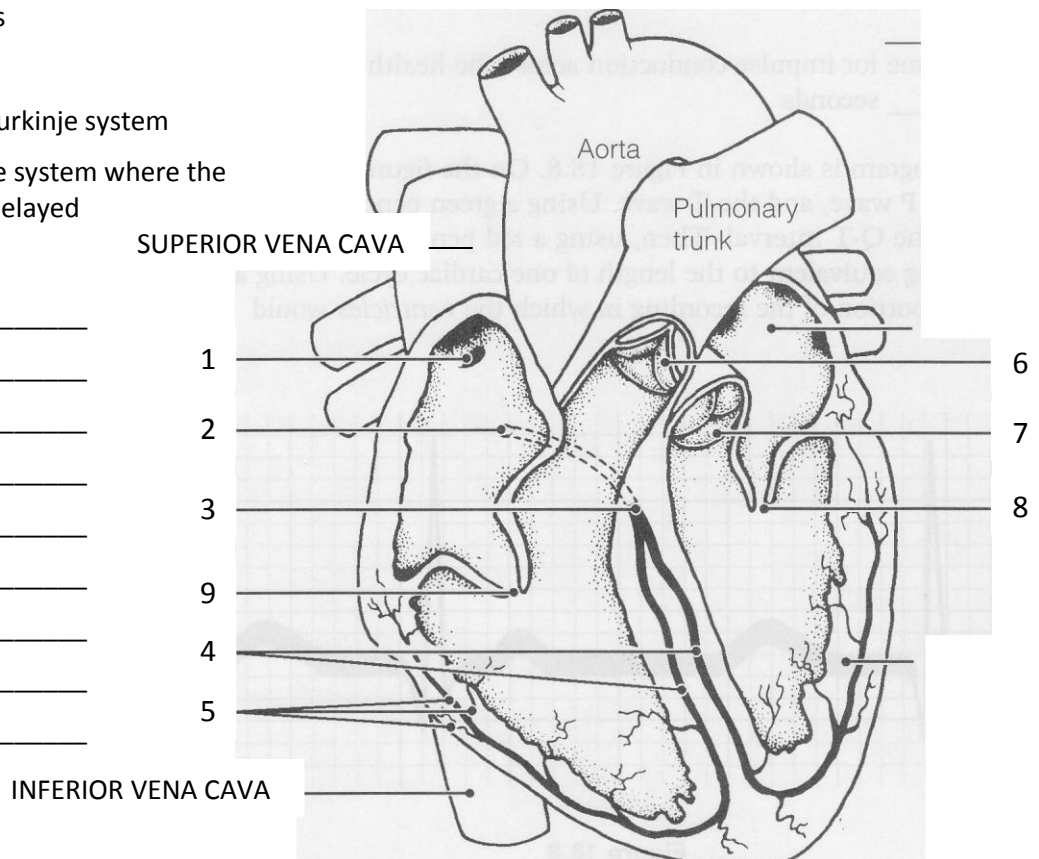
Which structures provide electrical coupling of cardiac cells? _____

The figure below is a diagram of the frontal section of the heart. Follow the instructions below to complete this exercise, which considers both anatomical and physiological aspects of the heart.

- 1) Draw arrows to indicate the direction of blood flow through the heart. Draw the pathway of the oxygen-rich blood with red arrows and trace the pathway of oxygen-poor blood with blue arrows.
- 2) Identify each of the elements of the intrinsic conduction system (numbers 1-5 on the figure) by writing the appropriate terms in the numbered answer blanks. Then, indicate with green arrows the pathway that impulses take through this system.
- 3) Identify each of the heart valves (numbers 6-9 on the figure) by writing the appropriate terms in the numbered answer blanks. Draw and identify by name the cordlike structures that anchor the flaps of the atrioventricular (AV) valves.
- 4) Use the numbers from the figure to identify structures (A—H).

- _____ A. _____ B. Prevent backflow into the ventricles when the heart is relaxed
- _____ C. _____ D. Prevent backflow into the atria when the ventricles are contracting
- _____ E. AV valve with three flaps
- _____ F. AV valve with two flaps
- _____ G. The pacemaker of the Purkinje system
- _____ H. The point in the Purkinje system where the impulse is temporarily delayed

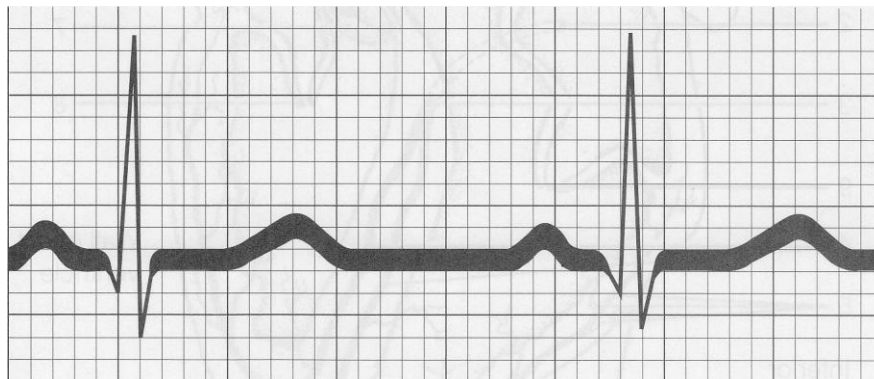
- 1) _____
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____
- 8) _____
- 9) _____



What parts of the body feel referred pain when there is a major myocardial infarction?

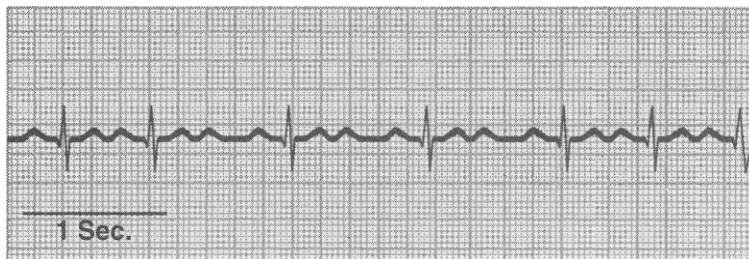
How does hypothyroidism affect heart rate? _____

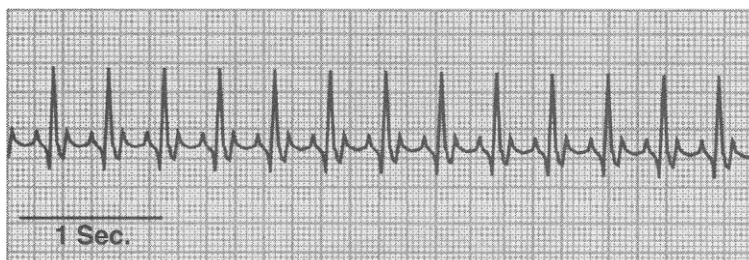
Part of an electrocardiogram is shown in the figure below. On the figure, identify the QRS complex, the P wave, and the T wave. Using a green pencil, bracket the P-Q interval and the Q-T interval. Then, using a red pencil, bracket a portion of the recording equivalent to the length of one cardiac cycle. Using a blue pencil, bracket a portion of the recording in which the ventricles would be in diastole.



Examine the abnormal EGG tracings below and describe the problem in the line given.







Please place an "X" next to all factors that lead to an increase in cardiac output by influencing either heart rate or stroke volume.

- ☐ Epinephrine
- ☐ Low blood pressure
- ☐ Hemorrhage
- ☐ High blood pressure

- ☐ Fear
- ☐ Increased EDV
- ☐ Exercise
- ☐ Prolonged grief

- ☐ Fever
- ☐ Depression
- ☐ Anxiety

If a statement is true, write the letter T in the answer blank. If a statement is false, change the underlined word(s) and write the correct words) in the answer blank.

- _____ Norepinephrine, released by parasympathetic fibers, stimulates the SA and AV nodes and the myocardium itself.
- _____ The resting heart is said to exhibit "vagal tone," meaning that the heart rate slows under the influence of acetylcholine.
- _____ Epinephrine secreted by the adrenal medulla decreases heart rate.
- _____ Low levels of ionic calcium cause prolonged cardiac contractions.
- _____ The resting heart rate is fastest in adult life.
- _____ Because the heart of the highly trained athlete hypertrophies, its stroke volume decreases.
- _____ In congestive heart failure, there is a marked rise in the end diastolic volume.
- _____ If the right side of the heart fails, pulmonary congestion occurs.
- _____ In peripheral congestion, the feet, ankles, and fingers swell.
- _____ The pumping action of the healthy heart ordinarily maintains a balance between cardiac output and venous return.

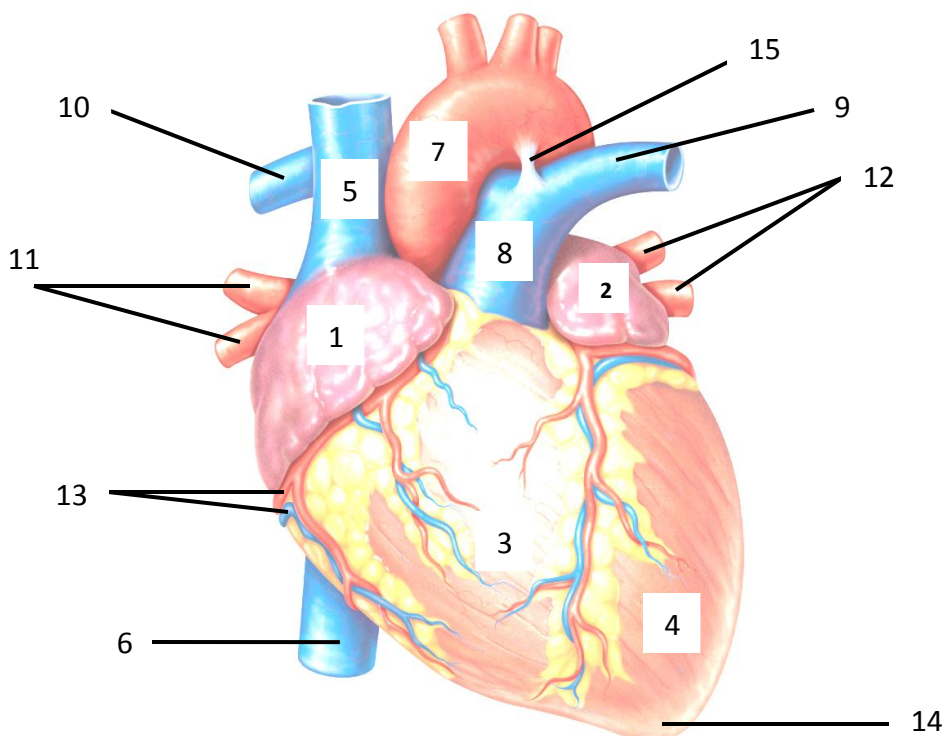
Please match the disorders with the correct description.

- | | | | |
|-----------------------------|------------------|--------------------------|----------------|
| A. Angina pectoris | D. Ectopic focus | G. Incompetent valve | J. Tachycardia |
| B. Bradycardia | E. Fibrillation | H. Myocardial infarction | |
| C. Congestive heart failure | F. Heart block | I. Pulmonary congestion | |

- _____ Results from prolonged coronary blockage
- _____ Abnormal pacemaker
- _____ Allows backflow of blood
- _____ Because of cardiac decompensation, circulation is inadequate to meet tissue needs
- _____ A slow heartbeat, that is, below 60 beats per minute
- _____ A condition in which the heart is uncoordinated and useless as a pump
- _____ A rapid heart rate, that is, over 100 beats per minute
- _____ Damage to the AV node, totally or partially releasing the ventricles from the control of the SA node
- _____ Chest pain, resulting from ischemia of the myocardium
- _____ Result of initial failure of the left side of the heart

The figure below is an anterior view of the heart. Identify each numbered structure and write its name in the corresponding answer blank. Then, select different colors for each structure with a coding circle and color the structure on the figure.

1. _____ ○
2. _____ ○
3. _____ ○
4. _____ ○
5. _____ ○
6. _____ ○
7. _____ ○
8. _____ ○
9. _____
10. _____
11. _____ ○
12. _____
13. _____
14. _____
15. _____ ○



Clinical Applications – Chapter 18 (The Heart)

- 1) What is the functional difference between ventricular hypertrophy due to exercise and hypertrophy due to congestive heart failure?
- 2) A less-than-respectable news tabloid announced that "Doctors show exercise shortens life. Life expectancy is programmed into a set number of heartbeats; the faster your heart beats, the sooner you die!" Even if this "theory" were true, what is wrong with the conclusion concerning exercise?
- 3) Ms. Hamad, who is 73 years old, is admitted to the coronary care unit of a hospital with a diagnosis of left ventricular failure resulting from a myocardial infarction. Her heart rhythm is abnormal. Explain what a myocardial infarction is, how it is likely to have been caused, and why the heart rhythm is affected.
- 4) You are a young nursing student and are called upon to explain how each of the following tests or procedures might be helpful in evaluating a patient with heart disease: blood pressure measurement, determination of blood lipid and cholesterol levels, electrocardiogram, chest X ray. How would you respond?
- 5) Homer Fox, a patient with acute severe pericarditis, has a critically low stroke volume. What is the name for the condition causing the low stroke volume and how does it cause it?
- 6) Mr. Greco, a patient with clotting problems, has been hospitalized with right-sided heart failure. What is his condition? Knowing Mr. Greco's history, what is the probable cause?

- 7) An elderly man is brought to the clinic because he fatigues extremely easily. An examination reveals a heart murmur associated with the bicuspid valve during ventricular systole. What is the diagnosis? What is a possible treatment?
- 8) Jimmy is brought to the clinic complaining of a sore throat. His mother says he has had the sore throat for about a week. Culture of a throat swab is positive for strep, and the boy is put on antibiotics. A week later, the boy is admitted to the hospital after fainting several times. He is cyanotic. What is a likely diagnosis?
- 9) Mary Ghareeb, a woman in her late 50s, has come to the clinic because of chest pains whenever she begins to exert herself. What is her condition called? How is this different from a myocardial infarction?
- 10) Mr. Trump, en route to the hospital ER by ambulance, is in fibrillation. What is his cardiac output likely to be? He arrives at the emergency entrance DOA (dead on arrival). His autopsy reveals a blockage of the posterior interventricular artery. What is the cause of death?
- 11) Excessive vagal stimulation can be caused by severe depression. What would this cause? How would this be reflected in a routine physical examination?
- 12) Marilyn Hobbs, a 14-year-old girl undergoing a physical examination before being allowed to matriculate at a dancing academy, was found to have a loud heart murmur at the second intercostal space to the left side of the sternum. Upon questioning, the girl admitted to frequent "breathlessness," and it was decided to perform further tests. An angiogram showed that the girl had a patent ductus arteriosus. Discuss the location and function of the ductus arteriosus in the fetus and relate the reason for the girl's breathlessness.