

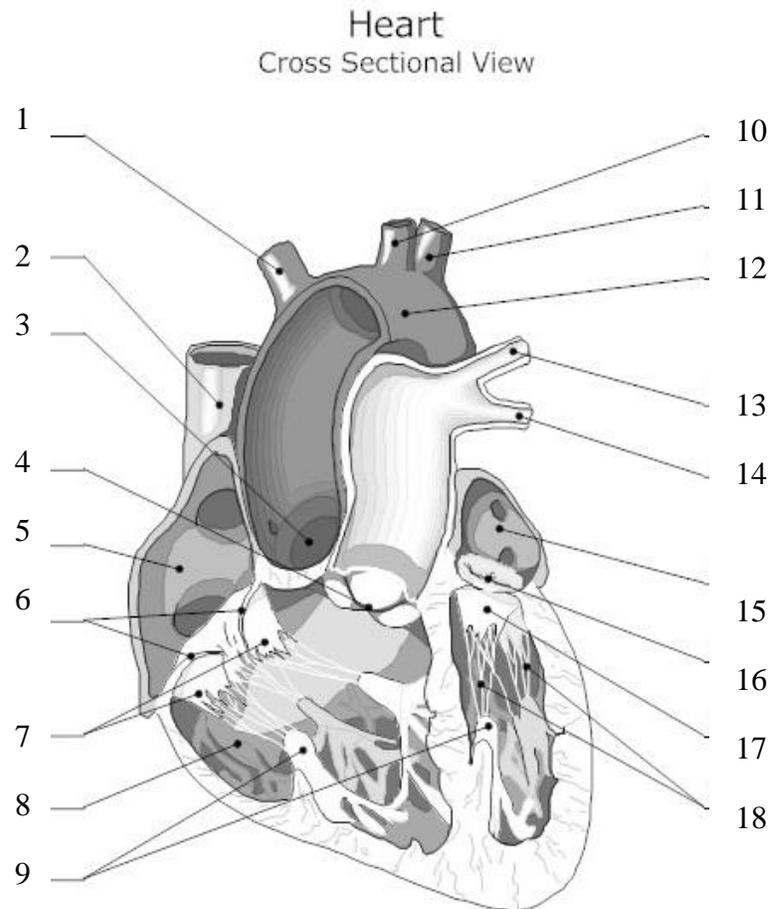
Name(s): _____ Team Name: _____
_____ Team Number: _____

Captains Test: Anatomy & Physiology 2019 (Division C)

- You have 50 minutes in which to complete this test.
- All answers—both multiple choice and free response—must be recorded on your separate answer packet. No credit will be awarded for any work shown or answers written in the test packet.
- For multiple choice questions, simply write the CAPITAL LETTER that corresponds to your answer choice on the appropriate line on your separate answer packet.
- For questions involving calculations, show all necessary work in the space provided on your separate answer packet.
- The number of points awarded for each question or set of questions may be found in brackets at the end of each question or directions for a set of questions in this test packet.

Total Score: _____ /120

Cardiovascular System



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For Questions 1-21, refer to the above cross section of the heart.

- 1) Label structure #1. [1]
- 2) Label structure #2. [1]
- 3) Label structure #3. [1]
- 4) Label structure #4. [1]
- 5) Label structure #5. [1]
- 6) Label structure #6. [1]
- 7) Label structure #7. [1]
- 8) Label structure #8. [1]
- 9) Label structure #9. [1]

- 10) Label structure #10. [1]
- 11) Label structure #11. [1]
- 12) Label structure #12. [1]
- 13) Label structure #13. [1]
- 14) Label structure #14. [1]
- 15) Label structure #15. [1]
- 16) Label structure #16. [1]
- 17) Label structure #17. [1]
- 18) Label structure #18. [1]
- 19) Structure #1 is an artery of the mediastinum. To where does it supply blood in the body? [1]
 - a) to the right arm, head, and neck
 - b) to the left arm, head, and neck
 - c) to the head, lungs, and arms
 - d) to the right arm, only
 - e) to the head, only
- 20) What is the function of structure #9? [2]
- 21) Structure #18, composed of collagen and elastin fibers, must be able to support an approximate load of _____ tons a day in the adult heart. [1]
 - a) 0
 - b) 25
 - c) 50
 - d) 75
 - e) 100
- 22) Which of the following is NOT a function of blood? [1]
 - a) transportation of O₂, CO₂, and nutrients
 - b) transportation of metabolic wastes
 - c) regulation of body temperature
 - d) synthesis of ATP
 - e) protection against blood loss and infection
- 23) What is the normal pH range for blood? [1]
 - a) 7.25-7.35
 - b) 7.35-7.45
 - c) 7.45-7.55
 - d) 7.55-7.65
 - e) 7.65-7.75
- 24) This element, mainly released from the sarcoplasmic reticulum (SR), functions as the excitation-contraction coupler in cardiac muscle, as in skeletal muscle, by combining with troponin: [1]
 - a) calcium
 - b) iron
 - c) manganese
 - d) phosphorus
 - e) molybdenum
- 25) _____ and _____ are peptide hormones that serve as the most potent inducers of vasoconstriction. [1]

- a) angiotensin I; leu-enkephalin
 - b) angiotensin I; endothelin 1
 - c) angiotensin II; leu-enkephalin
 - d) angiotensin II; endothelin 1
 - e) angiotensin II; endothelin 2
- 26) The cardiac cycle is divided into ventricular contraction (_____) and ventricular relaxation (_____): [1]
- a) atria; aorta
 - b) diastole; systole
 - c) systole; atria
 - d) diastole; atria
 - e) systole; diastole
- 27) Place the letters corresponding to the following events that occur in normal valve function in the left ventricle in the correct order: [3]
- a) As the left atrium contracts, more blood flows into the left ventricle.
 - b) When the left ventricle contracts, the mitral valve closes and the aortic valve opens, so blood flows into the aorta.
 - c) After the left ventricle relaxes, the aortic valve closes and the mitral valve opens, to allow blood to flow from the left atrium into the left ventricle.
- 28) Which of the following is NOT a Starling force that governs a passive exchange of H₂O? [1]
- a) hydrostatic pressure in the capillary
 - b) hydrostatic pressure in the interstitium
 - c) hydrostatic pressure in the arteriole
 - d) oncotic pressure in the capillary
 - e) oncotic pressure in the interstitium
- 29) The cluster of autorhythmic cells located in the wall of the right atrium that sets the rate and timing at which all cardiac muscle cells contract is the... [1]
- a) atrioventricular node
 - b) sinoatrial node
 - c) Schwann cell cluster
 - d) sinoventricular node
 - e) islets of Langerhans
- 30) To help maintain normal blood pH, _____ serves as a buffer during the conversion of CO₂ into bicarbonate, in which H⁺ ions are liberated, and is reduced by the dissociation of O₂. [1]
- a) PO₄³⁻
 - b) C₆H₁₂O₆
 - c) Hb
 - d) N₂H₄
 - e) Cl⁻

For Questions 31-34, fill in the blanks to complete the following description of the electrical stimulation of myocardial tissue: [4, 1 pt. each]

The (31) _____ node receives signals from the (32) _____ node. The impulses then pass to the (33) _____ and then follow left and right bundle branches through the interventricular septum and ultimately to the (34) _____.

35) Another term for a myocardial infarction is... [1]

- a) a stroke
- b) a heart attack
- c) a seizure
- d) a premature bradycardia
- e) an infection of the myocardium

36) _____ range from 7 micrometers to 1 millimeter in diameter and allows blood to return from capillary beds to drain into the larger blood vessels. [1]

- a) arterioles
- b) capillaries
- c) veins
- d) arteries
- e) venules

37) If your teammate's HCT is found to be 66% through a blood test, it may mean he is... [1]

- a) making too many red blood cells
- b) not making enough red blood cells
- c) suffering from a white blood cell cancer
- d) bleeding internally
- e) not producing platelets efficiently

38) *"The stroke volume of the heart increases in response to an increase in the volume of blood in the ventricles, before contraction (the end diastolic volume), when all other factors remain constant."*

The above statement is most closely aligned with: [1]

- a) the Frank-Starling Law
- b) Boyle's Law
- c) the Columbia Law
- d) Hilton's Law
- e) the Watson-Crick Law

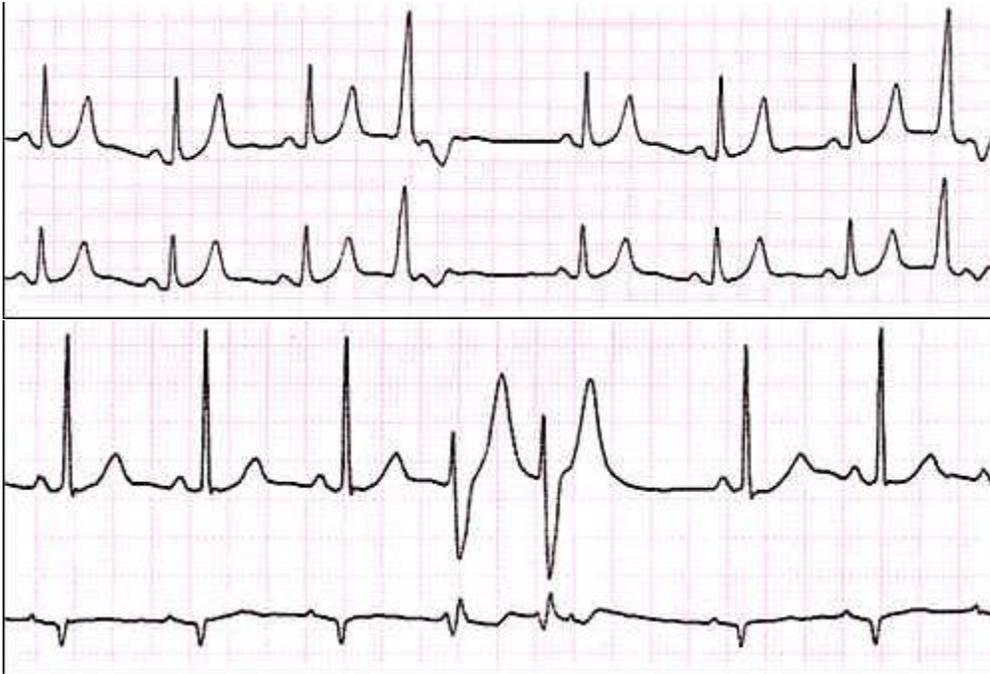
For Questions 39-50, fill in the cell with the corresponding number in the following table of blood types: [19, 1 pt. each]

Red Blood Cell Type	A	B	AB	O
Antibodies in Plasma	(39)	(42)	(45)	(48)
Antigens in Red Blood Cell	(40)	(43)	(46)	(49)
Blood Types Compatible in an Emergency	(41)	(44)	(47)	(50)

51) Circulating cholesterol and inflammation can act together to produce a cardiovascular disease called _____, the hardening of the arteries by accumulation of fatty deposits. [1]

- a) congestive heart failure
- b) atherosclerosis
- c) atrial fibrillation
- d) bradycardia
- e) tachycardia

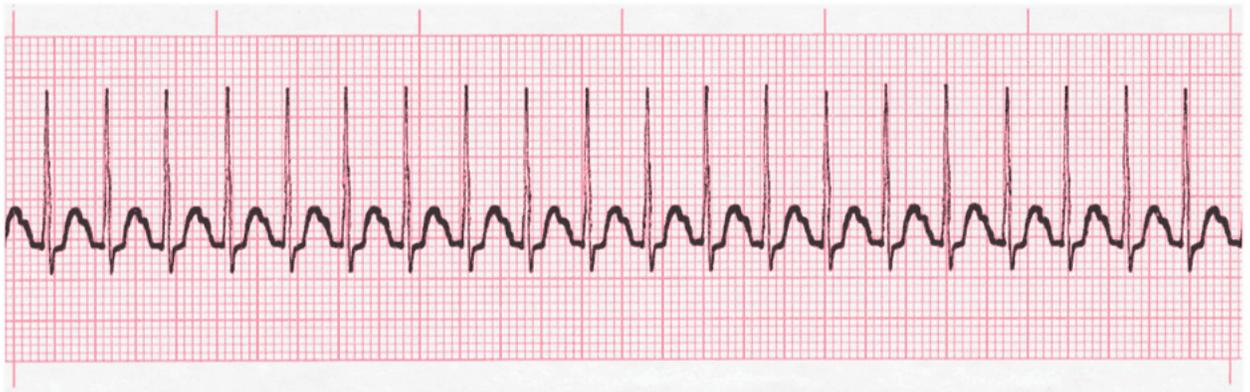
52)



The above EKG strip patterns both represent...[1]

- a) torsades
- b) bradycardia
- c) myocardial infarction
- d) supraventricular tachycardia
- e) premature ventricular contraction

53)



The above EKG strip pattern represents...[1]

- a) torsades
 - b) bradycardia
 - c) myocardial infarction
 - d) supraventricular tachycardia
 - e) premature ventricular contraction
- 54) Which of the following is NOT a way in which a regular exercise regimen aids cardiovascular health? [1]
- a) improves muscles' ability to pull oxygen out of blood
 - b) reduces stress hormones
 - c) works like a beta blocker to slow the heart rate and lower blood pressure
 - d) increases low-density lipoprotein (LDL) and helps control triglycerides
 - e) reduces the need for the heart to pump more blood to the muscles during activity
- 55) Researchers have found that ECF serves an important role in mediating the vascular effects of caffeine exposure. ECF is the abbreviation for... [1]
- a) epithelial cell function
 - b) endocardial cell function
 - c) endothelial cell function
 - d) exothelial cardiac function
 - e) endocardial cardiac function

Lymphatic System

For Questions 56-61, place the following terms relating to lymphokinetic motion and pressure gradient in order from highest pressure to lowest pressure: [6, 1 pt. each]

interstitial fluid; lymph veins; large circulatory veins; lymph ducts; blood capillaries; lymph capillaries

- 56) _____ (highest pressure)
 57) _____
 58) _____
 59) _____
 60) _____
 61) _____ (lowest pressure)

For Questions 62-71, classify the word, phrase, or description as belonging to the primary, secondary, or tertiary grouping of lymphoid tissues: [10, 1 pt. each]

- 62) bone marrow
 63) spleen
 64) MALT
 65) develop in adults in response to chronic inflammation, chronic infection, or autoimmunity
 66) thymus
 67) sites where lymphocytes interact with each other and with non-lymphoid cells to generate immune responses to antigens
 68) sites where lymphocytes develop from progenitor cells into functional and mature lymphocytes
 69) lymph nodes
 70) ectopic lymphoid tissues
 71) accumulations of lymphocytes and stromal cells in an organized structure
- 72) The presence of a _____ cell in a lymphoma patient classifies that lymphoma as Hodgkin's. [1]
 a) Walter-Reed
 b) Frank-Starling
 c) Schwann
 d) red blood
 e) Reed-Sternberg

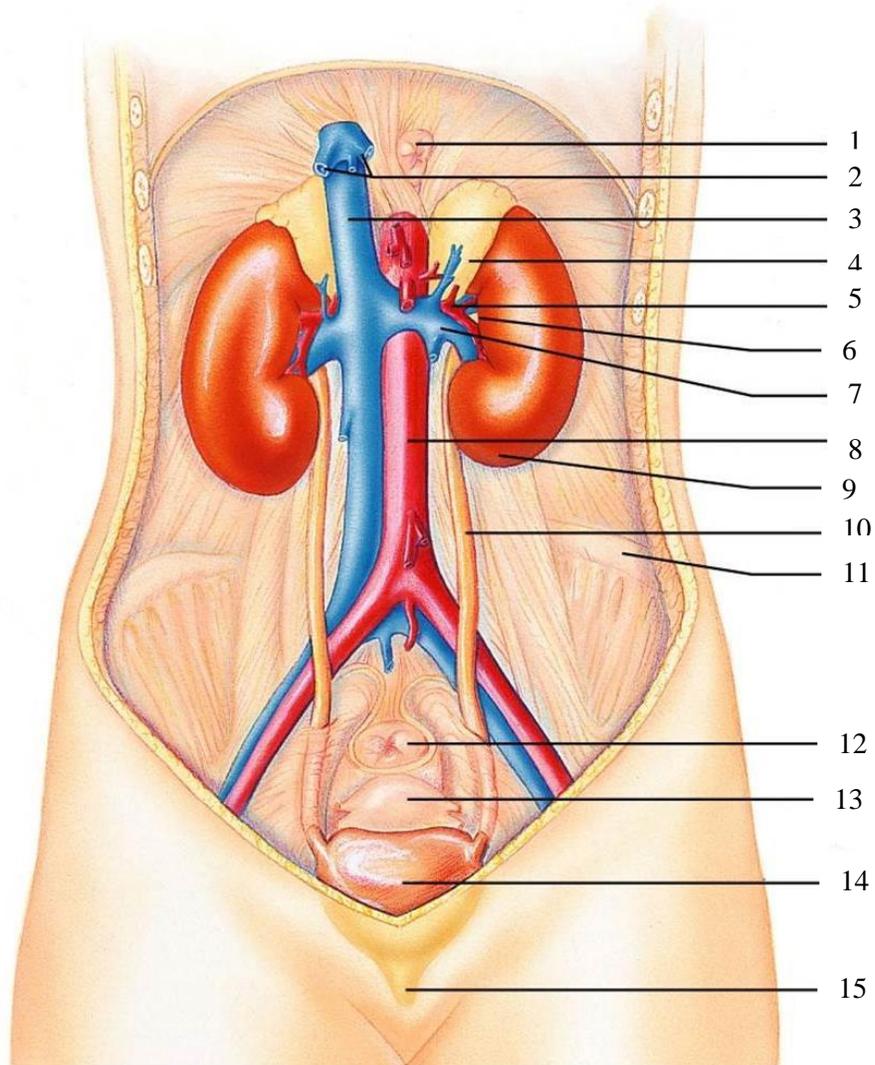
For Questions 73-76, fill in the blanks to complete the following sentence about the function of the spleen: [4, 1 pt. each]

Old (73)_____ are recycled in the spleen, and (74)_____ and (75)_____ are stored there. It metabolizes (76)_____ removed from erythrocytes.

77) Fats and fat-soluble vitamins are absorbed by _____ in the villi of the small intestine; the lymph in these structures has a milky appearance due to its high fat content and is called _____. [1]

- a) lactose; chyle
- b) lacteals; chyle
- c) lacteals; chyme
- d) lactose; chime
- e) lactose; bile

Excretory System



For Questions 78-, refer to the above diagram of the excretory system.

- 78) Label structure #3. [1]
- 79) Label structure #4. [1]
- 80) Label structure #5. [1]
- 81) Label structure #6. [1]
- 82) Label structure #7. [1]
- 83) Label structure #8. [1]
- 84) Label structure #9. [1]
- 85) Label structure #10. [1]
- 86) Label structure #12. [1]
- 87) Label structure #14. [1]
- 88) Label structure #15. [1]

- 89) One major test to measure structure #9's is the ACR test. For what does ACR stand? [2]
- 90) The other major test to determine structure #9's function is the measurement of the GFR. For what does GFR stand? [2].
- 91) If structure #9 becomes impaired, what will the effect be on BUN and creatinine blood levels? [1]
- a) BUN will increase; creatinine will decrease
 - b) BUN will decrease; creatinine will increase
 - c) BUN will increase; creatinine will increase
 - d) BUN will decrease; creatinine will decrease
 - e) both will remain the same (no change)
- 92) The Loop of Henle's main function is... [1]
- a) to provide structure and support for the nephron
 - b) to aid in enzymatic digestion
 - c) to facilitate excretion from the urinary bladder
 - d) to create a concentration gradient in the medulla of the kidney
 - e) to shift bile from the ileum to the jejunum by means of a salt bridge
- 93) The type of epithelial cells that comprises the Loops of Henle is... [1]
- a) simple squamous
 - b) stratified columnar
 - c) pseudostratified columnar
 - d) simple cuboidal
 - e) pseudostratified squamous
- 94) Excretion of excess H₂O leads to formation of _____ urine; excretion of excess solutes results in formation of _____ urine. [1]
- a) hypertonic; hypotonic
 - b) hypotonic; hypertonic
 - c) acidic; basic
 - d) basic; acidic
 - e) neutral; acidic
- 95) Which of the following is NOT one of the four main types of kidney stones? [1]
- a) Calcium stones
 - b) Uric acid stones
 - c) Struvite stones
 - d) Flint stones
 - e) Cystine stones
- 96) _____ is the scarring of the filtering part of the kidneys, leading to a loss of protein in the urine and leakage of fluid into nearby tissue. [1]
- a) UTI
 - b) Glomerulonephritis
 - c) Glomerulosclerosis

- d) Benign Prostatic Hyperplasia
- e) Incontinence

Calculations

For Questions 97-100, refer to the following paragraph:

On Thursday, James had an appointment with his cardiologist, Dr. Matthews. After checking his patient's blood pressure, Dr. Matthews reported James' blood pressure to be "80 over 50." He measured a stroke volume of about 40 mL/beat, with 68 beats per minute.

97) Calculate James' cardiac output (CO). [3]

98) Calculate James' pulse pressure (PP). [3]

99) Calculate James' mean arterial pressure (MAP). [3]

100) Is James' MAP abnormal? If so, provide two (2) plausible causes for the abnormality [3].