Anatomy & Physiology

by mangothecat =^..^=

Team Name: 

Competitor Names:

_____/103 pts

Part 1 - Cardiovascular System

Label the following diagram of the heart’s electrical conduction system (1pt each):

1.
2.
3.
4.
5.
14. What occurs during the P wave? (2 pts)

15. What occurs during the QRS complex? (2 pts)

16. What occurs during the T wave? (2 pts)
Use the following ECG strip for 17 - 19:

17. What abnormality is this? (Give the name.) (1pt)

18. How can you tell? Name 2 distinguishing features from the strip. (2pts)

19. What causes this abnormality in terms of physiology? (2pts)

Multiple choice (1pt each):

20. The lining of the inner walls of the heart's chambers is called the:
   a. visceral pericardium
   b. serous pericardium
   c. epicardium
   d. myocardium
   e. endocardium

21. The outermost layer of the heart’s serous membrane is called the:
   a. visceral pericardium
   b. parietal pericardium
   c. epicardium
   d. myocardium
   e. endocardium

22. Which of the following is the heart’s natural pacemaker?
   a. sinoatrial node
   b. atrioventricular node
   c. Purkinje fibers
   d. left and right bundle branches
23. When the membrane potential of a cardiac muscle cell reaches threshold potential (-40 mV), _______ channels open, initiating an action potential.
   a. sodium
   b. potassium
   c. calcium
   d. chloride
   e. magnesium

24. Which tunic of an artery contains endothelium?
   a. tunica interna/intima
   b. tunica media
   c. tunica externa
   d. tunica adventitia

25. In the arteriole end of a capillary, blood colloidal osmotic pressure is ______ than capillary hydrostatic pressure, causing ______ to occur.
   a. greater, filtration
   b. less, filtration
   c. greater, absorption
   d. less, absorption

26. Hemoglobin has ______ protein subunits, each of which have ______ heme group(s) that can bind onto ______ oxygen molecule(s) each.
   a. 2, 2, 2
   b. 2, 1, 1
   c. 4, 2, 2
   d. 4, 1, 1
   e. 4, 1, 2

27. Which of the following INCREASES hemoglobin binding affinity for oxygen?
   I. 2, 3-diphosphoglycerate
   II. increase in blood pH
   III. increase in temperature
   a. I only
   b. II only
   c. I, II
   d. II, III
   e. None of the above

28. Blood leaving the right ventricle immediately flows through the:
   a. tricuspid valve
   b. bicuspid atroventricular valve
   c. vena cava valve
   d. pulmonary valve
   e. aortic valve

29. Chordae tendineae:
   e. chordae tendineae
a. arise from papillary muscles in the ventricles
b. attach to the undersurface of the semilunar valves
c. are the only cardiac muscle cells under voluntary control
d. consist of elastic tissue

30. Timmy’s diastolic blood pressure is 80 mmHg, and his systolic blood pressure is 124 mmHg. What is Timmy’s mean arterial blood pressure?
   a. 95 mmHg
   b. 102 mmHg
   c. 109 mmHg
   d. 142 mmHg

31. What causes the refractory period of cardiac muscle to much longer than that of skeletal muscle? Why is this desirable? (4pts total)
Part 2 - Lymphatic System

Answer the following questions based on the spleen histology diagram below:

1. What “color” pulp is 1 pointing to? What is its function? (3pts)

2. What “color” pulp is 2 pointing to? What is its function? (3pts)

Multiple Choice (1pt each):

3. Lymph flows:
   a. towards the heart only
   b. away from the heart only
c. towards and away from the heart
d. within extracellular space only

4. The ___________ is an enlarged sac that collects lymph from the lumbar trunks and from the intestinal trunk.
   a. chordae tendineae
   b. cisterna chyli
   c. thoracic sac
   d. right lymphatic duct

5. Lymph vessels are similar to __________ in that they ________ have valves.
   a. arteries, do
   b. arteries, do not
   c. veins, do
   d. veins, do not

6. Lymph tissue mostly consists of which type of tissue?
   a. areolar connective tissue
   b. reticular connective tissue
   c. adipose tissue
   d. dense irregular connective tissue

7. Musoca-associated lymphatic tissue includes:
   a. spleen only
   b. tonsils only
   c. Peyer’s patches only
   d. tonsils and Peyer’s patches

8. __________ vessels enter a lymph node, and __________ vessels exit a lymph node
   a. afferent, efferent
   b. efferent, afferent

9. Which region of the lymph node contains germinal centers, where B cells divide?
   a. trabeculae
   b. medulla
   c. cortex
   d. sinus

10. Which lymphoid tissues trap and remove bacteria entering the throat?
    a. cervical lymph nodes
    b. tonsils
    c. axillary lymph nodes
    d. Peyer’s patches

11. The thymus is different from other lymphoid organs in that:
    a. it lacks follicles
    b. does not directly fight antigens due to the blood thymus barriers
    c. it consists mostly of epithelial cells instead of reticular fibers
    d. all of the above

12. Which of the following organs’ activity peaks in children and then gradually declines?
a. spleen
b. thymus
c. tonsils
d. appendix

13. The thymus is the organ where ________ mature.
   a. T lymphocytes
   b. B lymphocytes
   c. macrophages
d. dendritic cells

14. Dendritic cells:
   a. differentiate into B & T lymphocytes
   b. attack cancerous body cells
   c. inactivate bacterial and fungal pathogens
   d. capture antigens and bring them to lymph nodes

15. Lipids in the GI tract are absorbed into specialized lymphatic capillaries called:
   a. villi
   b. thoracic ducts
c. lacteals
d. cisterna chyli

16. Lymphocytes located in the ________ usually do not participate in the immune response.
   a. bloodstream
   b. lymphatic vessels
c. thymus
d. lymph nodes

17. Which of the following is not a mechanism for promoting lymph transport?
   a. skeletal muscle activity
   b. smooth muscle activity
   c. pressure changes in the thorax during breathing
   d. valves within lymph vessels
e. all of the above are mechanisms for promoting lymph transport.

18. List 4 differences between Hodgkin lymphoma and non-Hodgkin lymphoma. (8pts)
Part 3 - Excretory System

Label the following diagram of a kidney (1pt each):

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  
11.  
12.  

[Diagram of a kidney with labels 1 to 12]
For questions 13 & 14, answer the following questions about cystitis.

13. What is cystitis? (Give definition, causes, and 3 symptoms.) (6pts)

14. Does cystitis more commonly affect men or women? Why? (2 pts)

Multiple choice (1pt each):

15. Which of the following terms describes the location of the kidneys?
   a. suprarenal
   b. intraperitoneal
   c. retroperitoneal
   d. anteroperitoneal

16. Humans excrete nitrogenous wastes primarily in the form of:
   a. uric acid
   b. urea
   c. ammonia
   d. ammonic acid

17. The Bowman’s capsule is responsible for:
   a. filtration
   b. absorption
   c. secretion
   d. micturition

18. Which aspect of the nephron is impermeable to water?
   a. bowman’s capsule
   b. proximal tubule
   c. descending loop of Henle
   d. ascending loop of Henle

19. Which aspect of the nephron is almost exclusively permeable to water?
   a. proximal tubule
   b. descending loop of Henle
   c. ascending loop of Henle
   d. distal tubule

20. Which aspect of the nephron secretes potassium ions?
a. proximal tubule  
b. descending loop of Henle  
c. ascending loop of Henle  
d. distal tubule  

21. Which aspect of the nephron has the highest osmolarity?  
a. bowman’s capsule  
b. proximal tubule  
c. hairpin turn of loop of henle  
d. distal tubule  

22. Which one of the following is NOT true of urine under normal healthy conditions:  
a. is sterile  
b. contains ammonia  
c. is slightly alkaline  
d. contains urochrome  

23. In general,  
a. salt actively follows water  
b. water passively follows salt  
c. salt passively follows water  
d. water actively follows salt  

24. The normal pH of blood is:  
a. 6.8-6.9  
b. 7.0-7.35  
c. 7.35-7.45  
d. 7.45-8.0  

25. This hormone acts on the kidneys DIRECTLY to increase sodium ion and water reabsorption:  
a. angiotensin  
b. aldosterone  
c. ADH  
d. epinephrine  

26. ADH increases water uptake in the kidneys by:  
a. increasing number of aquaporins in the loop of Henle  
b. increasing number of aquaporins in the collecting duct  
c. increasing fenestration size in Bowman’s capsule  
d. increasing fenestration size in proximal tubule  

27. Oh no! Alfred has caught a bad case of sciolyosis, whose hallmark symptoms include severe diarrhea. Diarrhea, which reduces blood volume without increasing osmolarity, will cause a release of:  
a. aldosterone  
b. ADH  
c. atrial natriuretic peptide  
d. epinephrine
28. The average adult bladder holds ____ of water when full.
   a. 2 L
   b. 1 L
   c. 500 mL
   d. 100 mL

29. Urinary tract infections are most commonly caused by which genus of bacteria?
   a. Streptococcus
   b. Staphylococcus
   c. Escherichia
   d. Clostridium

30. Which of the following is not a type of kidney stone?
   a. calcium
   b. creatinine
   c. uric acid
   d. cystine

31. A glomerular filtration rate below ____ mL/min/1.73m² indicates kidney failure.
   a. 50
   b. 20
   c. 15
   d. 10

32. Which event does NOT occur during micturition?
   a. detrusor muscle contracts
   b. internal urethral sphincter opens
   c. medial urethral sphincter opens
   d. external urethral sphincter opens