Section 1
Answer questions 1 – 40 on the scan sheet.

1. Which of the following are functions of the cardiovascular system?
   a. transport of oxygen
   b. distributes nutrients to cells
   c. deliver hormones to target cells
   d. "a" and "b" of the above
   e. all of the above

2. The four-chambered heart of humans separates the blood-stream into two major circulatory pathways known as the:
   a. pulmonary and mixed
   b. pulmonary and systemic
   c. internal and external
   d. venous and arterial
   e. coronary and portal

3. All Arteries:
   a. carry blood away from the heart.
   b. drain blood into lymph vessels.
   c. have a thicker tunica interna (intima) than capillaries.
   d. carry oxygen-rich blood.
   e. have internal valves to prevent the backwards flow of blood.

4. The membranous sac which surrounds the heart is known as the ___________.
   a. pleura
   b. pericardium
   c. peritoneum
   d. epicardium
   e. tunica externa

5. The _______ is the thickest layer of the heart wall.
   a. endocardium
   b. mesocardium
   c. myocardium
   d. epicardium
   e. parietal pericardium
6. Blood leaving the left ventricle enters the:
   a. left atrium
   b. pulmonary trunk
   c. right ventricle
   d. aorta
   e. right atrium

7. The heat chamber which ejects blood into the pulmonary trunk is the _____________.
   a. left ventricle
   b. right ventricle
   c. left atrium
   d. right atrium

8. The state of a heart chamber that is relaxed is called _____________.
   a. systole
   b. diastole
   c. dipole
   d. the QRS complex
   e. the refractory period

9. As blood flows through the circulatory system, which of the following does deoxygenated blood first enter?
   a. left atrium
   b. right ventricle
   c. right atrium
   d. aorta
   e. left ventricle

10. The right atrioventricular valve is known as the __________ valve.
    a. tricuspid
    b. pulmonary
    c. bicuspid
    d. aortic
    e. mitral

11. The coronary vein:
    a. collects venous blood from the heart and empties into the right atrium.
    b. collects venous blood from the heart and empties into the left atrium.
    c. separates the right and left ventricles.
    d. lies between the atria and ventricles on the anterior surface of the heart.
    e. contains the SA node.

12. Intercalated discs:
    a. are dense bands that represent the junction between two cardiac muscle cells
    b. offer tremendous resistance to the passage of each action potential
    c. prevent the passage of ions from one cardiac muscle cell to the next
    d. all of the above
    e. none of the above
13. _________ are proteins that connect 2 adjacent cardiac myocytes creating an electrical synapse.
   a. Purkinjie fibers
   b. Desmosomes
   c. Thick filaments
   d. Sarcomeres
   e. Gap junctions

14. Which of the following is NOT a type of conducting cardiac myocyte of the heart?
   a. sinoatrial node
   b. Purkinjie fibers
   c. chordae tendineae
   d. Bundle of His
   e. atrioventricular node

15. A condition in which the heart rate is less than 60 per minute is known as _________.
   a. tachycardia
   b. bradycardia
   c. atrial fibrillation
   d. ventricular diastole
   e. atrial repolarization

16. Which of the following sequences describes the pathway for conduction of impulses in the heart?
   a. AV node - AV bundle - SA node - bundle branches
   b. SA node - AV node – bundle of His - bundle branches
   c. bundle branches - SA node - AV node - bundle of His
   d. SA node - AV node - bundle branches - bundle of His
   e. none of the above

17. Which of the following statements about the electrical activity of the heart is FALSE?
   a. The AV node delays the entry of the action potential from the atria into the ventricles.
   b. Depolarization of the conducting myocytes leads to depolarization of the contractile myocytes.
   c. The AV node initiates depolarization of the atria.
   d. An impulse from the conduction Purkinje fibers will depolarize the ventricles.
   e. The bundle of His receives its depolarization wave from the AV node.

18. Regarding Ca\(^{2+}\) (calcium) in the process of excitation-contraction coupling of cardiac myocytes, which of the following statements is FALSE?
   a. Most of the calcium required for contraction comes from the sarcoplasmic reticulum.
   b. Ca\(^{2+}\) is released from the sarcoplasmic reticulum due to entry of Ca\(^{2+}\) from the extracellular fluid.
   c. As the amount of Ca\(^{2+}\) that enters the sarcoplasm during an action potential increases, the strength of contraction of a cardiac myocyte decreases.
   d. Ca\(^{2+}\) ultimately allows the binding of actin to myosin for cross-bridge cycling to occur.
   e. In a cardiac myocyte that is in diastole, the intracellular Ca\(^{2+}\) concentration is low.

19. In order for a working cardiac myocyte to relax following contraction, intracellular calcium must be removed from the cytoplasm. Which of the following mechanisms is correct?
   a. Calcium diffuses out of the cell through calcium channels that are opened by epinephrine.
   b. Calcium is pumped into the nucleus by troponin.
   c. Calcium is pumped into the sarcoplasmic reticulum by Ca\(^{2+}\)-ATPase.
   d. Calcium is pumped out of the cell by myosin.
   e. The contraction of the working cardiac myocyte squeezes the calcium out of the cell.
20. The T-wave of an EKG is caused by:
   a. the spread of an action potential through the atria
   b. ventricular systole
   c. repolarization of the ventricular myocardium
   d. atrial systole
   e. the spread of action potentials through the ventricles

21. The "dup" or second heart sound is produced by the closure of the:
   a. atrioventricular valves
   b. venous valves
   c. pyloric valve
   d. semilunar valves
   e. chordae tendineae

22. The period of ventricular ejection occurs immediately after:
   a. passive ventricular filling.
   b. atrial systole.
   c. isovolumic ventricular contraction.
   d. isovolumic ventricular relaxation.
   e. none of the above.

23. Pressure in the ventricle reaches its peak during which phase of the cardiac cycle?
   a. passive ventricular filling
   b. atrial systole
   c. isovolumetric ventricular contraction
   d. ventricular ejection
   e. isovolumetric ventricular relaxation

24. Which of the following is true during the entire time the ventricles are in systole?
   a. the semilunar valves are closed
   b. the atria are in systole
   c. the atrioventricular valves are closed
   d. blood enters the ventricles
   e. all of the above

25. All of the following occur at the time of the first heart sound except:
   a. closure of the bicuspid valve
   b. ventricular systole
   c. ventricular contraction
   d. closure of the tricuspid valve
   e. contraction of the atria

26. The __________ is the amount of blood pumped out of the heart per beat.
   a. residual volume
   b. end diastolic volume
   c. end systolic volume
   d. stroke volume
   e. cardiac output
27. Cardiac output is calculated by multiplying ____________ and ____________.
   a. blood pressure; vascular resistance
   b. end systolic volume; end diastolic volume
   c. diastolic pressure; heart rate
   d. stroke volume; heart rate
   e. stroke volume; blood pressure

28. The cardioacceleratory center is located in the ____________.
   a. cerebral cortex
   b. spinal cord
   c. pons
   d. hypothalamus
   e. medulla oblongata

29. Which of the following will cause a decrease in the heart rate?
   a. stimulation of the sympathetic nervous system
   b. the binding of epinephrine to the β-adrenergic receptor on a working ventricular myocyte
   c. a sudden decrease in arterial blood pressure
   d. cholinergic stimulation of the sinoatrial node
   e. stimulation of the cardioacceleratory center

30. Exchange of materials between the blood and cells occur in the:
   a. arteries
   b. lymph vessels
   c. capillaries
   d. veins
   e. all of the above

31. Which of the following blood vessels is/are able to withstand the greatest amount blood pressure?
   a. veins
   b. arteries
   c. capillaries
   d. "a" and "b" of the above
   e. all of the above

32. At any moment, more than half of the blood of a resting individual may be found within the:
   a. ventricles
   b. arteries
   c. capillaries
   d. veins
   e. atria

33. Blood flows from:
   a. an area of higher pressure to an area of lower pressure
   b. the veins to the venules
   c. the capillaries to the arteries
   d. from the arterioles to the arteries
   e. all of the above
34. Which layer of the arteries is responsible for their ability to withstand high internal blood pressure?
   a. tunica salad
   b. tunica intima
   c. tunica media
   d. tunica externa
   e. endothelium

35. Systemic systolic arterial blood pressure typically indicates the force of the:
   a. left ventricle during the ventricular ejection phase of the cardiac cycle
   b. left ventricle during the isovolumic contraction phase of the cardiac cycle
   c. right atria during the atrial contraction phase of the cardiac cycle
   d. left atria during the isovolumic relaxation phase of the cardiac cycle
   e. right ventricle during the isovolumic contraction phase of the cardiac cycle

36. Blood hydrostatic pressure:
   a. increases from the capillaries to the heart
   b. is higher at the arterial end of the capillary than at the venous end
   c. pulls fluid into the capillaries from the interstitial (extracellular) spaces
   d. is greater in veins than in arteries
   e. none of the above

37. After rising from a lying down position, blood pressure **decreases** which results in:
   a. sympathetic stimulation to the blood vessels
   b. vasoconstriction
   c. vasodilation
   d. "a" and "b" of the above
   e. "a" and "c" of the above

38. Peripheral vascular resistance:
   a. decreases as the diameter of arterioles increases
   b. increases when blood viscosity increases
   c. increases under vasoconstriction
   d. "b" and "c" of the above
   e. all of the above

39. Which of the following would cause a **decrease** the flow of blood from the foot to the heart?
   a. fluid loss from severe dehydration
   b. an increase in stroke volume
   c. venous constriction
   d. release of norepinephrine onto the heart
   e. skeletal muscle movements

40. Capillary osmotic pressure:
   a. is higher at the arterial end than at the venous end of a capillary
   b. tends to drive fluid out of the capillaries into the tissues
   c. is approximately the same at the arterial and venous ends of the capillary
   d. is not important in the exchange of substances between capillaries and tissues
   e. none of the above
Section 2

Answer questions 41 – 55 on the scan sheet using A = increase, B = not change, or C = decrease
The cause is described before the blank and the effect is described after the blank in all questions.

41. An increase in the preload on the heart will ___________ the blood flow throughout the vascular system.
42. Increasing the intracellular calcium level of a ventricular contractile cell will ___________ cardiac output.
43. Bradycardia will ___________ arterial blood pressure.
44. An increase in systemic arterial blood pressure will ___________ the afterload on the ventricles.
45. Decreasing the intracellular calcium level of a ventricular contractile cell will ___________ the cardiac output.
46. An increase in end diastolic volume (EDV) will ___________ the preload on the ventricles.
47. A decrease in blood pressure sensed by baroreceptors will ___________ the secretion of acetylcholine from the Vagus nerve.
48. An increase in the stroke volume will ___________ the resistance of blood flow through an arteriole.
49. Contraction of skeletal muscle surrounding a vein will ___________ the osmotic pressure of the blood within the vein.
50. An increase in the red blood cells within the blood will __________ the vascular resistance.
51. An increase in the secretion of norepinephrine onto an arteriole will ___________ the diameter of the arteriole.
52. Vasoconstriction of a venule will ___________ the capillary hydrostatic pressure.
53. A decrease in the plasma volume will ___________ the amount of filtration that occurs along the length of a capillary.
54. A decrease in diameter of an arteriole will ___________ the blood flow through the arteriole.
55. A decrease in the capillary hydrostatic pressure will ___________ the amount of filtration that occurs across the capillary wall.