For the following questions, indicate the letter that corresponds to the SINGLE MOST APPROPRIATE ANSWER.

1. A 12-year-old little league baseball player received a direct hit to his manubrium from a fast ball. As a medical student and a concerned parent, you know that many important structures lie posterior to the manubrium. Which of the following relationships is in the correct anterior-to-posterior orientation?
   A. Thymus, trachea, left brachiocephalic vein
   B. Left brachiocephalic vein, arch of the aorta, esophagus, trachea
   C. Brachiocephalic artery, trachea, right brachiocephalic vein
   D. Thymus, arch of the aorta, trachea, thoracic duct
   E. Thymus, arch of the aorta, left brachiocephalic vein, thoracic duct, esophagus

2. During surgery to remove a large mass from the esophagus, the intern recalled that all of the following information about structures in the posterior mediastinum is correct EXCEPT that the
   A. azygos vein drains into the superior vena cava via the arch of the azygos.
   B. thoracic duct drains lymph from the upper right side of the thoracic wall.
   C. greater splanchnic nerves are found in the posterior mediastinum.
   D. thoracic duct ascends between the azygos vein and the descending aorta.
   E. posterior intercostal arteries are crossed anteriorly by the azygos and hemiazygos veins.

3. Although you are a first year medical student and a novice at using the stethoscope, you distinctly recall that the sound of the mitral valve can best be heard over the
   A. second left intercostal space just lateral to the sternum.
   B. right half of the lower end of the body of the sternum.
   C. second right intercostal space just lateral to the sternum.
   D. left fifth intercostal space at the mid-clavicular line.

4. Which of the following sets of structures are found in the right ventricle?
   A. Musculi pectinati, chordae tendinae, fossa ovalis.
   B. Anterior papillary muscle, mitral valve, infundibulum.
   C. Auricle, crista terminalis, trabeculae carnae.
   D. Aortic vestibule, septomarginal band, coronary sinus.
   E. Infundibulum, trabeculae carnae, septal papillary muscle.
5. An intern at the University Hospital examined an MR image that was a transverse section through the lower end of the T4 vertebral body. In a normal adult scan, she should have seen all of the following EXCEPT the
   A. aorta.
   B. superior vena cava.
   C. upper lobe of the right lung.
   D. left common carotid artery.
   E. tracheal bifurcation.

6. A tumor located in the bronchomediastinal lymph nodes immediately superior to the right primary bronchus would most likely DIRECTLY compress which of the following structures?
   A. Right atrium
   B. Right sympathetic chain
   C. Arch of the azygos vein
   D. Inferior vena cava
   E. Descending aorta

7. A knife penetrating the anterior chest wall in the area at the tip of the arrow below would likely injure all of the following structures EXCEPT the
   A. right atrium.
   B. right primary bronchus.
   C. parietal pleura.
   D. pericardium.
   E. internal thoracic artery.

8. A knife-wound to the anterior chest would usually NOT cause a collapsed lung if it was located at the area marked below as
   A. A
   B. B
   C. C
   D. D
   E. E

9. In an anterior-posterior X-ray of the chest, the right ventricle would often be located in the area marked above as
   A. A
   B. B
   C. C
   D. D
   E. E
10. Following a particularly intense workout at the gym, a 25-year-old man experienced pain on the left side along the dermatome that included the nipple. While there is overlap, the sensory nerve fibers to this strip of skin are carried PRIMARILY in the ventral ramus of the
   A. first thoracic spinal nerve.
   B. second thoracic spinal nerve.
   C. third thoracic spinal nerve.
   D. fourth thoracic spinal nerve.
   E. fifth thoracic spinal nerve.

11. A 54-year-old woman with severe angina experienced pain radiating down the medial side of her left arm. Anginal pain of cardiac origin referred to the medial aspect of the arm is perceived as pain along the distribution of the
   A. intercostobrachial nerve.
   B. phrenic nerve.
   C. medial pectoral nerve.
   D. anterior cutaneous branches of the intercostal nerves.
   E. vagus nerve.

12. As you pass a chest tube through the sixth intercostal space of a patient suffering from a pneumothorax, you remind yourself that all the following statements concerning the sixth intercostal nerve are correct EXCEPT that it
   A. contains both GSA and GSE fibers.
   B. is located between the internal and innermost layers of intercostal muscles.
   C. is the continuation of the ventral primary ramus of the 6th thoracic spinal nerve.
   D. is closer to the seventh than the sixth rib.
   E. contains GVE fibers.

13. A knife piercing the 4th intercostal space two inches lateral to the spinous processes could damage which of the following structures?
   A. 5th intercostal nerve
   B. Internal intercostal muscle
   C. External intercostal muscle
   D. Transversus thoracis muscle
   E. Serratus posterior inferior muscle

14. An individual with a gunshot wound to the chest is diagnosed as having a damaged left phrenic nerve which
   A. travels between parietal and visceral layers of pleura.
   B. passes anterior to the lingula.
   C. originates from fibers of the lower three cervical spinal nerves.
   D. may carry impulses that a patient interprets as pain from the neck and shoulder.
   E. supplies sympathetic fibers to the heart.
15. During a procedure to drain blood from the pericardial sac in a patient suffering from cardiac tamponade, you and the attending ER resident began a discussion about the fibrous pericardium. All of the following statements about this structure are correct EXCEPT that it
   A. fuses with the diaphragm.
   B. lies immediately anterior to the esophagus.
   C. extends onto the roots of the great vessels.
   D. extends from the 2nd to the 6th costal cartilages.
   E. is lined by visceral pericardium.

16. The blood flow in the limbs can be increased by surgically sectioning the sympathetic supply (sympathectomy) to the blood vessels supplying the limbs. Preganglionic sympathetic fibers can be surgically sectioned in all the following structures EXCEPT the
   A. lesser splanchnic nerve.
   B. cervical sympathetic trunk.
   C. ventral roots of the thoracic spinal nerves.
   D. white rami communicantes.
   E. gray rami communicantes.

17. A 72-year-old woman has undergone "preventive" angioplasty of her right coronary artery every three years for the past fifteen years. She now is thoroughly aware that branches of the right coronary artery usually supply all of the following structures EXCEPT the
   A. right atrium.
   B. right ventricle.
   C. left atrium.
   D. SA node.
   E. left ventricle.

18. During a 4th year elective in pulmonary disease, you become involved in a discussion about parietal pleura and pulmonary diseases. During the conversation, you remind yourself that all of the following statements about pleurae are correct EXCEPT that the
   A. parietal pleura receives sensory innervation from intercostal and phrenic nerves.
   B. pulmonary ligament extends inferiorly from the hilum of the lung.
   C. pleural recesses are formed between two layers of the parietal pleura.
   D. parietal pleura lining the right pleural cavity is continuous with parietal pleura lining the left pleural cavity.
   E. parietal pleura extends into the root of the neck slightly above the level of the first rib.
19. A 63-year-old man having failed his stress test, underwent an arteriogram to ascertain the degree of stenosis of his coronary arteries. It was determined that he should have quadruple bypass surgery, requiring dissection in the coronary sulcus. The thoracic surgeon reviewed this case with the surgery residents and reminded them that the coronary sulcus contains all of the following structures EXCEPT
   A. the circumflex branch of the left coronary artery.
   B. the coronary sinus.
   C. an opening into the right atrium.
   D. the marginal branch of the right coronary artery.

20. Surgery in the posterior mediastinum has severely damaged the left greater splanchnic nerve. In your discussions with a classmate, the two of you decide that all the following statements concerning the greater splanchnic nerve are correct EXCEPT that it
   A. arises from spinal cord levels T5-T9.
   B. is composed primarily of preganglionic axons.
   C. contains sympathetic fibers.
   D. sends fibers into spinal nerves via the gray rami communicantes.
   E. travels to the abdominal cavity.

21. An arteriogram of the coronary arteries in a 52-year-old man revealed several sites of stenosis, including one in the portion of the left coronary artery just proximal to its branching. At this position, the artery would be located in the
   A. anterior interventricular groove.
   B. posterior interventricular groove.
   C. atrioventricular sulcus.
   D. sulcus terminalis.

22. While skiing out west, a 48-year-old man fell and his ski pole pierced his thoracic cavity deep to the left first intercostal space. The resort emergency medicine physician was concerned that the tip of the pole may have directly damaged the
   A. left coronary artery.
   B. brachiocephalic artery.
   C. left pulmonary artery.
   D. trachea.
   E. left subclavian artery.
23. A 34-year-old man had his left vagus nerve severed as a result of a traumatic injury to his neck. A structure that does not receive contributions from the vagus nerve and, therefore, would not be affected by a sectioning of the left vagus nerve in the neck is the

A. heart.
B. esophageal plexus
C. left greater splanchnic nerve.
D. left recurrent laryngeal nerve.
E. lungs.

24. An MRI of the thorax of a 4-year-old child indicates a mass approximately the size of a golf ball attached to the posterior surface of the manubrium. All of the following statements are probably correct EXCEPT that this mass could

A. displace the thymus gland.
B. alter blood flow through the aortic arch.
C. decrease venous return from the left upper limb.
D. decrease coronary circulation.
E. compress the trachea.

25. While reviewing anatomy in preparation for thoracic surgery, you spend some time thinking about the salient features of the left recurrent laryngeal nerve. A true statement concerning the left recurrent laryngeal nerve is that it

A. loops around the left pulmonary artery.
B. passes posterior to the ligamentum arteriosum.
C. provides sympathetic fibers to the heart.
D. ascends toward the larynx in a groove between the aorta and the azygos vein.
E. provides sympathetic fibers to the lungs.

26. During surgery to remove bony overgrowths from the anterior midline surface of the body of the sixth thoracic vertebra, the surgeon was careful to avoid cutting the

A. right thoracic sympathetic chain.
B. left lesser splanchnic nerve.
C. left vagus nerve.
D. thoracic duct.
E. left sixth posterior intercostal artery.

CASE STUDY: Questions 27-30

An 84-year-old woman with a history of chronic congestive heart failure complains of being short of breath. Her breathing is rapid and labored.
27. The movement of the ribs during inspiration involves all of the following EXCEPT
   A. elevation of the ribs.
   B. increase in the transverse thoracic diameter.
   C. movement at the costovertebral joints.
   D. movement of the sternum anteriorly.
   E. upward movement of the diaphragm.

28. During your physical exam of the patient's thorax, you note a percussive dullness and suspect fluid in the pleural cavity. Fluid in the pleural cavity reduces ventilation capacity. Thoracocentesis to remove the fluid is best accomplished by inserting a needle
   A. adjacent to the sternum in the 2nd intercostal space.
   B. adjacent to the sternum in the 5th intercostal space.
   C. in the midclavicular line in the 4th intercostal space.
   D. in the midaxillary line in the 6th intercostal space.
   E. in the 12th intercostal space adjacent to the vertebral column.

29. After withdrawal of 855 ml of fluid, the signs of respiratory distress are still present. In further discussions with your patient, she informs you that she "inhaled" a peanut a few days ago and was unable to cough it up. On bronchoscopy, a small aspirated object will most likely be located in the
   A. left lower bronchus.
   B. left main bronchus.
   C. left upper bronchus.
   D. right lower bronchus.
   E. right upper bronchus.

30. Radiographic examination confirmed the foreign body in an airway and showed atelectasis (collapse) of a few bronchopulmonary segments. You begin to muse about the lungs and recall that all of the following statements are correct EXCEPT that
   A. the mediastinal pleura becomes visceral pleura at the root of the lung.
   B. at the hilus of the lung, the bronchus generally lies posterior, the artery superior, and the veins lie inferior.
   C. the carina is an important landmark during bronchoscopy since it is located between the superior ends of the right and left main bronchi.
   D. the brachiocephalic veins form the superior vena cava at about the level of the bifurcation of the trachea.
   E. a bronchopulmonary segment is aerated by a secondary bronchus.
31. The normal adult arterial pattern develops as a result of the formation and selective regression of the aortic arches and their connections to the primitive heart tube and the dorsal aortae. All of the following statements concerning this process are correct EXCEPT that the
   A. ductus arteriosus shunts blood from the pulmonary to the systemic circulation.
   B. descending aorta does not arise from an aortic arch.
   C. right and left subclavian arteries are remnants of the 4th aortic arches.
   D. 3rd aortic arches give rise bilaterally to the common carotid arteries.
   E. pulmonary arteries initially sprout from the 4th aortic arches.

32. In the adult, the right and left recurrent laryngeal nerves pursue different paths in the neck and thorax. This can be explained by the embryological development of the aortic arches. Around which of the aortic arches do the recurrent laryngeal nerves loop?
   A. Right 4th, left 4th
   B. Right 3rd, left 4th
   C. Right 4th, left 3rd
   D. Right 6th, left 4th
   E. Right 4th, left 6th

33. An isolated membranous ventricular septal defect (VSD) could result from abnormal migration/fusion of any of the following structures EXCEPT the
   A. truncoconal septae.
   B. muscular ventricular septum.
   C. septum secundum.
   D. cardiac neural crest cells.
   E. inferior endocardial cushion.

34. The first blood cells in the human embryo are formed in the
   A. angioblastic cords.
   B. yolk sac.
   C. embryonic liver.
   D. embryonic spleen.
   E. embryonic disc.

35. A large oblique vein was last observed by U.C. medical students in a cadaver in 1997. When this vestigial vein is present, it is the result of a persistent
   A. right sinus venosus.
   B. left sinus venosus.
   C. right vitelline vein.
   D. right anterior cardinal vein.
   E. left anterior cardinal vein.
36. A persistent communication between the right and left atria is an atrial septal defect (ASD). ASD results when there is
   A. an incomplete closure of the ostium primum.
   B. an incomplete formation of the septum intermedium.
   C. an incomplete formation of the ostium secundum.
   D. a complete formation of the septum secundum.
   E. an overlap of the ostium secundum and the foramen ovale.

37. The vitelline system of veins gives rise to all of the following structures EXCEPT the
   A. portal vein.
   B. azygos vein.
   C. superior mesenteric vein.
   D. liver sinusoids.
   E. splenic vein.

38. As soon as a newborn takes her first breath, all of the following changes occur in the circulation EXCEPT that
   A. the pulmonary circulation opens.
   B. the foramen ovale closes.
   C. the ductus arteriosus begins to constrict.
   D. the flow in the umbilical vessels ceases.
   E. highly oxygenated blood is now found in the pulmonary arteries.

39. A number of malformations can arise during the various steps of cardiogenesis. A folding of the primitive heart tube to the right results in a malformation known as
   A. acardia.
   B. ectopia cardis.
   C. situs inversus.
   D. dextrocardia.
   E. sinestral looping.

40. All of the following events occur during the first five days of heart formation:
   1. The heart begins to fold.
   2. The endocardial tubes fuse to form the primitive heart tube.
   3. Vasculogenesis in the cardiac region forms the lateral endocardial tubes.
   4. Splanchnopleuric mesoderm invests the heart tube and forms cardiac jelly.
   5. Embryonic folding brings the endocardial tubes together.

Choose the letter which corresponds to the correct chronological sequence of the events.
   A. 3, 5, 4, 1, 2
   B. 4, 1, 2, 5, 3
   C. 3, 2, 5, 4, 1
   D. 3, 5, 2, 4, 1
   E. 4, 1, 3, 5, 2
Answers:
1d2b3d4e5d6c7b8c9c10d11a12d13c14d15e16e17c18d19d20d21c22e23c24d25b26d27e2
8d29d30e31c32e33c34b35e36e37b38e39d40d