

Human Anatomy — Biology 351

Exam #2

Please place your name on the back of the last page of this exam. You must answer *all* questions on this exam. Because statistics demonstrate that, on average, between 2-3 questions on every 100-point exam are ambiguous enough to come out "aberrant" on an item analysis, the total number of points possible on this exam is 106. However, grades will be calculated out of a possible 100 points, assuming that a maximum of 3 questions on this exam are aberrant.

Section 1: Vertebral column and true back muscles. Place the most appropriate letter in the space provided. (2 points each)

- _____ 1. A vertebra that has a bifid spinous process and transverse foramina would be a
 - a. cervical vertebra
 - b. thoracic vertebra
 - c. lumbar vertebra
 - d. sacral vertebra
 - e. coccygeal vertebra

- _____ 2. Spinal nerves exit from which structure of the vertebral column?
 - a. transverse foramina
 - b. vertebral arch
 - c. costal facet
 - d. intervertebral foramen
 - e. pedicle

- _____ 3. Which of the following groups of true back muscles rotate the trunk to the opposite side? (In other words, when the right muscles within this group are contracted you rotate the trunk to the left.)
 - a. splenius muscles
 - b. iliocostalis
 - c. longissimus
 - d. spinalis
 - e. transversospinalis

- _____ 4. Which of the following anatomical characteristics accurately describe the anatomy of an intervertebral disc?
- a. The outer layer is termed the annulus fibrosis (which is composed of elastic cartilage) and the inner layer is termed the nucleus pulposus and is composed of fibrogelatinous material. The posterior aspect of the annulus fibrosis is thinner than the anterior aspect.
 - b. The outer layer is termed the annulus fibrosis (which is composed of hyaline cartilage) and the inner layer is termed the nucleus pulposus and is composed of fibrogelatinous material. The anterior aspect of the annulus fibrosis is thinner than the posterior aspect.
 - c. The outer layer is termed the annulus fibrosis (which is composed of fibrous cartilage) and the inner layer is termed the nucleus pulposus and is composed of fibrogelatinous material. The anterior aspect of the annulus fibrosis is thinner than the posterior aspect.
 - d. The outer layer is termed the annulus fibrosis (which is composed of fibrous cartilage) and the inner layer is termed the nucleus pulposus and is composed of fibrogelatinous material. The posterior aspect of the annulus fibrosis is thinner than the anterior aspect.

Section 2: Spinal cord, spinal nerves, brachial plexus and lumbosacral plexus. If the following statement is true place a (+) in the space provided; if the statement is false place a (O) in the space provided. (2 points each)

- _____ 5. Damage to the ulnar nerve would either eliminate or reduce the ability to utilize two extensor muscles of the forearm and most of the muscles of the hand.
- _____ 6. Damage to the axillary nerve could be the result of damage to any of the roots involved in the brachial plexus.
- _____ 7. Damage to the radial nerve could be the result of damage to any of the roots involved in the brachial plexus.
- _____ 8. The musculocutaneous nerve is formed from the lateral cord, which arises from structures that can be traced back to the roots of C₅ to C₇. This nerve innervates all of the flexors of the forearm.
- _____ 9. The ulnar nerve innervates two extensor muscles in the forearm and most of the muscles of the hand. This nerve arises from structures that can be traced back to the roots of C₈ and T₁.
- _____ 10. The median nerve innervates most of the flexors of the forearm and some of the muscles of the hand. This nerve arises from structures that can be traced back to the roots of C₅ to T₁.
- _____ 11. The obturator nerve is formed from the anterior fibers of the sacral plexus.
- _____ 12. The sciatic nerve is formed from the fibers of the lumbar plexus.
- _____ 13. The femoral nerve is formed from the posterior fibers of the sacral plexus.

Section 3: Spinal cord, spinal nerves, autonomic nervous system. If the following statement is true place a (+) in the space provided; if the statement is false place a (O) in the space provided. (2 points each)

- _____ 14. There are 31 pairs of spinal nerves exiting from the spinal cord: 8 cervical, 12 thoracic, 5 lumbar, 5 sacral, and 1 coccygeal. Each of these 31 pairs of spinal nerves is identical.
- _____ 15. The sympathetic branch of the autonomic nervous system exits from spinal nerves T₁ to L₂.
- _____ 16. The parasympathetic branch of the autonomic nervous system exits from cranial nerves III, VII, IX and X and from sacral spinal nerves S₂ to S₄.
- _____ 17. In the formation of the brachial plexus the superior trunk is formed by the union of the roots of C₅ and C₆; the inferior trunk is formed by the union of the roots of C₈ and T₁, while the middle trunk is simply a continuation of the root of C₇.
- _____ 18. In the formation of the brachial plexus the lateral cord is formed by the anterior divisions of the middle and lower (inferior) trunks.
- _____ 19. The medial cord of the brachial plexus forms the musculocutaneous nerve and part of the median nerve. The musculocutaneous nerve innervates the flexors of the arm, while the median nerve innervates only two flexors in the forearm and most of the muscles of the hand.
- _____ 20. The medial cord of the brachial plexus forms the ulnar nerve and part of the median nerve. The median nerve innervates only two flexors in the forearm and most of the muscles of the hand. The ulnar nerve also supplies most of the muscles of the hand and two of the flexors of the arm.
- _____ 21. The lumbosacral plexus is formed by the spinal nerves L₁ to S₄ (with a small contribution from T₁₂).
- _____ 22. Every spinal nerve would have both a white and gray communicating ramus.
- _____ 23. Every spinal nerve would have both a dorsal and ventral ramus.
- _____ 24. Every spinal nerve would have both a dorsal and ventral root.
- _____ 25. Every spinal nerve would have a gray communicating ramus.

Section 4: Thoracic cavity; structures within the thoracic cavity. If the following statement is true place a (+) in the space provided; if the statement is false place a (O) in the space provided. (2 points each)

- _____ 26. The thoracic cavity is lined by the pleural membrane. The visceral pleural membrane lines the thoracic cavity.
- _____ 27. The visceral and parietal pleural membranes are continuous.

- _____ 28. All of the following structures would be found *only* within the superior mediastinum: trachea, esophagus, aortic arch, right and left brachiocephalic veins.
- _____ 29. The aorta would be found within both segments of the mediastinum. However, the ascending aorta and the aortic arch would be found within the superior mediastinum only, while the thoracic aorta would be found within the inferior mediastinum only.
- _____ 30. The azygos vein drains into the superior vena cava.
- _____ 31. The brachiocephalic trunk is the first vessel to branch off of the aorta.
- _____ 32. The right ventricle is subdivided into the crista supraventricularis and the conus arteriosus. The conus arteriosus would be found closer to the apex of the heart as compared to the crista supraventricularis.
- _____ 33. The hemiazygos vein drains the inferior right side of the thoracic cavity.

Section 5: Spinal nerves: Place the most appropriate letter in the space provided. (2 points each)

- _____ 34. Cutting the spinal nerve found between vertebrae C₇ and T₁ immediately distal to the union of the dorsal root and the ventral root that you would eliminate which of the following?
- a. somatic motor output
 - b. somatic sensory input
 - c. parasympathetic motor output
 - d. sympathetic motor output
 - e. a and b
 - f. a and c
 - g. a and d
 - h. a, b and c
 - j. a, b and d
 - k. a, b, c and d

- _____ 35. Cutting the spinal nerve that exits from the intervertebral foramen between T₄ and T₅ immediately distal to the union of the dorsal root and the ventral root you would eliminate which of the following?
- somatic motor output
 - somatic sensory input
 - parasympathetic motor output
 - sympathetic motor output
 - a and b
 - a and c
 - a and d
 - a, b and c
 - a, b and d
 - a, b, c and d
- _____ 36. If you were to cut the ventral ramus of spinal nerve S₂ you would eliminate which of the following?
- somatic motor output
 - somatic sensory input
 - parasympathetic motor output
 - sympathetic motor output
 - a and b
 - a and c
 - a and d
 - a, b and c
 - a, b and d
 - a, b, c and d
- _____ 37. If you were to cut spinal nerve S₂ proximal to the gray communicating ramus you would eliminate which of the following?
- somatic motor output
 - somatic sensory input
 - parasympathetic motor output
 - sympathetic motor output
 - a and b
 - a and c
 - a and d
 - a, b and c
 - a, b and d
 - a, b, c and d

- _____ 38. If you were to cut the dorsal root of spinal nerve S₂ you would eliminate which of the following?
- a. somatic motor output
 - b. somatic sensory input
 - c. parasympathetic motor output
 - d. sympathetic motor output
 - e. a and b
 - f. a and c
 - g. a and d
 - h. a, b and c
 - j. a, b and d
 - k. a, b, c and d

Section 6: Short answer/drawing

39. In the space provided draw and label a cross section of the spinal cord and the formation of the spinal nerve (up to and including the division into dorsal and ventral rami) at the level of C₁. (10 points)

Section 7: Multiple Uglies. Circle the letter in front of *each and every correct statement*. Each statement is worth 1 point, and the total question is worth the number of points indicated.

40. Sympathetic Nervous System (5 pts):

- a. The preganglionic neuron of the sympathetic nervous system originates within the lateral horn of the spinal cord.
- b. The preganglionic neuron will exit the spinal cord by the ventral ramus of the spinal nerve, and will enter the spinal nerve and, ultimately, enter the paravertebral sympathetic ganglionic chain.
- c. The preganglionic neuron will exit the spinal nerve by the white communicating ramus in order to enter the paravertebral sympathetic ganglionic chain. The white communicating ramus is found proximal to the gray communicating ramus.
- d. The postganglionic neuron will reenter the spinal nerve by the gray communicating ramus. The gray communicating ramus is found proximal to the white communicating ramus and is also distal to the ventral ramus of the spinal nerve.
- e. Pre-ganglionic neurons of the sympathetic branch of the autonomic nervous system will exit the spinal cord from spinal nerves T₁ to L₂. These nerves will therefore exit from the vertebral column by the intervertebral foramina found inferior to their corresponding vertebrae.

41. Parasympathetic nervous system (4 points)

- a. The parasympathetic nervous system exits via cranial nerves III, VII, IX and X
- b. The parasympathetic nervous system exits from sacral spinal nerves S₂ to S₄
- c. The preganglionic neuron of the part of the parasympathetic nervous system that exits from the sacral spinal nerves originates within the ventral horn of the spinal cord, and the preganglionic neuron will exit the spinal cord by the ventral ramus of the spinal nerve.
- d. Relax – circle the letter “d” and collect one free point.

42. Cardiac anatomy (5 points)

- a. The right atrium is located anteriorly and laterally to the mediastinal surface of the right lung.
- b. The left atrium is found on the base of the heart, and is found mostly on the posterior surface of the heart.
- c. Most of the left ventricle would be found on the posterior surface of the heart when viewed from the anterior surface of the body.
- d. The sinus venarum cavarum of the right atrium has smooth walls, while the atrium proper has rough walls due to the presence of the pectinate muscles.
- e. The smooth portion of the left ventricle is termed the aortic vestibule, while the smooth portion of the right ventricle is termed the conus arteriosus

Section 8: Short-answer. Define the following terms in the space provided. (2 points each)

43. efferent:

44. plexus:

45. ramus: