

# Human Anatomy — Biology 351

## Exam #3

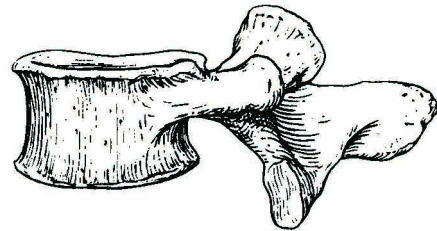
**Please place your name on the back of the last page of this exam.** You must answer *all* questions on this exam. Because statistics demonstrate that, on average, between 2-5 questions on every 100-point exam are ambiguous enough to come out "aberrant" on an item analysis, the total number of points possible on this exam is 104. However, grades will be calculated out of a possible 100 points, assuming that 2 to 3 questions on this exam are aberrant.

**Section 1: True Back Muscles.** If the following statements are true place a (+) in the space provided; if the statement is false place a (O) in the space provided. (2 points each)

- \_\_\_\_\_ 1. All of the muscles of the back are arranged into three layers. The most superficial layer is composed of the muscles of respiration; the second layer is composed of muscles that act upon the upper limb; the third layer of musculature is composed of the true back muscles.
- \_\_\_\_\_ 2. True back muscles are a deep, large and complex group of muscles. *Most* (but not all) of these muscles extend from the pelvis to the skull.
- \_\_\_\_\_ 3. The most superficial layer of true back muscles is the longest and the strongest of all of the true back muscles. The deeper one goes the shorter and weaker the muscles become.
- \_\_\_\_\_ 4. The transversospinalis muscles are the deepest of the true back muscles. These muscles extend the vertebral column and rotate the vertebral column to the opposite side (as compared to the location of the muscles that are contracting). The origin of these muscles is the vertebral spinous process; the insertion is the vertebral transverse process.
- \_\_\_\_\_ 5. The splenius group of true back muscles are found in the neck. They extend the vertebral column and rotate the vertebral column to the same side of the vertebral column (as compared to the location of the muscles that are contracting). These muscles ascend from the cervical vertebrae to attach to the base of the skull.
- \_\_\_\_\_ 6. The intermediate layer of true back muscles is termed the erector spinae muscles. This layer is composed of the iliocostalis muscles, the longissimus muscles and the spinalis muscles. All of these muscles extend the vertebral column and rotate the vertebral column to the opposite side of the vertebral column (as compared to the location of the muscles that are contracting).

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

- \_\_\_\_\_ 7. The spinal cord does not fill the entire length of the vertebral arch, in that the spinal cord only extends from C<sub>1</sub> to L<sub>2</sub> within the vertebral column.
- \_\_\_\_\_ 8. The filum terminale of the spinal cord is a fine thread of nervous tissue that connects the spinal cord to the hiatus of the sacrum.
- \_\_\_\_\_ 9. Both of the images below are of thoracic vertebrae.



- \_\_\_\_\_ 10. The adult vertebral column has four curves: cervical, thoracic, lumbar, and sacral. Of these two are primary curves (which are primarily concerned with counteracting the effects of gravity and, therefore develop after birth) and two are secondary curves (which are not concerned with counteracting the effects of gravity and, therefore develop before birth). The cervical and lumbar curves are secondary curves and the thoracic and sacral curves are primary curves.
- \_\_\_\_\_ 11. Each intervertebral disc consists of an outer laminated (layered) portion of hyaline cartilage termed the annulus fibrosis. The inner core of an intervertebral disc is termed the nucleus pulposus and is composed of a semi-gelatinous substance. The nucleus pulposus loses its ability to absorb water as you age, which accounts for an individual being shorter at age 80 than they were at age 40.
- \_\_\_\_\_ 12. Every vertebra has two superior articulating processes (with their associated articulating facets) and two inferior articulating processes (with their associated articulating facets). A well-trained anatomist can tell what is the superior and inferior surfaces of a vertebra just by looking at the orientation of these structures.

**Go on to the next page for the next set of questions**

**Section 3: Spinal cord (continued)**

13. In the space provided below draw and label the cross section of the spinal cord and the formation of the spinal nerve that would be found exiting the vertebral column at a level immediately inferior to vertebra L<sub>2</sub>. The drawing has to include to the formation of the dorsal and ventral rami. (10 points)

**Section 4: Brachial plexus.**

14. In the space provided draw and label the brachial plexus and indicate the muscles innervated by each nerved. (10 points)

**Section 5: Autonomic Nervous System**

Circle the letter in front of any and all correct statements. (Each choice is worth 1 point)

15. The sympathetic nervous system. (8 points)

- a. The sympathetic branch of the autonomic nervous system exits the spinal cord between T<sub>1</sub> and L<sub>2</sub>.
- b. The preganglionic neuron of the sympathetic nervous system originates in the lateral horn of the gray matter of the spinal cord.
- c. The preganglionic neurons of the sympathetic nervous system are short and myelinated.
- d. The postganglionic neurons of the sympathetic nervous system are long and unmyelinated.
- e. Preganglionic neurons of the sympathetic branch of the autonomic nervous system exit the spinal nerve by the white communicating ramus and enter the paravertebral sympathetic ganglionic chain that lies on both sides of the vertebral column.
- f. Not all preganglionic neurons synapse with the postganglionic neuron within the ganglionic chain.
- g. All spinal nerves possess a gray communicating ramus which allows the postganglionic neuron of the sympathetic nervous system to enter the spinal nerve.
- h. Not all spinal nerves possess a white communicating ramus.

16. The parasympathetic nervous system (4 points)

- a. The parasympathetic branch of the autonomic nervous system exits the spinal cord between S<sub>1</sub> and S<sub>3</sub>.
- b. The preganglionic neuron of the parasympathetic nervous system originates in the lateral horn of the gray matter of the spinal cord.
- c. The preganglionic neurons of the parasympathetic nervous system are long and unmyelinated.
- d. The postganglionic neurons of the parasympathetic nervous system are long and myelinated.

**Section 6: Thoracic cavity and structures.** In the following questions circle the letter in front of *any and all* correct statements. Each question is worth the total number of points indicated. (Each choice is worth 1 point)

17. When examining the anatomy of the coronary artery circulation you would note which of the following? (6 points)

- a. The right coronary artery general supplies blood to the right atrium and the right ventricle.
- b. The right marginal branch of the right coronary artery supplies blood to the right atrium, right ventricle and the interatrial septum.
- c. The posterior interventricular branch of the right coronary artery supplies blood to both ventricles and the interventricular septum
- d. In general the left coronary artery supplies blood to most of the right ventricle and most of the left atrium
- e. The circumflex branch of the left coronary artery does not always circle all of the way around to the posterior surface of the heart.
- f. If the left posterior descending branch of the left coronary artery is present it would supply blood to the left atrium and the left ventricle

18. When examining the internal anatomy of the heart you would note which of the following? (4 points)
- The interior of the right ventricle is subdivided into the crista supraventricularis and the aortic vestibule.
  - The interior of the left ventricle would be lacking a crista supraventricularis when compared to the internal anatomy of the right ventricle
  - Both the right atrium and the right ventricle have thicker walls than their counterparts on the left side of the heart
  - Trabecular carnae are found only in the right and left ventricles of the heart.

**Section 7:** *Coronary circulation.* If the following statements are true place a (+) in the space provided; if the statements are false place a (0) in the space provided. (2 points each)

- \_\_\_\_\_ 19. The left coronary artery always has three branches.
- \_\_\_\_\_ 20. If the circumflex branch of the left coronary artery does reach the posterior surface of the heart the left posterior descending coronary artery (also termed the posterior left ventricular branch of the left coronary artery) supplies the left ventricle, left atrium, and right ventricle with blood.
- \_\_\_\_\_ 21. The posterior interventricular branch of the right coronary artery supplies both ventricles, the interventricular septum and both atria with blood.
- \_\_\_\_\_ 22. The anterior interventricular branch of the left coronary artery (also termed the left anterior descending coronary artery) supplies the right ventricle, left ventricle, right atrium and the interventricular septum with blood.
- \_\_\_\_\_ 23. The right marginal branch of the right coronary artery supplies the right atrium, interatrial septum and the left ventricle with blood.
- \_\_\_\_\_ 24. The circumflex branch of the left coronary artery does not always reach the posterior surface of the left side of the heart.

**Go on to the next page to answer the next set of questions**

**Section 8: Think questions about spinal nerves and the autonomic nervous system.**

Answer the following questions utilizing the following key. **Note that the choices do not follow alphabetical order**

- a. Efferent somatic motor activity would be lost
- b. Afferent somatic sensory activity would be lost
- c. Efferent parasympathetic motor activity would be lost
- d. Efferent sympathetic motor activity would be lost.
- e. a & b
- f. a, b & c
- d. a, b, c & d
- e. a & c
- f. a, c & d
- g. b & c
- h. b, c & d
- k. c & d
- m. a, b & d

- \_\_\_\_\_ 25. What neural activity would be lost if you were to cut the ventral ramus of spinal nerve C<sub>1</sub>?
- \_\_\_\_\_ 26. What neural activity would be lost if you were to cut the ventral root of spinal nerve S<sub>3</sub>?
- \_\_\_\_\_ 27. What neural activity would be lost if you were to cut the dorsal ramus of spinal nerve T<sub>10</sub>?
- \_\_\_\_\_ 28. What neural activity would be lost if you were to cut the spinal nerve immediately distal to the union of the dorsal and ventral roots of spinal nerve L<sub>3</sub>?
- \_\_\_\_\_ 29. What neural activity would be lost if you were to cut both the dorsal and ventral rami of spinal nerve C<sub>6</sub>?
- \_\_\_\_\_ 30. What neural activity would be lost if you were to cut spinal nerve T<sub>2</sub> immediately proximal to the gray communicating ramus?
- \_\_\_\_\_ 31. What neural activity would be lost if you were to cut the dorsal root of spinal nerve C<sub>2</sub>?
- \_\_\_\_\_ 32. What neural activity would be lost if you were to cut the spinal nerve immediately distal to the gray communicating ramus of spinal nerve C<sub>2</sub>?

**Go on to the next page and to answer the next set of questions**

**Think question. (10 points)**

33. You are a fourth-year medical student working in the E.R. An ambulance pulls in and the patient is wheeled into observation room #4. You, a first-year E.R. resident, and the head E.R. physician attend to the patient. The patient is significantly agitated and keeps saying “my heart, my heart.” After vital signs are taken the patient is wheeled into the imaging suit and administered a radio-opaque dye so the coronary arteries could be visualized. As you, the first-year resident and the head E.R. physician view the results of the test the head E.R. makes the following observations:

- All atrial branches appear normal
- The posterior interventricular branch of the RCA (right coronary artery) appears normal
- The anterior interventricular branch of the LCA (left coronary artery) appears normal
- The patient has no left posterior interventricular branch of the LCA

The head physician of the E.R. asks both of you the following question: What areas of the heart are not being perfused with the appropriate amount of blood?

Answer the head physician’s question and provide your anatomical reasoning in the space below.