# Anatomy
## Science Olympiad – Division B

**Description:**   Anatomy is set up as a typical laboratory practical with stations set up around the room.  Students are required to know the basic anatomy of various human body systems and how they are affected by disease and by drugs. Process skills may include making observations, inferences, predictions, calculations, data collection, analysis, and conclusions.

**Event Parameters:**   Each team may have up to two members.

Teams may bring non-programmable calculators.

No resources are allowed.

**Coverage:**   This event covers the Nervous System and the Circulatory System.

This event consists of 10 stations of 4-6 questions each (50 questions total).

Selected questions will be used as tie-breaker questions.  These questions are indicated on the question sheet and highlighted on the answer key.

**Event Execution:**

1) Set up the stations at various places around the room.  Include the question sheet at each station.

2) In some cases, diagrams are included on the question sheet.  It is acceptable to substitute models (if available) where appropriate.

3) You may allow all teams to enter at once, or stagger their entry.  This is based on how many teams are competing at each time period.

4) Hand each team an answer sheet upon entry into the room.  Emphasize to them to include both their school name and team member names on their answer sheet.

5) Allow 3 minutes at each station.  Event supervisor should keep time and direct the teams to rotate at the appropriate time.  If there are more than 10 teams competing, have teams rotate in the cycle as others rotate out.

**Event Provided by South Carolina**

1._____

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**10.**_____

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**15.**_____

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36._____

**37.**_____

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39._____

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47._____

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50._____

**STATION A:**         **Valves of the heart.**

Questions 1-4.  Starting with a drop of blood in the right atrium of the heart, list **in order** the valves of the heart that this drop of blood would pass through as the heart beats.

5. During each heartbeat, two sounds can be heard that are often described as "lub-dup" and are associated with the closing of the heart valves.  Indicate one of the valves that you listed in the previous question that closes to produce the first heart sound "lub".

**STATION B:**          **Blood Vessels.**

6. Of the five anatomical categories of blood vessels, which one is designed for exchange of materials like oxygen and glucose?

7. Of the five anatomical categories of blood vessels, which one is composed of three distinct tunics and possesses one way valves?

8. Of the five anatomical categories of blood vessels, which one contains the most smooth muscle?

9. During blood pressure measurement, the sounds are typically auscultated in which blood vessel?

**10 (Tie-Breaker). Caffeine a common component of headache medications.  Explain why in relation to the effect of caffeine on blood vessels to the brain.**

**STATION C:**          **Neurons and Neurotransmitters.**



11

13
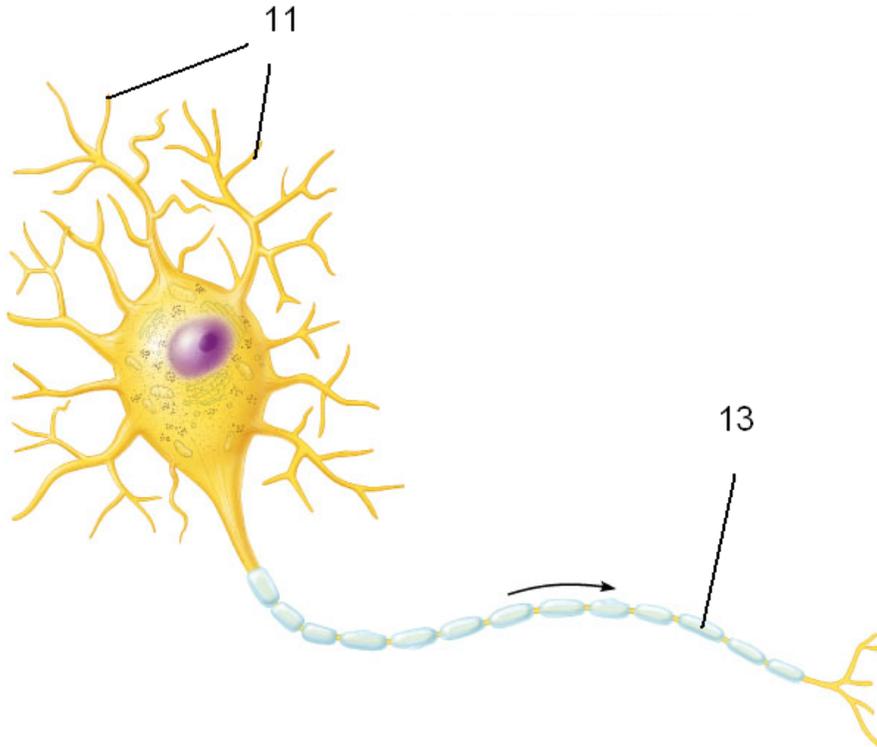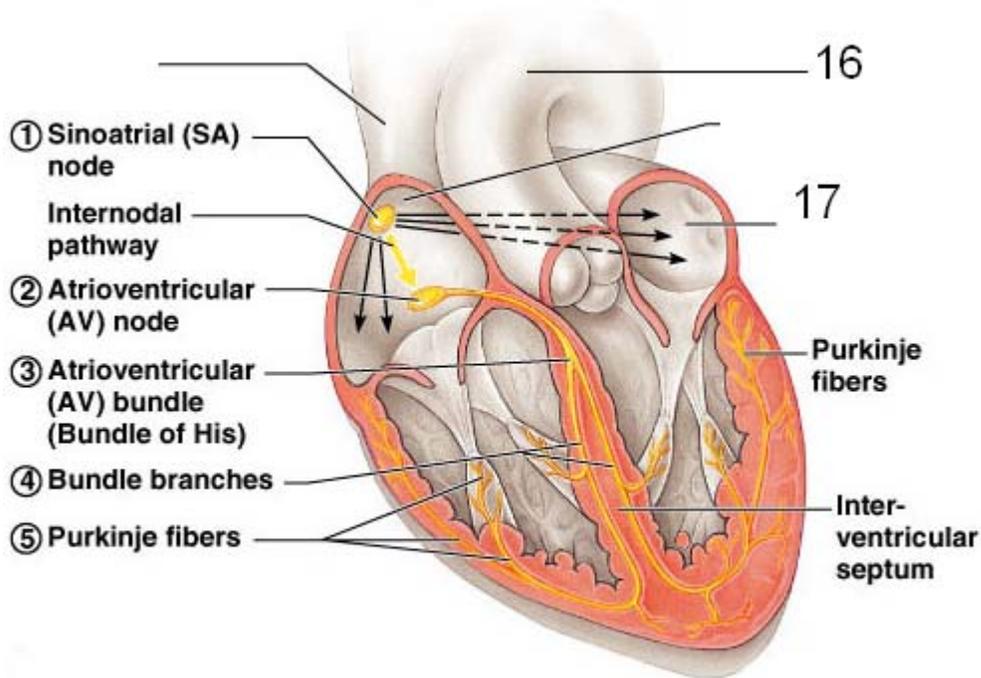
11. Identify these structures associated with the neuron.


12. Do the structures that you identified in Question #11 *receive a signal* from another cell or *transmit a signal* to another cell?


13. Identify this structure associated with the neuron.


14. At the end of the neuron, the signal changes from electrical to chemical as it is passed to an adjacent neuron or an effector.  What is the term used to describe these chemicals that transmit signals from the nerve cell?


**15 (tie-breaker). Briefly describe the paralytic effects of nerve gas.  Be sure to mention the enzyme affected by this agent and what is inhibited by the gas.**

**STATION D:**      **The Heart and Heartbeat.**



① Sinoatrial (SA) node
Internodal pathway
② Atrioventricular (AV) node
③ Atrioventricular (AV) bundle (Bundle of His)
④ Bundle branches
⑤ Purkinje fibers

Purkinje fibers

Inter-ventricular septum

16

17

16. Identify the vessel.

17. Identify the chamber.

18. Which of the items illustrated in the diagram above is the heart's own natural pacemaker?

19. Which of the items illustrated in the diagram above causes a 0.1 s delay in the transmission of the impulse, preventing all chambers of the heart from contracting at once?

20. What is the effect of marijuana on heart rate?

**STATION E:**           **Nervous System Disorders.**

**Question 21-25.  Match each of the disorders below to the correct description:**

**21. Epilepsy**

**22. Multiple Sclerosis**

**23. Alzheimer's Disease**

**24. Lou Gehrig's Disease**

**25. Tay-Sachs Disease**


A. Its scientific name is ALS – Amyotrophic Lateral Sclerosis.


B. Is marked by sudden bursts of electrochemical activity that scramble the brain's messages.


C. Results from an enzyme deficiency leading to an inability of nerve cells to break down lipids.


D. Is caused by autoimmunity.


E. An increased risk of inheriting this disorder results from the inheritance of a gene called apolipoprotein E (APOE).
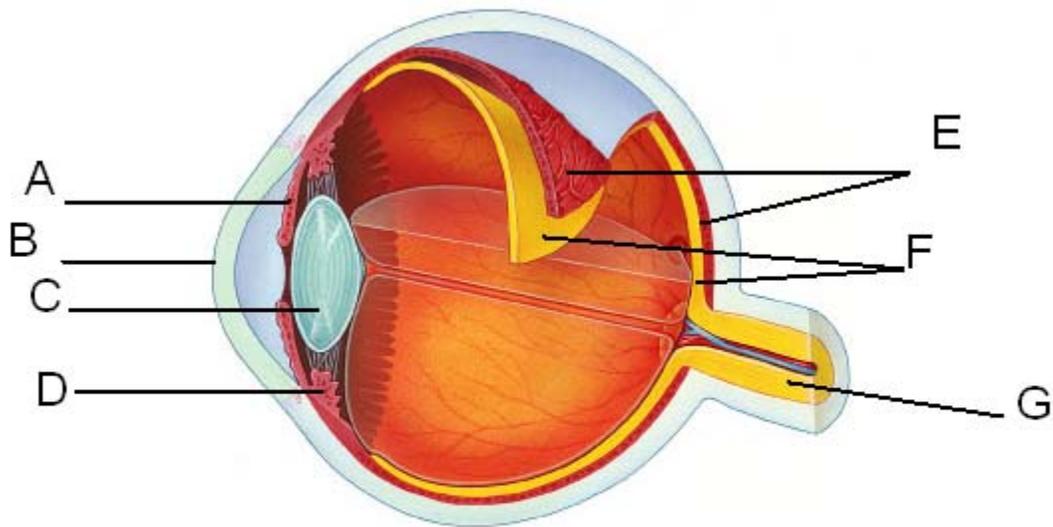
**STATION F:**        **The Brain.**
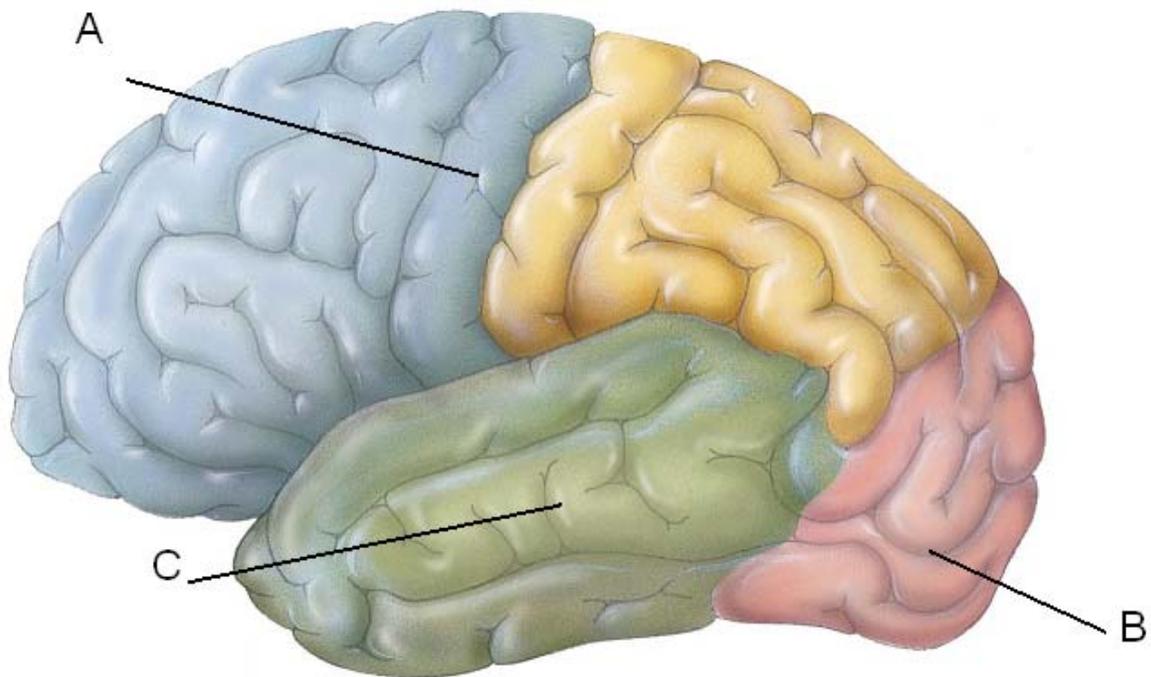
A

C

B

**Refer to the diagram above.**

26. Which labeled area (A,B, or C) is the visual association area?

27. Which labeled area (A,B, or C) is the motor cortex?

28. Which labeled area (A,B, or C) is the auditory association area?

29. Identify the lobe of the brain shaded in green.

30. Identify the lobe of the brain shaded in yellow.

**STATION G:**          **The Eye.**

**Refer to the diagram above.**

31. Which structure (A-G) is most affected by conjunctivitis?

**32 (tie –breaker). Which structure (A-G) is most affected by glaucoma?**

33. Which structure (A-G) is most affected by a cataract?

34. Which structure (A-G) is most affected by iritis?

35. Which structure (A-G) is most affected by retinopathy?

**STATION H:**      **Blood Pressure Measurement.**



**Refer to the diagram above.**

36. Name the blood pressure cuff and meter pictured above.


**37 (tie-breaker). Name the sounds heard by a stethoscope placed on an artery when the cuff is inflated.  These sounds represent the tapping of blood cells against a constricted artery.**



**Questions 38-40.  Consider a person with normal blood pressure.**

38. At which point (A-E) is the first sound heard?


39. At which point (A-E) is the last sound heard?


40. Which point (A-E) represents diastolic blood pressure?

**STATION I:** **The Cardiovascular System.**

41-44.      ___(41)___ is defined as the amount of blood that is pumped by

each ventricle in one minute.  This is determined by two factors:  ___(42)___

and ___(43)___ .  High blood pressure ___(44)___(increases/decreases) the

volume of blood pumped/minute.

45-46. ___(45)___ is defined as the amount of blood that is pumped by one

ventricle with each beat.  High blood pressure ___(46)___

(increases/decreases) volume of blood pumped with each beat.

**STATION J:**          **The Ear.**

47. The cochlea is part of the _____ (outer/middle/inner) ear.

48. The incus is part of the _____ (outer/middle/inner) ear.

49. The auricle is part of the _____ (outer/middle/inner) ear.

50. Motion sickness is due to disturbances within the _____ (outer/middle/inner) ear.

# ANATOMY ANSWER KEY - <span style="color:red">**DO NOT COPY WITH EVENT**</span>

1. tricuspid or right AV valve
2. pulmonary semilunar valve
3. bicuspid or left AV or mitral valve
4. aortic semilunar valve
5. left (bicuspid/mitral) or right (tricuspid) AV valve
6. capillary
7. vein
8. artery
9. brachial artery
**10. dialates them**
11. dendrites
12. receive
13. myelin sheath/Schwann cell
14. neurotransmitters
**15. binds to and inhibits acetylcholinesterase**
16. aorta/aortic arch
17. right atrium
18. sinoatrial (SA) node
19. atrioventricular (AV) node
20. increases
21. B
22. D
23. E
24. A
25. C
26. B
27. A
28. C
29. temporal lobe
30. parietal lobe
31. B
**32. G**
33. C
34. A
35. F
36. sphygmomanometer
**37. Sounds of Korotkoff**
38. A
39. C
40. C
41. cardiac output
42. stroke volume
43. heart rate
44. increases
45. stroke volume
46. decreases
47. inner
48. middle
49. outer
50. inner