

Endocrine

1-15. (15 pts, 1 pt each)

1. Growth hormone (GH)
2. Antidiuretic hormone (ADH / vasopressin)
3. Insulin
4. Parathyroid hormone (PTH)
5. Follicle-stimulating hormone (FSH)
6. Human chorionic gonadotropin
7. Somatostatin
8. Atrial-natriuretic hormone (ANP)
9. Melatonin
10. Prolactin
11. Adrenocorticotropic hormone (ACTH)
12. Cholecystokinin (CCK)
13. Leptin
14. Melatonin
15. Cortisol

16. (2, 1 pt each) Calcitonin and PTH

17. (2) 1 pt for: Stimulates reabsorption of Ca^{2+} (through renal tubules)

1 pt for: Activates conversion Vitamin D to active form

18. (1) Neurotransmitter release, intracellular signaling pathways, dendritic spiking, etc. (Many answers possible).

19. (1) E

20. (1) D

21. (1) E

22. (1) B

23. (1) C

24. (1) D

25. (1) B

26. (1) C

27. (1) E

28. (1) Cholesterol

29. (2) Steroid hormones are fat-soluble (0.5 pts) + fat-soluble molecules cross the plasma membrane easily (0.5 pts). Proteins/amines/peptides are hydrophilic (0.5 pts) and hydrophilic molecules cannot cross the plasma membrane easily (0.5 pts).

30. (2**) C

31. (2; 1 pt each, -0.5pt for each incorrect answer) A, B

32. (2; -0.5 pts for each incorrect answer) B

33. (2; 1 pt each, -0.5pt for each incorrect answer) A, C

34. (2; 0.66 pts each, -0.5 pts for each incorrect answer) A, C, D

35. (1) A

36. (3**) Endothelial cells of blood vessels do not need insulin to uptake glucose (1 pt)

Thus due to increased blood glucose levels in diabetes, they uptake more glucose than normal (1 pt)

Which weakens the lining of the blood vessels by increased surface glycoproteins (1 pt; only needs to mention weakened blood vessel lining)

37. (1) A

38. (1) A

39. (1) B

40. (1) B

41. (1) Pineal gland

42. (1) Parathyroid glands

43. (1) Anterior pituitary

44. (1) Posterior pituitary

45. (1) Anterior pituitary

46. (1) Pancreas

47. (1) Hypothalamus

48. (1) Anterior pituitary

49. (1) Adrenal medulla (no points for "adrenal cortex" or just "adrenal")

50. (1) Hypothalamus

51. (1) F

52. (1) A

53. (1) B

54. (1) C

55. (1) D

Nervous System STATION

STATION: letters will be assigned to these when pinning

- 56. (1) Primary Somatosensory cortex
- 57. (1) Primary Motor cortex.
- 58. (1) Meninges
- 59. (1) Frontal lobe
- 60. (1) Occipital lobe
- 61. (1) Temporal lobe
- 62. (1) Parietal lobe
- 63. (1) Cerebellum
- 64. (1) Corpus Colossum
- 65. (1) Thalamus
- 66. (1) Hypothalamus
- 67. (1) Pons
- 68. (1) Cingulate Gyrus
- 69. (1) Cerebellum
- 70. (1) Ventricle
- 71. (1) Hippocampus
- 72. (1) Corpus Colossum
- 73. (1) Insula
- 74. (1) Globus pallidus

Nervous system written

- 75. (1) **C
- 76. (1) E
- 77. (1) D
- 78. (1) F
- 79. (1) B
- 80. (1) E
- 81. (1) B
- 82. (1) B
- 83. (1) E
- 84. (1) A
- 85. **(1) C
- 86. (1) A
- 87. (1) C
- 88. (1) F
- 89. (1) Accept -90 to -60 mV
- 90. (1) Accept +10 to +40 mV
- 91. (1) 1 ms
- 92. (1) B
- 93. (1) C
- 94. (1) C
- 95. **(1) C

96. (1) B many cells, as occurs with many interneurons.
97. (1) A
98. (1) B
99. (2) If the action potential is initiated at the distal end of the axon, or anywhere in the middle
100. (2)
- 1pt for “Yes, if the action potential is initiated in the middle of the axon.”
 - 1pt for explanation: “because **voltage gated sodium channels are not inactivated** either distally or proximally from the site of action potential generation, and **can thus be recruited** to propagate the action potential in either direction.”
101. (2) 1 pt: Electrical synapses are physically coupled cells – channels allow ions to flow freely between the two cells. 1 pt: Chemical synapses = the cells are separated by a synaptic cleft; ions cannot directly flow.
102. (2) Chemical synapses allow neurons to modulate the signal (1 pt if just say “modulate”, full credit if give example: to adjust the gain, to change the sign, etc.). Or, signal computation via summation of both excitatory and inhibitory inputs.
103. (2) Electrical synapses are the fastest way to propagate a signal. Or, can couple the membrane potential of
104. (2, 0.5 pt for each answer in the correct location) III, II, IV, I
105. (1) D
106. (1) D
107. (1) A
108. (1) B
109. (1) 1. A
110. (1) D
111. (1) F
112. (1) H
113. (1) B
114. (1) Accept 0.5-4 Hz
115. (1) B
116. (1) B
117. (1) D
118. (1) Acetylcholine
119. (2) Sympathetic ganglia are located close to the spinal cord, whereas parasympathetic ganglia are located close to the target organ
- Also accepted: Sympathetic ganglia arise from thoracic and lumbar regions of the spinal cord, whereas parasympathetic ganglia receive input

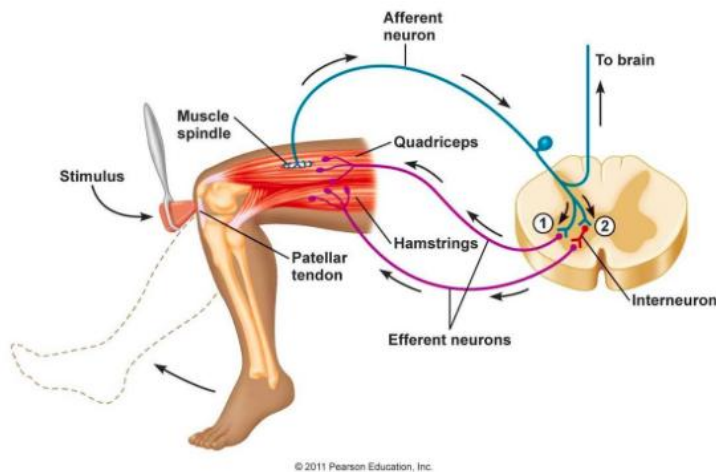
from cranial nerves and sacral regions of the spinal cord.

Sense organs

- 120. (1) E
- 121. (1) C
- 122. (1) B
- 123. (1) D
- 124. (1) H
- 125. (1) F
- 126. (1) I
- 127. (1) C
- 128. (1) H
- 129. (1) A
- 130. (1) H

- 131. (1) E
- 132. (1) A
- 133. (1) C
- 134. (1) C
- 135. (1) A
- 136. (1) C
- 137. (1) C
- 138. (1) A
- 139. (1) B
- 140. (2) 1 pt each: A, E
- 141. (1) B
- 142. (6) see diagram on left

- a. 1 pt: muscle spindle receptor in quadriceps
- b. 1 pt: sensory neuron cell body in DRG outside spinal cord
- c. 1 pt: synapse onto motor neuron in spinal cord
- d. 1 pt: motor neuron cell body in gray matter of spinal cord
- e. 1 pt: motor neuron output synapse into quadriceps
- f. 1 pt: inclusion of the



- interneuron / hamstring circuit component
143. (1) G
144. (1) B
145. (1) A
146. (1) E
147. (1) I
148. (1) H
149. (1) D
150. (2**)
- a. 1 pt: Retina is “backwards” layered, with photoreceptors in deeper layers and RGCs on the surface
- b. 1 pt: So when RGCs send axons to brain, they need to pass through the retina, including through the photoreceptor layer
151. (1) B
152. (1) D
153. (1) A
154. (1) **C
155. (1) B
156. (2) In darkness, rods are depolarized, whereas the presence of light hyperpolarizes the rod.
157. (1) C
158. (1) B
159. (1) E
160. (1) D
161. (1) E
162. (4)
- a. Resonance frequency: the frequency at which a system vibrates with the largest amplitude (1)
- b. Determined by physical properties of the system (1)
- c. The basilar membrane has different mechanical properties along its length → each part has a different resonant frequency (1)
- d. This creates a “frequency map” that allows the brain to determine which frequencies are being heard based on which part of the basilar membrane is vibrating most (1)
163. (1) Stereocilia
164. (1) E
165. (1) Stereocilia in cochlea lose the kinocilium (one tallest stereocilia) in adult mammals.
- a. OR, in the cochlea, bending of stereocilia in one direction causes depolarization; in the other direction causes nothing. But in vestibular structures, bending in the other direction leads to hyperpolarization.
166. (1) A

167. (1) C
168. (1) C
169. (1) Oval window
170. (1) B
171. (1) 7
172. (1) 2
173. (1) 1
174. (1) 6
175. (1) C
176. (1) B
177. (1) D
178. (1) F
179. (1) H
180. (1) A
181. (1) D
182. (1) C
183. (1) B
184. (1) D
185. (3, 1 pt each) A, D, E
186. (1) Seven
187. (1) D
188. (2) I, V, III, II, IV
189. (2) E
190. (1) B
191. (1) C
192. (1) D
193. (1) C
194. *(1) A
195. (1) C
196. *(1) C
197. (1) A
198. (2) 1 pt: Virus is dormant in dorsal root ganglion cells.
1 pt: Virus travels through axons to reach skin.
199. (2)
a. 1 pt similarity: both have difficulty with speech
b. 1 pt difference: Broca's lesions cause very slow, labored speech
Wernicke's lesions cause very proliferative speech that doesn't make much sense
200. (1) E
201. (1) D
202. (1) A
203. (1) C
204. (1) C
205. (2) 1 pt. each, including
a. Decreased cortical gray matter
b. Enlarged ventricles

- c. Atrophy of temporal lobe
especially hippocampus