CIRCULATORY SYSTEM BASICS

1. The circulatory system includes components of _____ and _____ systems.
2. What are the functions of the circulatory system?
3. What is the most basic function of the lymphatic system?
4. What is circulation that supplies all organs except the lungs?
5. Oxygenated blood from the lungs travel in the _____ into the _____.
6. Ventricles receive blood from _____. Atria from _____.
7. Resistance in the _____ is greater than the _____.
8. Give the order of conduction in the heart.
9. Myocardial cells are _____, _____, and interconnected by _____.
10. What is the muscle that forms the entire chamber called?
11. Why are the four chambers of the heart separated by nonconductive tissue?
12. What are the processes involved in electrical activation of the heart?
13. What cell has continuous spontaneous depolarization?
14. What is the order of AP transmission in the heart?

CARDIAC ACTION POTENTIALS

15. What cells conduct a fast response AP?
16. What cells conduct a slow response AP?
17. Changes in membrane potential in cardiac cells is determined by ____, ____,
18. What ions are in high concentration outside of the cell?
19. The electrostatic contribution gives us _____.
20. The plateau signifies what?
21. G_x stands for what?
22. The depolarization period between ____mV & ____mV in the SA node is known as the _____.
23. What are the three factors of SA node pacemaker potential/automaticity?
24. cAMP hyperpolarizes this crucial I_F channel for the pacemaker potential to occur. What is it?
25. SA node diastolic depol. occurs faster when exposed to ____ & ____ resulting in more ____.
26. Spontaneous phase 4 depolarization in non-SA node myocardial cells is called _____.
27. Myocardial cells are depolarized from their resting potential of ____mV by the _____.
28. What conditions may result in an ectopic pacemaker?
29. What produces the upstroke in Myocardial APs?
30. At what voltage does the long plateau occur and for how long in Myocardial APs?
31. The AV node has a _____ conduction rate, while the Purkinje fibers have a _____ rate.
32. When does ventricular contraction occur n comparison to atrial contraction?
33. The heart is stimulated by the _____ center, while it is inhibited by the _____ center.

34. Depolarization of myocardial cells results in what chain of events?
35. The P wave is caused by _____.
36. The QRS complex is caused by _____.
37. The T wave is caused by _____.

FAST RESPONSE CARDIAC POTENTIAL

38. Fast response cells have a _____ duration. Gives the times for each type.
39. Atrial, ventricle, and purkinje cells have _____.
40. Describe Phase 0.
41. Phase 1 is a brief period of _____ by closure of _____ and opening of _____.
42. What drives the K^+ out of the cell in phase 1?
43. What does Tetrodotoxin block and when?
44. Phase 2 sees an increase in _____ producing a(n) _____ via _____ channels.
45. Genesis of the plateau occurs when? What causes it?
46. A high resting Potassium conductance occurs during what phase?
47. What does the L stand for with calcium channels?
48. During Phase 2, the calcium influx may induce what?
49. Ca^{2+} conductance (___) may be enhanced by the stimulation of Sympathetic neurons via ____.
50. Upon the β-adrenergic receptor activation, what chain of events may occur?
51. What may diminish G_{ca}?
52. What are some possible pharmaceutical calcium channel blockers?
53. What occurs during phase 3 of a fast response cardiac cycle?
54. What occurs during phase 4 of a fast response cardiac cycle?
55. When is sodium conductance the highest? Calcium?
56. What are the regulators of ionic concentration restoration?
57. What does the Na^+ K^+ ATPase do and when?
58. What does the Na^+/Ca^{2+} exchanger protein do and when?
59. What is the Na^+ K^+ ATPase pharmaceutical blocker?

SLOW RESPONSE CARDIAC POTENTIAL

60. What phases are non-existent in SRCP?
61. What causes the upstroke during phase 0?
62. What occurs during phase 3 of a slow response cardiac cycle?
63. What occurs during phase 4 of a slow response cardiac cycle?
64. What keeps the pacemaker channels open for diastolic depolarization?
65. What turns on the I_f? Why is this important?

CARDIAC CYCLE

66. Systole refers to the _____ and systolic pressure is the _____.
67. What heart chambers contract in tandem?
68. When do the ventricles contract?
69. Describe ventricular filling.
70. What occurs during ventricular systole?
71. What phase of ventricular systole opens the semi-lunar valves? When does it occur?
72. What is isovolumetric contraction?
73. During _____, all valves close and the ventricles undergo _____.
74. What occurs during atrial systole?
75. What is the Dicrotic notch?
76. When does the heart sounds occur?
77. What causes the semilunar valves to close?
78. _____ is the volume of blood in the ventricles at the end of diastole (____ml).
79. What is stroke volume?
80. What is the end-systolic volume?
81. What is cardiac output?
82. Cardiac output is the product of _____ and _____.
83. _____ is the difference between resting and maximal Cardiac Output.
84. What are the factors that affect stroke volume?
85. The Fick principle uses what law?
86. What is the equation of the Fick Principle?
87. What is the preload?
88. What is contractility?
89. What is afterload?
90. What is the ejection fraction?
91. What is states that strength of ventricular contraction varies directly with EDV?
92. What is the intrinsic property of the myocardium?
93. Increased contractility can be caused by _____ stimulation.
94. What clinical actions would reduce stroke volume?
95. What is velocity of blood flow?
96. Blood flow is measured in _____ and is equivalent to _____.
97. What is blood pressure?
98. How is BP measured?
99. What drives blood around the vascular system?
100. What is peripheral resistance?

101. What are the three primary sources of resistance? It is described by what equation?
102. Which of the resistance factors readily changes?
103. The steepest change in BP can occur in the _____.
104. Arterial BP reflects two factors of arteries close to the heart. What are they?
105. BP in elastic arteries near the heart is _____.
106. What is systolic blood pressure? Diastolic?
107. What is pulse pressure?
108. What is mean arterial pressure?
109. What is the capillary blood pressure range?
110. Why is low blood pressure favorable?
111. The venous blood pressure is _____.
112. Since venous blood pressure is steady, how does a lesion differ from an artery cut?
113. What are the main factors determining blood pressure?
114. The 1st sound, a.k.a. _____, is produced by the closing of the _____.
115. The 2nd sound, a.k.a. _____, is produced by the closing of the _____.
116. What are heart murmurs?
117. What are two common causes of heart murmurs?
118. What is mitral stenosis?
119. If blood accumulates in the left ventricle, what may occur?
120. Damaged papillary muscles may lead to _____ valves, meaning they _____.
121. What are septal defects and what is their usual source?

REGULATION OF HEART RATE

122. Mechanisms that affect cardiac rate are called _____.
123. Sympathetic nerves will release ___ & ___ opening _____, and thus depolarizing SA node.
124. Parasympathetic nerves release ____ opening _____, and thus _____ depolarization.
125. The HCN channels (I_f) are stimulated by _____, and allow ___ to enter the cell.
126. What coordinates the activity of autonomic innervations?
127. A shortened pacemaker potential yields a(n) _____ heart rate.
128. What direction does the K^+ go when Ach stimulates the cell?
129. Sympathetic fibers on atrial and ventricle muscles can result in _____.
130. Sympathetic fibers on the AV node may result in what? Parasympathetic?
131. _____ is phosphoralated and then activates the _____ to restore a resting muscle state.
132. Where are the stretch receptors, a.k.a. _____, located?
133. As the walls stretch, baroreceptors conduct __ to the ____ & ____ of the medulla oblongata.
134. What is the baroreceptor reflex most sensitive too?

135. What is the Atrial (Bainbridge) reflex?
136. What does the atrial reflex stimulate?
137. In an attempt to reduce BP, _____ may occur to reduce BP and blood flow.
138. The baroreceptor reflex attempts to _____ the HR.
139. Increases in blood volume inhibits _____ and promotes secretion of _____.
140. What hormones may increase heart rate?
141. What must be maintained for normal heart function?
142. What are the neural controls of peripheral resistance?
143. What is utilized in the neural control
144. Vasomotor activity can be modified by what?
145. What are chemoreceptors sensitive too?
146. What is the vasomotor center?
147. What is the cardiovascular center?
148. If BP is increased, what will attempt to lower it and how?
149. If BP decreases to much, what will attempt to raise it and how?
150. Where are the prominent chemoreceptors located?
151. What are the higher brain centers that can modify BP via the medulla?
152. What chemicals decrease BP?
153. What chemicals increase BP?
154. BP can be regulated by what long term mechanism?
155. Give the order of production on the Renin-angiotensin mechanism.

DIGESTIVE SYSTEM BASICS

156. _____ is the assimilation, storage, and synthesis of food molecules.
157. _____ is the mechanical and chemical breakdown of food materials.
158. What is the order of hydrolysis breakdown for carbohydrates?
159. What is the order of hydrolysis breakdown for fats?
160. What are the accessory organs of the digestive system?
161. What is the organization of the GI tract?
162. Salivary glands get their primary neural control from what system?
163. What are the components of the alimentary tract?
164. Digestion in the stomach is started by what two things?
165. Where is the submucosal plexus found? The Myentric plexus?
166. What are the mediators of the serous acinar cells?
167. Describe the cholinergic control mechanism during salivation.
168. Describe the adrenergic control mechanism during salvation.

169. PIP_2 → ____ & ____ . What does the primary product do?
170. What are the means of GI tract motility?
171. Where does it occur and what is segmentation?
172. Endocrine glands discharge their products where?
173. What are the exocrine GI tract secretions?
174. What does HCO^-_3 do?
175. The endocrine secretions tend to be _____.

GASTROINTESTINAL TRACT FUNCTIONS

176. The regulation of gastrointestinal tract functions is controlled by _____.
177. Hormones are produced by _____ and released into the _____.
178. Neurocrines are produced by _____ and act _____ on the target cell.
179. Paracrines are produced by _____ and act _____ on the target cell.
180. What does the GI tract secrete?
181. Where are endocrine cells located?
182. What do paracrine substances regulate?
183. What is the long reflex?
184. What is the short reflex?
185. What are the plexuses of the short reflex?
186. Sympathetic innervations of the GI tract reduces _____ and _____.
187. Parasympathetic postganglionic neurons are _____ and _____.
188. What does the Vagus nerve innervate?
189. What does the Pelvic nerve innervate?
190. What has the ability of directing all GI tract functions if needed?
191. Myenteric neurons control _____ and are located between the _____ and _____.
192. The excitatory neurons of the myenteric plexus are stimulated by _____ and _____.
193. The inhibitory neurons of the myenteric plexus are stimulated by _____ and _____.
194. Submucosal neurons control _____, _____, and _____ functions of the GI tract.
195. The resting membrane potential of GI tract cells oscillates in slow waves do the the _____.
196. Gastrointestinal smooth muscle cells have a _____ compared to other _____.
197. What causes the rising phase of GI smooth muscle Action potential?

STOMACH & PANCREAS

198. What cells of the stomach are impermeable to HCL?
199. The alkaline mucus that protects the stomach contains _____ and is secreted by _____.
200. _____ inhibit gastric secretions.

201. To protect the stomach, epithelial cells have _____ and a _____.
202. In addition to a mucus secretion, what secretion protects the stomach lining?
203. Mucin is a _____.
204. Why are carbohydrates no longer digested in the stomach?
205. What are the physiological agonists of gastric acid HCL secretion?
206. The HCL agonists, which are collectively known as _____, bind to _____.
207. What is the function of the stomach?
208. What do goblet cells secrete?
209. What do parietal cells secrete?
210. What do chief cells secrete?
211. What do enterochromaffin-like cells secrete?
212. What do g-cells secrete? D-cells?
213. What does HCL do in the stomach?
214. When the H^+ and Cl^- are produced, what is the by produce placed into the blood capillary?
215. What allows the Cl to enter the lumen in exchange for the Carbonate?
216. The H^+ is secreted in response to what hormone and neurotransmitter?
217. When Histamin binds to parietal cells _____ results in H release.
218. When gastrin and Ach bind to parietal cells _____ results in H release.
219. What is the endocrine function of the pancreas?
220. What is the exocrine secretions of the pancreas?
221. What are the four pancreatic juices?
222. How do Ach, CCK/Gastrin, & Substance P lead to increased enzyme secretion?
223. How does secretin/vip lead to increased enzyme secretion?

INTESTINES

224. Primary absorption of food occurs in the _____ and is facilitated by its _____.
225. What enzyme, which (*is/is not*) secreted into the lumen, is attached to microvilla?
226. The microvilla attached enzymes are exposed to _____.
227. Sugar digestion via sucrase digest sucrose to _____.
228. Sugar digestion via lactaste digest lactose to _____.
229. Sugar digestion via maltase digest maltose to _____.
230. What are the peptidase enzymes?
231. What do aminopeptidases produce?
232. What do enterokinase do? Deficiency of enterokinase results in what?
233. What are needed for absorption of calcium and are regulated by Vitamin D?
234. What does alkaline phosphatase do? What may it be regulated by?

235. Although it has no digestive function, the large intestine absorbs ___, ___. ___, ___, and ___.
236. Although the LI surface lacks _____, it does have a _____ which produce ____,____, and ___.
237. The intestine bacteria produce fatty acids from the fermentation of what substance?
238. Although the SI absorbs more water overall, the LI absorbs _____.
239. Water absorption in the LI begins with the _____ set up by _____.
240. What stimulates water and salt reabsorption?
241. What occurs via active transport of NaCl?
242. The defecation reflex begins with the relaxation of what?

KIDNEY, LIVER, GALL BLADDER

243. Digested food is first delivered to the _____ via the _____.
244. What is the recirculation of compounds released thru bile back into the liver from the SI?
245. What are the functions of the liver?
246. Bile pigment, aka _____, is produced in the _____, _____, and _____.
247. When bilirubin combines with _____, it forms _____, which is the actual bile secretion.
248. What is urobilinogen?
249. Bile acids emulsify _____, increase surface area for _____, and form _____.
250. Bile acids are produced from what substance?
251. What is the purpose of micelles?
252. When are gall stones formed?
253. Bilirubin is bound to _____ in plasma.

DIGESTION AND ABSORPTION

254. Pancreatic amylase converts starch to _____, which are hydrolyzed by _____.
255. What do the endopeptidases do in the SI and give 3 examples.
256. What do the exopeptidases do in the SI and give 3 examples.
257. What is the result of protein digestion in the SI?
258. Pancreatic lipase hydrolyzes _____ into _____ and _____.
259. Phosopholipase A breaks down _____ into _____ & _____.
260. When fatty acids and monglycerides dissolve into micelles they become known as _____.
261. Once FA's, monoglycerides, & lysolecithin enter the epithelial cells what occurs to them?
262. What are VLDL's made by, where, and for what purpose?
263. LDL's transport _____. HDL's transport _____.
264. Ca^{+} is absorbed in the _____ & ____ stimulates its absorption by activating the _____.
265. What binds Calcium to the inner surface of the brush border membrane?
266. _____ stores Iron. _____ passes iron to transferrin receptors. Transferrin _____.