RESPIRATORY SYSTEM BASICS

1. What is external respiration?
2. What is internal respiration?
3. What is the process in which Oxygen is transported into the blood?
4. No gas exchange occurs the _____ zone. Give the components of this zone.
5. The _____ is the site of gas exchange. Give components of this zone.
6. What are the three major functions of the lungs?
7. What does the conducting zones do to inspired air?
8. What helps to clean the inspired air?
9. What area does the diaphragm underline?
10. The _____ covers the lungs; the _____ lines the thoracic cavity walls.
11. What is the thin fluid layer between the two lung coverings.
12. What is the purpose of the pleura?
13. What is the gas exchange unit?
14. The membranes between alveoli allow for _____.
15. What cell in the lungs are majorly responsible for gas exchange?
16. What do type 2 cells produce?
17. What is bronchial circulation?
18. Pulmonary arteries branch profusely ultimately feeding into the _____.
19. What is carried in the pulmonary vein?
20. The bronchial arteries enter the lungs where? What tissue does it supply?

LUNG PRESSURE

21. What is intrapulmonary pressure?
22. What is the change of intrapulmonary pressure during inspiration & expiration?
23. What keeps our lungs inflated?
24. If the Transpulmonary pressure during inspiration is +3, what is the intrapleural pressure?
25. If the Transpulmonary pressure during expiration is +6, what is the intrapleural pressure?
26. Intrapleural pressure is always less than _____.
27. Using boyle's law (volume inverse of pressure), what occurs when lung volume increases?
28. Ease of lung to expand with pressure (↑ volume with ↑pressure) is _____.
29. What is the tendency to return to initial size after distention? When is this tension the lowest?
30. What is surface tension?
31. What is the law of Laplace?
32. What causes surface tension to rise within the lungs?
33. What are surfactants made of?

BREATHING

34. Quiet breath occurs primarily do to the diaphragm _____.
35. What contractions increase the thoracic volume laterally during quiet breathing?
36. During quiet breathing, expiration is primarily due to _____.
37. What muscles are additionally recruited during deep breathing for vertical expansion?
38. What muscles are additionally recruited during deep breathing for expiration?
39. What is the resting intrapulmonary pressure?
40. What instrument measures respiratory functions?
41. What is an increased airway resistance? Give an example.
42. Restrictive disorders are a reduction in _____ from _____ or _____ lung changes.
43. Give an example of a restrictive disorder.
44. What is tidal volume (TV) and it's usual volume?
45. What is inspiratory reserve volume (IRV) and it's usual volume?
46. What is expiratory reserve volume (ERV) and it's usual volume?
47. What is residual volume (RV) and it's usual volume?
48. What is inspiratory capacity (IC)?
49. What is the Law of Laplace in mathematically form?
50. What is residual capacity (RC)?
51. What is vital capacity (VC) and it's usual volume?
52. What is the usual volume of total lung capacity?
53. _____ is the volume of the airways and lungs that does not participate in gas exchange.
54. What is the anatomical dead space?
55. What is the functional dead space? Give another name.
56. What is physiological dead space? Give another name.
57. What is total ventilation?
58. What is perfusion?
59. The ventilation-perfusion ratio is the ratio of _____.
60. What is the normal ventilation-perfusion ratio?
61. Pulmonary ventilation can be calculated with _____ by _____, which is normally about ____.
62. Alveolar ventilation can be calculated by _____.
63. A normal breath has an alveolar ventilation of _____; a shallow breath _____?
64. Obstructive diseases may raise what pulmonary function results?
65. Restrictive diseases may reduce what pulmonary function results?

FACTORS AFFECTING GAS EXCHANGE

66. What is partial pressure?

67. What is Dalton's law?
68. When does O_2 dissolve in the blood the best?
69. What provides a good index of lung function?
70. Why does Billy Goat Smith get less oxygen in the Alps?
71. What is the normal PO_2 of arterial blood? Of systemic blood?
72. What is the normal PCO_2 of systemic blood?
73. What in the CNS controls automated breathing?
74. Bronchial tone is controlled by the _____. Specifically _____ for relaxation.
75. What are the major factors of gas exchange?
76. What inhibits the inspiratory neurons?
77. _____ modify ventilation to maintain normal CO_2, O_2, and pH levels.
78. Hyperventilation results in _____. This is known as _____.
79. Surprisingly, low blood _____, a.k.a. _____, has little affect on ventilation.
80. Each hemoglobin compound can carry _____.
81. What is a heme combined with CO_2? Heme with a O_2?
82. Which bond is greater? Oxygen w/ heme, or CO_2 w/ heme?
83. Affinity of O_2 reduces when _____ or _____. This is known as the _____.
84. On the oxyhemoglobin dissociation curve, a shift to the right represents a _____.
85. What is 2,3 Diphosphoglycerate (DPG)?
86. During what condition do RBCs tend to produce more DPG?
87. What is fetal hemoglobin (HbF)?
88. The red pigmented Myoglobin is found exclusively in _____.
89. Mb bonds with _____ and has a _____ for O_2 than hemoglobin.
90. Due to Myoglobin's extreme affinity, it shifts the curve _____ and only release O_2 at a _____.
91. What is the principle purpose of Myoglobin?

CO_2 TRANSPORT AND ACID-BASE BALANCE

92. How is carbon dioxide most commonly transported in blood?
93. How is H_2CO_3 produced?
94. H_2CO_3 is cleaved into ____ and ____.
95. Because of the HCO_3, RBC's become _____ charged, resulting in a _____.
96. The reverse chloride shift occurs where?
97. How is CO_2 formed so that it may be breathed out?
98. O_2 binds to hemoglobin in a _____ curve.
99. What organs maintain Blood pH? What is the normal blood pH?
100. Excess __ is buffered by _____, the most important blood buffer.

101. How is excess hydrogen released from the body?
102. What are the two major classes of acids in the body?
103. What is acidosis? What is alkalosis?
104. What is respiratory acidosis caused by? What does it result in?
105. Hyperventilation may result in _____.
106. Too much HCO_3^- or too little nonvolatile acids result in _____.
107. Metabolism of Lysine/Arginine yields _____. Asparate/Glutamate yields _____.
108. The bicarbonate buffer is properly known as the _____.

RENAL BASICS

109. The kidneys regulate _____ thus maintaining homeostasis.
110. The kidneys regulate _____ for cell volumes, especially of the cardiovascular.
111. What is the process of emptying the urinary bladder? Of what system is it a reflex of?
112. Actions of the int. and ext. urethral sphincters are regulated by the _____.
113. What are the two steps of Micturition?
114. Filling of the bladder activates _____ that in turn activate _____ neurons.
115. When the _____ contracts, the _____ relaxes promoting the urge to urinate.
116. Voluntary control of urination is provided by what muscle?
117. What is found in the renal cortex?
118. The pyramid in the renal _____ contains _____ which unite to form the _____.
119. What is the functional unit of the kidney?
120. What does the afferent arteriole become once it enters the glomerular capsule?
121. The efferent arteriole branches into the _____ which produces what vascular loops?
122. The vasa rectra ascend into the _____ to become the _____.
123. The capillaries of the glomerulus are covered by _____, beyond which is the _____.
124. What modified smooth muscle cells synthesize, store, and release renin?
125. What are the major functions of the kidney?
126. Regulation of body fluids osmolality and volumes are done via what three systems?
127. Permeability of the _____ is completely under the control of ADH.
128. What are the electrolytes?
129. Reabsorption of salt _____ blood volumes and pressure because _____.
130. What hormones control the kidneys re-absorption of sodium and excretion of potassium?
131. Urea is produced from _____. Uric acid is produced from _____.
132. In the basic terms, if blood is too acidic _____ is excreted and _____ is reabsorbed.
133. Renin activates the _____ which helps regulate _____, _____, & _____.
134. Calcitrol is a metabolite of _____.

135. What is calcitrol needed for?
136. _____ stimulates RBC formation.
137. What are the 3 factors of renin secretion from the juxtaglomerular apparatus?
138. Renin is a _____ enzyme that cleaves _____ into _____.
139. The physiologically inactive Angiotensin is produced in the _____.
140. _____ on the surface of _____ cleaves angiotensin I into angiotensin II.
141. The physiologically active Angiotensin II stimulates _____ secretion by the adrenal cortex.
142. Angiotensin II and Norepinephrine has what effect on arterioles?
143. At lower physiological concentrations where does angiotensin II bind to an arteriole?
144. At higher pharmalogical concentrations, where does Angiotensin II bind to an arteriole?
145. Where does NE bind to an arteriole?
146. Angiotensin II stimulates NaCL reabsorption by the _____.
147. Angiotensin II effects what water related secretions and actions?
148. What is the first step of urine formation?
149. Net filtration is equal to _____ minus _____ plus _____.
150. What is oncotic pressure?
151. What should the oncotic pressure be in the proximal convoluted tubule?
152. What would be the GBHP in the efferent arteriole in comparison to the afferent?
153. Net filtration pressure can be reduced by _____, _____, _____, or _____.
154. RBF (_____), is regulated by _____ and _____.
155. RBF = (_____ minus _____) divided by _____.
156. As pressure increases, resistance _____, and therefore renal blood flow _____.
157. Sympathetic nerve activity stimulates _____ thus _____ the RBF and GFR.

RENAL TUBULES

158. The juxtaglomerular apparatus is involved in the autoregulation of _____ and _____.
159. What is the purpose of mitochondria and microvilla in cubodial epi cells of the PCT?
160. _____ is reabsorbed in the PCT and is _____ by ADH and other hormones.
161. What is transported into the PCT?
162. The PCT reabsorbs 67% of _____, ___, ___, and ___.
163. The PCT reabsorbs all the available _____ and _____.
164. Where and what is the key water dependent enzyme protein of the PCT and Loop of Henle?
165. What does water reabsorption in the PCT follow?
166. _____ filtered by the glomerulus are reabsorbed in the PCT.
167. From strongest to weakest, which portions of the loop of henle absorb NaCl and K.
168. How much NaCl and K does the thick ascending loop of henle absorb?

169. 15% of water is reabsorbed by the _____, the _____ is impermeable to water.
170. In addition to NaCl and K, what solutes are absorbed in the Loop of Henle?
171. The DCT has _____, resulting in weaker reabsorption.
172. The DCT and collecting duct reabsorbs ____% of water and ____% of NaCl.
173. What does the DCT and collecting ducts secrete?
174. Water reabsorption is entirely regulated by _____.
175. What stimulates the principle cells to reabsorb NaCl in the DCT and collecting duct?
176. The DCT & CT can reabsorb or secrete K^+, what stimulates the potassium secretion?
177. What effects the amount of K secretion into the late DCT and CT?
178. Increased plasma concentration of ___ stimulates ___, which stimulates ____ resulting in ___.
179. During normal conditions all _____ is reabsorbed, but alkalosis _____ resulting in secretion.
180. That is the primary factor that results in H^+ secretion?
181. What produces acidosis and what does it lead to in relation to hydrogen?
182. Glutamine is metabolized in the _____ into _____ and _____.
183. Where does the glutamate products go?
184. NH_4^+ is reabsorbed by the _____ and may later diffuse into the _____.

RENAL CLEARANCE & CONTROL

185. What is the ability to remove substance from blood and excrete them in urine?
186. What fructose polymer measures GFR because it is neither absorbed nor secreted?
187. What is Renal Plasma clearance?
188. If a substance is filtered but not reabsorbed (everything is excreted) RPC __ GFR.
189. Urea is _____ into the glomerular capsule.
190. Urea clearance demonstrates how _____.
191. Urea clearance is _____, while inulin clearance is _____.
192. Seeing that urea clearance is lower, _____ of filtered urea is _____.
193. Tubular secretion excretes ____, ____, ____, ____, and _____.
194. Alcohol inhibits _____. Caffeine _____ glomerular filtration.
195. At rest, renal blood flow (RBF) is about _____% of the cardiac output.
196. RBF is the _____ divided by the _____. (RBF= $\Delta P/R$)
197. How does the RBF and GFR maintain constant although arterial pressure changes?
198. What does the myogenic mechanism respond to and what is it related to?
199. What does the Tubuloglomerular feedback mechanism respond to?
200. What is the intrinsic property of smooth muscle which the myogenic mechanism uses?
201. The GFR & RBF remain constant between ____ & ____ mm Hg.
202. Constriction of the efferent arteriole would result in _____, _____, and _____.

203. Constriction of the afferent arteriole would result in _____, _____, and _____.
204. As arterial blood pressure rises until 90mm Hg, what happens to the RBF and GFR?
205. Dilation of the efferent arteriole would result in _____, _____, and _____.
206. Dilation of the afferent arteriole would result in _____, _____, and _____.
207. Macula densa, Juxtaglomerular Apparatus (JGA)
208. What are the vasoconstrictors and what is there effect on the GFR and RBF?
209. Afferent arteriole resistance
210. What are the vasodilators and what is their effect on the GFR and RBF?
211. _____ and _____ are maintained within a narrow range despite variation in intake.
212. What makes prostaglandins unique from all the other vasodilators?
213. Fluid exchange between body fluid compartments occurs by _____ and _____.
214. Extracellular fluid is ____ x body weight. Intracellular is ____x body weight.
215. Interstitial fluid comprises of about _____ of ECF.
216. What do the renal nerves regulate?
217. Renal plasma flow is determined by what chemical _____.
218. The nerve supply to the kidneys are _____ that release _____ and _____.
219. Activation of the tubules and collecting duct stimulate _____.
220. Where are the α-adrenergic sympathetic nerves for urination located and for what purpose?
221. The sacral muscarinic parasymph. nerves for urination innervate what for what purpose?
222. The fundus of the stomach is innervated by what sensory nerve?
223. What nerve causes the constriction of the skeletal muscle external sphincter?