Chapter 19 The Urinary System: Fluid and Electrolyte Balance Exam Study Questions

19.1. The Concept of Balance
1. Define balance.

19.2 Water Balance
1. List factors that affect water balance (Figure 19.3).
   a. Inputs:
   b. Outputs:
2. Where does most of water reabsorption occur in the renal tubules?
3. Where does the regulation of water reabsorption in the renal tubules occur?
4. ADH (vasopressin) [↑ or ↓] the insertion of water channels (aquaporin-2) into apical membrane therefore [↑ or ↓] water reabsorption.
5. Define countercurrent multiplier and explain its function.
6. Descending loop of Henle is ________ to water; not permeable to _________. Thick ascending limb of the loop of Henle is _________ to water; and permeable to ____________.
7. What is the function of vasa recta?
8. Where is ADH secreted?
9. ADH secretion is regulated by two factors. The strongest stimuli for ADH release are the _____________ (page 542). Increased osmolarity in ECF ____ (stimulates/inhibits) ADH secretion. Decreased MAP and blood volume decreases baroreceptor activity. This ____ (stimulates/inhibits) the secretion of ADH. What effect will this have on blood volume and MAP? ______________

19.3 Sodium Balance
1. Renal handling of sodium, _____ filtrated; reabsorbed at all renal segments except _________ (Table 18.2); ____ secretion.
2. Sodium reabsorption is____ (active/passive).
3. Aldosterone stimulates sodium ________ and the______ of potassium ion.
4. Answer the following questions on the Renin-Angiotensin-Aldosterone System.
1) What enzyme is released from the kidney in response to decreased blood pressure? 

2) What enzyme converts angiotensin I to angiotensin II? 

3) What are four effects of angiotensin II (page 546)?
   a. 
   b. 
   c. 
   d. 

4) How does aldosterone cause more sodium to be reabsorbed in the kidney? 

5) Overall, RAAS tends to _____ (increase/decrease) MAP.

5. ANP increases sodium excretion by increase_______ and decreasing __________ (page 547).

19.4 Potassium Balance
1. The net effect of renal handling of potassium is _______.
2. The secretion of potassium occurs in __________ and __________. This secretion is regulated by hormone _______. This hormone _____ the secretion of potassium ions.

19.5 Calcium Balance
1. Renal handling of calcium, reabsorption of calcium is regulated in______ and ________. Two hormones_________ and _________ stimulate the calcium absorption in the GI tract and reabsorption in kidneys.
2. ______________ decreases plasma calcium levels by increasing bone formation and (↑ or ↓) the reabsorption of calcium by the kidneys.

19.6 Interactions between fluid and Electrolyte Regulation
(T/F) The long term regulation of blood pressure is the hormonal control of the kidneys.

19.7 Acid-Base Balance
1. Normal arterial pH is ________ to __________. What is the pH in alkalosis? ___. What is the pH in acidosis? __________
2. Define and explain the causes of respiratory acidosis.
3. (Page 559) With respiratory acidosis, show what happens to the following (↑ or ↓): In renal compensation:____ renal excretion of bicarbonate____ renal excretion of H+
4. Define and explain the causes of respiratory alkalosis.
5. Define and explain the causes of respiratory alkalosis.

6. Explain the causes of metabolic acidosis.

7. Explain the causes of metabolic alkalosis.

8. (Page 560) With metabolic alkalosis, show what happens to the following (↑ or ↓)
   a. During metabolic alkalosis, ____ plasma pH
   b. In respiratory compensation: ____ bicarbonate levels, ____ respiratory rate
   c. If kidneys are not part of the causes, in renal compensation:____ renal excretion of bicarbonate and ____ production of bicarbonate

9. List the three important buffer systems in the body:
   1) __________________________________
   2) __________________________________
   3) __________________________________
   4) Which buffer system is the fastest? __________
   5) Which buffer system is the strongest? ________________

10. Most important ECF buffer = ______ICF Buffers ______ and ______

11. In the proximal tubule, bicarbonate reabsorption is coupled with ____ secretion.

12. In ____ and ________ (renal segments), secretion of H⁺ is coupled to the reabsorption of ________.