LEARNING OBJECTIVES FOR
URINARY SYSTEM & FLUID BALANCE
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URINARY SYSTEM
1. List the functions of the urinary system.
2. List the organs of the urinary system.

Kidney Anatomy
3. Where are the kidneys located as to the vertebral column and ribs? Which kidney is the lowest in position?
4. List and briefly state a function of each of the three layers of tissues which surround the kidney.
5. Identify the following internal structures of the kidney: cortex, medulla, pyramids, papillae, columns, calyces, pelvis. Give a basic structural description of each.
6. What is the functional unit (blood processing unit of the kidney?)
7. Describe the glomerulus, renal tubule, glomerular (Bowman's) capsule - parietal and visceral layers, renal corpuscle, glomerular endothelium, podocytes, and filtration slits (or pores).
8. Be able to identify and list in the order of filtration the following components of the juxtamedullary nephron: glomerular (Bowman's) capsule, glomerulus, proximal convoluted tubule, descending limb, loop of Henle, ascending limb, distal convoluted tubule, and collecting tubules, and papillary ducts.
9. How is the glomerulus different from other capillary beds? Where do the peritubular capillary beds arise? What are they adapted for? Where is the vasa recta?
10. Describe the location and function of the juxtaglomerular apparatus (juxtaglomerular cells and the macula densa).

Mechanisms of Urine Formation
11. About how much blood-derived fluid is filtered daily? How much of this leaves the body as urine? What are the three processes of urine formation?
12. Define filtration. What are the two reasons why glomerular filtration is more efficient than other capillary beds?
13. List and describe the three components of the filtration membrane.
14. What is net filtration pressure? How does the filtration of blood depend upon the following pressures: glomerular hydrostatic pressure, glomerular osmotic pressure (blood colloidal osmotic pressure), and capsular hydrostatic pressure.
15. What are three factors which govern filtration at the glomerular capillary bed? What is glomerular filtration rate directly proportional to? What factor "normally" regulates net filtration pressure?
16. What is the function of renal autoregulation? How do the following contribute to autoregulation: the myogenic mechanism, the tubuloglomerular feedback mechanism? What is the renin-angiotensin mechanism? Which mechanism causes systemic blood pressure and blood volume to increase (how)?
17. How does the sympathetic nervous system influence renal filtration?
18. What is the difference between filtrate and urine? What is tubular reabsorption? What are two processes involved in tubular reabsorption? Explain: transport maximum, obligatory water reabsorption, and solvent drag.
19. What part of the renal tubule is the most active in reabsorption? List several substances reabsorbed in this region.
20. Sodium ion absorption (distal convoluted tubule) is under the influence of which hormone? How does this influence water absorption? How does aldosterone influence potassium levels?
21. What is tubular secretion? What are four important effects? List several materials secreted.
22. With respect to the countercurrent mechanism: 1) What is the descending limb impermeable to and permeable to, and what is happening to the osmolarity of the filtrate? 2) What is the ascending limb impermeable to, what does it actively transport out, and what is happening to the osmolarity of the filtrate?
23. Is dilute urine produced in the presence or absence of ADH? How does ADH influence the formation of concentrated urine? What is facultative water reabsorption?

Ureters
24. Where are the ureters located? How is urine moved through the ureters?

Urinary Bladder
25. Where is the urinary bladder located? What are three modifications that allow stretching?

Urethra
26. What is the urethra? What is its function? Describe the location and function of the internal and external urethral sphincters.

Micturition
27. What is micturition, incontinence, and urinary retention?

FLUID, ELECTROLYTE, ACID - BASE BALANCE
1. What are the two body fluid compartments? What are the two subdivisions of the ECF compartment? What are electrolytes and nonelectrolytes; which forms solutions with the greater osmotic pressure? Why
2. List three major electrolytes of plasma, interstitial fluid, and intracellular fluid.
Water Balance
3. What are the two primary ways water moves in and out of body compartments? What are three ways solute distribution is regulated? What regulates the exchange between plasma and interstitial fluid, and what are the two forces which are involved in the exchange? What regulates the exchange between interstitial and intracellular fluids? The volume of the ICF is a function of the concentration of what ECF component?
4. What are two ways the body "obtains" water? How does water output occur?
5. How is water intake by thirst regulated?
6. What is obligatory water loss? List several ways this occurs.

Electrolyte Balance
7. What is electrolyte balance? Which electrolyte is pivotal to fluid and electrolyte balance? What are the two sodium salts and what is their percentage of the ECF? What is sodium balance linked to? What is the role of aldosterone? What is the role of cardiovascular pressoreceptors? How might they be regarded as sodium receptors? What is the influence and regulation of ADH? How do estrogens influence water balance?
8. What are several functions of potassium ions? How much is normally lost in urine? What is the main thrust of renal regulation - conservation or excretion? How does aldosterone influence the level of potassium?
9. What are several functions of calcium ions? What is the role of parathyroid hormone? What does it target? What is the role of calcitonin?

Acid -Base Balance
10. What is the normal pH of arterial blood? What is a buffer system? What is alkalosis and acidosis? What are three major systems involved in homeostasis of pH?
11. Briefly explain the bicarbonate buffer system.
12. How can altered respiratory rates effect pH?
13. What are metabolic (fixed) acids? What is metabolic acidosis? Renal regulation of acid-base balance involves the secretion of __ and conservation of __? What are the two most important urine buffer systems?

LABORATORY
Complete Laboratory exercise #33. Complete #33 at -www.linkpublishing.com/interactive%20exams.htm