

Anatomy & Physiology STUDY GUIDE for *Unit 9 – The Urinary System*

(Chapter 25: The Urinary System, textbook pages 954 - 989; and
Exercise 36: Urinary System Structure and Function, pages 595 - 601 & 607 - 611)

21. I can identify and describe the ANATOMY of the urinary system.

- a. I can describe the location of the kidneys in the body and identify the following regions of a kidney in a diagram or on a model: hilum, cortex, medulla, medullary pyramids, calyces, pelvis, and renal columns. (textbook pages 955 - 958, including Figures 25.1 & 25.2; and *Exercise 36*, pages 595 - 597 & 607)
- b. I can state that the nephron is the structural and functional unit of the kidney and describe and identify its anatomy in a diagram or on a model. (textbook pages 958 - 963, including Figures 25.5, 25.7 & 25.8; and *Exercise 36*, pages 600 & 601)

1. The nephron is the structural and functional unit of the kidney. What does that mean?

 2. Identify the structures of the nephron on Figure 25.5 below. NOTE: Some structures to be identified do not have leader lines.
- | | | |
|---|---|-------------------------------|
| A. Afferent arteriole | B. Ascending limb of nephron loop/
loop of Henle | C. Collecting duct |
| D. Descending limb of nephron
loop/loop of Henle | E. Distal convoluted tubule | F. Efferent arteriole |
| G. Glomerular capsule | H. Glomerulus | I. Proximal convoluted tubule |
| J. Renal corpuscle | | |

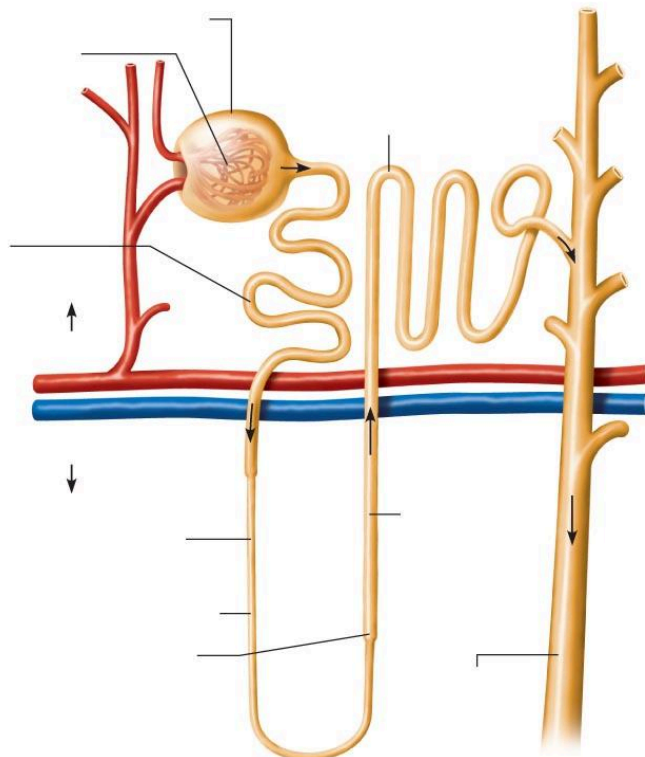


Figure 25.5 Location and structure of nephrons. (page 959)

- c. I can describe the general location, structure, and function of the ureters, urinary bladder, and urethra and identify them in a diagram or on a model. (textbook pages 998, 1023 - 1026, including Figures 25.1, page 955, & 25.18, page 979; and *Exercise 36* 595, 596, 598, 599 & 608)

22. I can explain the PHYSIOLOGY of the urinary system.

- I can describe the major function of the urinary system. (textbook page 954)
 - I can describe the process of urine formation, identifying the areas of the nephron that are responsible for filtration, reabsorption, and secretion.
3. Use your knowledge of anatomy and physiology and Figure 25.9 below to describe the three processes of urine formation.

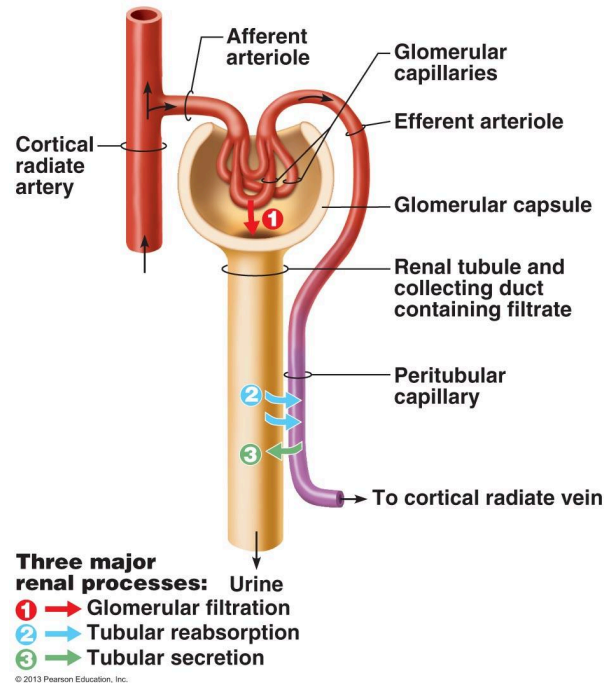


Figure 25.9 **A schematic, uncoiled nephron showing the three major renal processes that adjust plasma composition.** (page 963)

Process	Is process selective or nonselective?	Substances move out of	Substances move into
Filtration			
Reabsorption			
Secretion			

- i. **I can trace the flow of components of blood as they pass through the structures of the nephron (glomerular (Bowman's) capsule, proximal convoluted tubule, nephron loop (loop of Henle), distal convoluted tubule, and collecting duct).** (textbook pages 963 - 965, 968 - 973)
- I can identify the process (osmosis) by which water is reabsorbed from the descending loop of Henle and collecting duct.
4. Trace the flow of urine, as it is formed in the nephron, as it passes through the structures of the kidney, and, finally, out of the body, starting with the glomerulus.

Ascending limb of nephron loop/ loop of Henle	Collecting duct	Descending limb of nephron loop/loop of Henle
Distal convoluted tubule	Glomerular capsule	Major calyces
Minor calyces	Renal pelvis	Ureter
Urethra	Urinary bladder	

- a. glomerulus
- b. _____
- c. _____
- d. _____
- e. _____
- f. _____
- g. _____
- h. _____
- i. _____
- j. _____
- k. _____
- l. _____

- ii. I can describe the roles of hormones (antidiuretic hormone (ADH), aldosterone), medications (diuretics), and other substances (glucose, alcohol, caffeine) in maintaining homeostasis (water balance, salt - water balance). (textbook pages 972, 976 & 977, including Figure 25.17)

5. Describe how ADH and aldosterone help to regulate water balance by completing the table below.

Hormone	Secreted by the _____ gland, located in/on _____	Effect on distal convoluted tubule and collecting duct	Is urine more dilute or more concentrated as a result of hormone's effect?
Antidiuretic hormone (ADH)			
Aldosterone			

6. Describe how alcohol and caffeine affect water balance by completing the table below.

Substance	Effect on distal convoluted tubule and collecting duct	Is urine more dilute or more concentrated as a result of hormone's effect?
Alcohol		
Caffeine		

- c. I can describe the normal physical and chemical properties of urine and list several abnormal urine components, and name the condition characterized by the presence of detectable amounts of each (red blood cells, white blood cells, glucose, proteins, ketones). (textbook pages 978 & 989; Table 25.2, textbook page 1024; and *Detecting Unknowns in Simulated Urine*)

7. What percentage of urine does water account for? _____ Solutes? _____

8. What solutes are normally present in urine?

9. What conditions might the presence of the following substances in urine indicate?

Substance	Condition
Glucose	
Ketones	
Leukocytes (White blood cells)	

10. (a) Why are proteins not normally found in urine? (b) Proteins are often present in the urine of individuals with hypertension (high blood pressure). Explain why this happens.

a.

b.

- d. I can define *micturition* and describe the roles of the internal and external urethral sphincters in controlling the flow of urine from the bladder. (textbook page 982 & 983, including Figure 25.21)
- e. I can describe the cause, symptoms, tests and diagnosis, treatment, and prevention of conditions or diseases related to or affecting the organs of the urinary system including, but not limited to, renal calculi/kidney stones (textbook pages 979 & 980), incontinence (textbook page 982), - 601 & 988). *collectively/commonly called *urinary tract infection*