Multiple-Choice Questions

1) The urinary system
A) regulates plasma concentrations of electrolytes.
B) regulates blood volume by removing RBCs from circulation.
C) contributes to stabilizing blood pH.
D) A and C only
E) all of the above
Answer: D
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms

2) Organs of the urinary system that are involved with urine transport are the
A) urethra and ureters.
B) kidneys and bladder.
C) ureters and kidneys.
D) urethra and bladder.
E) kidneys and urethra.
Answer: A
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms

3) Using anatomical terminology, identify the correct order of words that make this a true statement:
The ________ kidney extends ________ slightly more than the ________ kidney.
A) right; superiorly; left
B) right; inferiorly; left
C) left; superiorly; right
D) left; inferiorly; right
E) right; anteriorly; left
Answer: C
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms
4) Urine is stored by the
A) liver.
B) urinary bladder.
C) kidney.
D) ureter.
E) urethra.
Answer: B
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms

5) Which of the following is correct about the location of the kidney?
A) There is one kidney deep to the liver.
B) The kidneys are bilateral and retroperitoneal.
C) The left kidney is lower than the right.
D) The kidneys are in the anterior abdominal wall.
E) all of the above
Answer: B
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms

6) Which of the following carries urine from the kidney to the bladder?
A) small intestine
B) prostate
C) liver
D) ureter
E) urethra
Answer: D
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms

7) The kidneys are
A) located in a position that is retroperitoneal.
B) surrounded by a renal capsule.
C) protected by the lower ribs of the rib cage.
D) A and B only
E) all of the above
Answer: D
Diff: 1
Learning Outcome: 18.1
Skill Level: 1 Reviewing Facts and Terms
8) A pyelogram, an X-ray of the urinary system in which radio-opaque dye is injected into the urinary pathways, can be used to detect
A) kidney stones.
B) structural abnormalities of the kidney.
C) obstruction of the ureters.
D) tumors or growths in the urinary bladder.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 18.1
Skill Level: 3 Critical Thinking & Clinical Applications

9) A renal corpuscle includes the
A) glomerulus and glomerular capsule.
B) glomerulus and renal tubule.
C) glomerular capsule and renal tubule.
D) renal tubule and collecting tubule.
E) pyramid and glomerulus.
Answer: A
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

10) The renal pyramid is
A) the innermost layer of kidney tissue.
B) a conical-shaped structure that is located in the renal medulla.
C) an internal cavity lined by the fibrous capsule and located in the area of the hilus.
D) a large branch of the renal pelvis.
E) a knot of capillaries that lies within the renal corpuscle.
Answer: B
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

11) The innermost layer of kidney tissue is the
A) renal cortex.
B) renal medulla.
C) major calyx.
D) minor calyx.
E) renal pelvis.
Answer: B
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms
12) Cortical tissue located between renal pyramids is called
A) medulla.
B) renal columns.
C) renal pelvisses.
D) nephrons.
E) calyces.
Answer: B
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

13) Renal columns are
A) internal cavities of the fibrous capsule located in the area of the hilus.
B) the expanded ends of the ureters.
C) the basic functional units of the kidney.
D) located adjacent to interlobar vessels.
E) conical-shaped structures that are located in the renal medulla.
Answer: D
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

14) Major calyces are
A) large branches of the renal pelvis.
B) expanded ends of nephrons.
C) basic functional layers of the kidney.
D) conical-shaped structures that are located in the renal medulla.
E) the expanded ends of renal pyramids.
Answer: A
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

15) The glomerular capsule and glomerulus make up the
A) renal pyramid.
B) loop of Henle.
C) renal corpuscle.
D) renal tubule system.
E) collecting system.
Answer: C
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms
16) The expanded end of a nephron is the
A) glomerulus.
B) glomerular capsule.
C) proximal convoluted tubule.
D) distal convoluted tubule.
E) loop of Henle.
Answer: B
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

17) A DCT is
A) the expanded end of a nephron.
B) a knot of capillaries that lies within the renal corpuscle.
C) the portion of the nephron closest to the renal corpuscle.
D) the portion of the nephron that attaches to the collecting duct.
E) the horseshoe-shaped segment of the nephron.
Answer: D
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

18) The portion of the nephron that attaches to the collecting duct is the
A) proximal convoluted tubule.
B) loop of Henle.
C) distal convoluted tubule.
D) collecting duct.
E) minor calyx.
Answer: C
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

19) The portion of the nephron between the glomerular capsule and the nephron loop is the
A) proximal convoluted tubule.
B) renal corpuscle.
C) distal convoluted tubule.
D) collecting duct.
E) minor calyx.
Answer: A
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms
20) The visceral epithelium of the glomerular capsule is the 
A) capillary endothelium. 
B) lamina densa. 
C) podocytes. 
D) basement membrane of the capillaries. 
E) capsular space. 
Answer: C 
Diff: 1 
Learning Outcome: 18.2 
Skill Level: 1 Reviewing Facts and Terms 

21) The renal tubule contains cells adapted for absorption by having 
A) cilia. 
B) microvilli. 
C) villi. 
D) flagella. 
E) all of the above 
Answer: B 
Diff: 1 
Learning Outcome: 18.2 
Skill Level: 1 Reviewing Facts and Terms 

22) The following is a list of the blood vessels that carry blood to the kidney: 
1. afferent arteriole 
2. arcuate artery 
3. interlobar artery 
4. renal artery 
5. glomerulus 
6. interlobular artery 
7. efferent arteriole 
8. peritubular capillary 

The proper order in which blood passes through these vessels is 
A) 4, 6, 2, 3, 1, 5, 7, 8. 
B) 4, 3, 2, 6, 1, 5, 7, 8. 
C) 4, 3, 2, 6, 7, 5, 1, 8. 
D) 4, 6, 2, 3, 7, 5, 1, 8. 
E) 4, 3, 6, 2, 1, 5, 7, 8. 
Answer: B 
Diff: 2 
Learning Outcome: 18.2 
Skill Level: 1 Reviewing Facts and Terms
23) Which of the following are too large to be filtered?
A) amino acids.
B) glucose.
C) lipids.
D) proteins.
E) none of the above
Answer: D
Diff: 1
Learning Outcome: 18.2
Skill Level: 2 Reviewing Concepts

24) The countercurrent mechanism functions in the
A) nephron.
B) renal corpuscle.
C) glomerulus.
D) loop of Henle.
E) filtration unit.
Answer: D
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms

25) Reabsorption of glucose occurs mostly in the
A) renal sinus.
B) proximal convoluted tubule.
C) distal convoluted tubule.
D) nephron loop.
E) renal corpuscle.
Answer: B
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms

26) Most hydrogen ions are secreted into the
A) glomerular capsule.
B) PCT.
C) loop of Henle.
D) DCT.
E) collecting duct.
Answer: B
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms
27) The primary function of the proximal convoluted tubule is
A) filtration.
B) absorption of ions, organic molecules, vitamins, and water.
C) secretion of acids and ammonia.
D) secretion of drugs.
E) adjustment of urine volume.
Answer: B
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms

28) The ability to form a concentrated urine depends on the regulation of the
A) proximal convoluted tubule.
B) collecting duct.
C) distal convoluted tubule.
D) loop of Henle.
E) Bowman's capsule.
Answer: B
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms

29) The cells of the proximal convoluted tubule normally reabsorb
A) approximately 60 percent of the volume of the filtrate produced in the renal corpuscle.
B) virtually all of the glucose and other nutrients under normal conditions.
C) cations such as sodium, calcium, and magnesium.
D) anions such as bicarbonate, chloride, sulfate, and phosphate.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms

30) General characteristics of normal urine include
A) specific gravity.
B) bacteria.
C) pH.
D) A and B only
E) A and C only
Answer: E
Diff: 1
Learning Outcome: 18.3
Skill Level: 1 Reviewing Facts and Terms
31) Which of the following is the lesser amount?
A) the concentration of solute in the filtrate at the beginning of the loop of Henle
B) the concentration of solute in the filtrate at the bottom of the descending limb of the nephron loop
Answer: B
Diff: 1
Learning Outcome: 18.3
Skill Level: 2 Reviewing Concepts

32) ADH promotes water reabsorption mainly through the wall of the
A) loop of Henle.
B) proximal convoluted tubule.
C) distal convoluted tubule.
D) collecting duct.
E) minor calyx.
Answer: D
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms

33) Which of the following is aldosterone able to affect?
A) regulation of body fluid concentration
B) regulation of body fluid volume
C) removal of wastes
D) pH regulation
E) formation of plasma proteins
Answer: A
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms

34) When the level of ADH (antidiuretic hormone) increases,
A) more urine is produced.
B) less urine is produced.
C) less water is reabsorbed by the nephron and collecting duct.
D) the specific gravity of the urine decreases.
E) more salt is secreted by the nephron.
Answer: B
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms
35) In response to decreased levels of aldosterone, the kidneys could produce
A) a larger volume of urine.
B) urine with a higher concentration of sodium ions.
C) urine with a lower concentration of potassium ions.
D) urine with a lower specific gravity.
E) urine with less urea.
Answer: B
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms

36) The juxtaglomerular apparatus regulates the filtration rate by
A) vasoconstriction of the afferent arteriole.
B) vasodilation of the afferent arteriole.
C) vasoconstriction of the peritubular capillaries.
D) vasodilation of the efferent arteriole.
Answer: B
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms

37) The hormone ADH
A) is secreted by the anterior pituitary gland in response to changes in blood osmolarity.
B) stimulates the kidneys to retain sodium ions.
C) stimulates water conservation at the kidneys.
D) causes the kidneys to produce a large volume of urine.
E) all of the above
Answer: C
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms

38) The amount of potassium secreted by the kidneys is regulated by
A) ADH.
B) aldosterone.
C) parathormone.
D) atrial natriuretic peptide.
E) cortisol.
Answer: B
Diff: 1
Learning Outcome: 18.4
Skill Level: 1 Reviewing Facts and Terms
39) If the afferent arteriole becomes constricted,
A) blood flow into the efferent arteriole will increase.
B) GFR will decrease.
C) GFR will increase.
D) hydrostatic pressure in the glomerulus will increase.
E) the protein concentration in the filtrate will increase.
Answer: B
Diff: 1
Learning Outcome: 18.4
Skill Level: 2 Reviewing Concepts

40) Factors that increase the secretion of ADH include
A) increased concentration of sodium ions in the ECF.
B) water deprivation.
C) increased osmolarity of the ECF.
D) decreased renal blood flow.
E) all of the above
Answer: E
Diff: 1
Learning Outcome: 18.4
Skill Level: 2 Reviewing Concepts

41) If, through injury, the blood flow to the kidneys decreases, which of the following will occur?
A) The renin-angiotensin system will be activated.
B) Sodium reabsorption will be inhibited.
C) There will be systemic vasodilation.
D) Obligatory water reabsorption will decrease.
E) The amount of ADH in the blood will decrease.
Answer: A
Diff: 1
Learning Outcome: 18.4
Skill Level: 3 Critical Thinking & Clinical Applications

42) Management of renal failure involves restriction of water and salt intake and reducing caloric intake to a minimum; dietary proteins are also limited. This combination lessens the strain on the urinary system by
A) minimizing volume of urine produced.
B) altering the pigments produced.
C) preventing the generation of large quantities of nitrogenous waste products.
D) A and C only
E) all of the above
Answer: D
Diff: 1
Learning Outcome: 18.4
Skill Level: 3 Critical Thinking & Clinical Applications
43) The micturition reflex center is located in the
A) hypothalamus.
B) medulla oblongata.
C) pons.
D) lumbar spinal cord.
E) sacral spinal cord.
Answer: E
Diff: 1
Learning Outcome: 18.5
Skill Level: 1 Reviewing Facts and Terms

44) Which of the following is the most distal part of the male urethra?
A) prostatic urethra
B) membranous urethra
C) penile urethra
D) glandular urethra
E) glans urethra
Answer: C
Diff: 1
Learning Outcome: 18.5
Skill Level: 1 Reviewing Facts and Terms

45) The ureters and urinary bladder are lined by
A) stratified squamous epithelium.
B) pseudostratified columnar epithelium.
C) simple cuboidal epithelium.
D) transitional epithelium.
E) simple columnar epithelium.
Answer: D
Diff: 1
Learning Outcome: 18.5
Skill Level: 1 Reviewing Facts and Terms

46) Which of the following is greater?
A) the length of the urethra in males
B) the length of the urethra in females
Answer: A
Diff: 1
Learning Outcome: 18.5
Skill Level: 1 Reviewing Facts and Terms
47) The term *incontinence* refers to the
   A) inability to void (expel) urine.
   B) inability to control urination.
   C) inability to control kidney function.
   D) process of urinating.
   E) process of urine production.
   Answer: B
   Diff: 1
   Learning Outcome: 18.5
   Skill Level: 1 Reviewing Facts and Terms

48) The detrusor muscle
   A) moves urine through the ureters.
   B) compresses the urinary bladder and expels urine through the urethra.
   C) functions as the internal urinary sphincter.
   D) functions as the external urinary sphincter.
   E) is located in the renal pelvis.
   Answer: B
   Diff: 1
   Learning Outcome: 18.5
   Skill Level: 1 Reviewing Facts and Terms

49) The intracellular fluid (ICF) is found in
   A) blood vessels.
   B) lymph.
   C) the cells of the body.
   D) the interstitial spaces.
   E) the cerebrospinal fluid.
   Answer: C
   Diff: 1
   Learning Outcome: 18.6
   Skill Level: 1 Reviewing Facts and Terms

50) Which of the following is considered transcellular fluid?
   A) interstitial fluid
   B) plasma
   C) cerebrospinal fluid
   D) intercellular fluid
   E) lymph
   Answer: C
   Diff: 1
   Learning Outcome: 18.6
   Skill Level: 1 Reviewing Facts and Terms
51) Movement of water between compartments is by
A) diffusion.
B) osmosis.
C) active transport.
D) pinocytosis.
E) facilitated diffusion.
Answer: B
Diff: 1
Learning Outcome: 18.6
Skill Level: 1 Reviewing Facts and Terms

52) Which compartment is the largest?
A) lymph
B) plasma
C) interstitial fluid
D) transcellular fluid
E) cerebrospinal fluid
Answer: C
Diff: 1
Learning Outcome: 18.6
Skill Level: 1 Reviewing Facts and Terms

53) The most abundant cation in the ECF is
A) chloride.
B) potassium.
C) sodium.
D) bicarbonate.
Answer: C
Diff: 1
Learning Outcome: 18.7
Skill Level: 1 Reviewing Facts and Terms

54) The principal cation in the ICF is
A) sodium.
B) potassium.
C) calcium.
D) magnesium.
E) chloride.
Answer: B
Diff: 1
Learning Outcome: 18.7
Skill Level: 1 Reviewing Facts and Terms
55) When water is lost but electrolytes are retained,
A) the osmolarity of the ECF falls.
B) osmosis moves water from the ICF to the ECF.
C) both the ECF and the ICF become more dilute.
D) there is an increase in the volume of the ICF.
E) all of the above
Answer: B
Diff: 1
Learning Outcome: 18.7
Skill Level: 1 Reviewing Facts and Terms

56) Hypoproteinemia could lead to
A) a drastic increase in the osmolarity of the blood.
B) a temporary increase in blood volume.
C) decreased thirst.
D) hypotension.
E) activation of the renin-angiotensin mechanism.
Answer: B
Diff: 1
Learning Outcome: 18.7
Skill Level: 1 Reviewing Facts and Terms

57) Intracellular fluid contains high concentrations of
A) chloride and potassium.
B) potassium and phosphate.
C) sodium and phosphate.
D) potassium and sulfate.
E) magnesium and bicarbonate.
Answer: B
Diff: 1
Learning Outcome: 18.7
Skill Level: 1 Reviewing Facts and Terms

58) When the level of sodium ions in the ECF increases,
A) osmoreceptors swell.
B) a person experiences an increased thirst.
C) less ADH is released.
D) there is an increase in the level of aldosterone.
E) there is an increase in the level of atrial natriuretic peptide.
Answer: B
Diff: 1
Learning Outcome: 18.7
Skill Level: 1 Reviewing Facts and Terms
59) When the amount of sodium ions in the ECF increases,
   A) osmoreceptors are stimulated.
   B) there is decreased thirst.
   C) ADH secretion decreases.
   D) aldosterone secretion increases.
   E) there is an increase in the volume of urine produced.
   Answer: A
   Diff: 1
   Learning Outcome: 18.7
   Skill Level: 1 Reviewing Facts and Terms

60) Calcium homeostasis primarily reflects
   A) a balance between absorption in the gut and excretion at the kidneys.
   B) careful regulation of blood calcium levels by the kidneys.
   C) an interplay between parathormone and aldosterone.
   D) an interplay between reserves in the bone, the rate of absorption, and the rate of excretion.
   E) hormonal control of calcium reserves in the bones.
   Answer: D
   Diff: 1
   Learning Outcome: 18.7
   Skill Level: 1 Reviewing Facts and Terms

61) The thirst center is located in the
   A) thalamus.
   B) hypothalamus.
   C) midbrain.
   D) pons.
   E) medulla oblongata.
   Answer: B
   Diff: 1
   Learning Outcome: 18.7
   Skill Level: 1 Reviewing Facts and Terms

62) Dehydration would cause
   A) fluid to shift from the ECF to the ICF.
   B) decreased secretion of ADH.
   C) increased thirst.
   D) decreased levels of aldosterone.
   E) all of the above
   Answer: C
   Diff: 1
   Learning Outcome: 18.7
   Skill Level: 1 Reviewing Facts and Terms
63) If excessive amounts of water are taken into the body,  
   A) the release of ADH increases.  
   B) osmoreceptors in the brain begin to swell.  
   C) more water is reabsorbed from the renal tubule.  
   D) the collecting duct becomes more permeable to water.  
   E) none of the above  
Answer: B  
Diff: 1  
Learning Outcome: 18.7  
Skill Level: 1 Reviewing Facts and Terms

64) The primary stimulus in the blood for the secretion of aldosterone is  
   A) rising potassium levels.  
   B) falling potassium levels.  
   C) rising sodium levels.  
   D) falling sodium levels.  
   E) none of the above  
Answer: D  
Diff: 1  
Learning Outcome: 18.7  
Skill Level: 1 Reviewing Facts and Terms

65) Ions normally found in urine and plasma include which of the following?  
   A) chloride  
   B) bicarbonate  
   C) potassium  
   D) sodium  
   E) all of the above  
Answer: E  
Diff: 1  
Learning Outcome: 18.7  
Skill Level: 1 Reviewing Facts and Terms

66) Dan has been lost in the desert for two days with very little water. As a result of this exposure,  
one would expect to observe  
   A) elevated ADH levels.  
   B) decreased blood concentration.  
   C) normal urine production.  
   D) increased blood volume.  
   E) cells enlarged with fluid.  
Answer: A  
Diff: 1  
Learning Outcome: 18.7  
Skill Level: 3 Critical Thinking & Clinical Applications
67) The most important factor affecting the pH of body fluids is the concentration of
A) lactic acid.
B) ketone bodies.
C) organic acids.
D) carbon dioxide.
E) hydrochloric acid.
Answer: D
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

68) The most abundant intracellular mechanism for regulating pH is
A) protein buffers.
B) the carbonic acid-bicarbonate buffer system.
C) the phosphate buffer system.
D) changes in the rate and depth of breathing.
E) all of the above
Answer: A
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

69) Hypoventilation would cause
A) respiratory acidosis.
B) respiratory alkalosis.
C) metabolic acidosis.
D) metabolic alkalosis.
E) none of the above
Answer: A
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

70) In response to respiratory alkalosis,
A) the respiratory rate increases.
B) the tidal volume increases.
C) the kidneys conserve bicarbonate.
D) the kidneys secrete more hydrogen ions.
E) the body retains more carbon dioxide.
Answer: E
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms
71) A person who suffers from emphysema can exhibit signs of
A) respiratory acidosis.
B) respiratory alkalosis.
C) metabolic acidosis.
D) metabolic alkalosis.
E) none of the above
Answer: A
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

72) A person who suffers from chronic diabetes can exhibit signs of
A) respiratory acidosis.
B) respiratory alkalosis.
C) metabolic acidosis.
D) metabolic alkalosis.
E) none of the above
Answer: C
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

73) A person who chronically consumes large amounts of antacids to settle an upset stomach may risk
A) respiratory acidosis.
B) respiratory alkalosis.
C) metabolic acidosis.
D) metabolic alkalosis.
E) none of the above
Answer: D
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

74) Which of the following is an example of a physiologic buffer?
A) bicarbonate ions
B) phosphate ions
C) proteins
D) renal mechanisms
E) none of the above
Answer: D
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms
75) Acid-base buffer systems minimize pH changes by
A) converting weak acids to strong acids.
B) converting strong acids to weak acids.
C) causing breathing rate to increase.
D) excreting hydrogen ions in the urine.
E) a decrease in the net glomerular filtration pressure.
Answer: B
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

76) Ingestion of sodium bicarbonate to relieve indigestion may lead to
A) metabolic acidosis.
B) metabolic alkalosis.
C) respiratory acidosis.
D) respiratory alkalosis.
Answer: B
Diff: 1
Learning Outcome: 18.8
Skill Level: 2 Reviewing Concepts

Matching Questions

1) Match the region of the nephron in the first column with its primary function in the second column.
   _____ 1. renal corpuscle      A. conduction of urine to minor calyx
   _____ 2. distal convoluted tubule  B. reabsorption of ions, vitamins, water,
                                      and organics
   _____ 3. papillary duct        C. reabsorption of sodium ions and secretion
                                    of acids
   _____ 4. collecting duct       D. reabsorption of water and sodium ions
   _____ 5. proximal convoluted   E. filtration of plasma to initiate urine formation
tubule
Answer: 1-E, 2-C, 3-A, 4-D, 5-B
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms
2) Match the acid-base disorder in the first column with its characteristic treatment in the second column.

_____ 1. metabolic acidosis  A. improve ventilation
_____ 2. metabolic alkalosis  B. administer bicarbonate
_____ 3. respiratory acidosis  C. reduce respiratory rate, allow rise in $P_{CO_2}$
_____ 4. respiratory alkalosis  D. no treatment below pH 7.55; above pH 7.55, administer ammonium chloride

Answer:  1-B, 2-D, 3-A, 4-C
Diff: 1
Learning Outcome:  18.8
Skill Level:  1 Reviewing Facts and Terms

Fill in the Blank Questions

1) Movement of fluid from the peritubular capillaries to the renal tubule is called _____________________.
Answer: secretion
Diff: 1
Learning Outcome:  18.2
Skill Level:  1 Reviewing Facts and Terms

2) Water reabsorption occurs by the process of __________________________.
Answer: osmosis
Diff: 1
Learning Outcome:  18.3
Skill Level:  1 Reviewing Facts and Terms

3) ADH is produced by cells in the _________________________.
Answer: hypothalamus
Diff: 1
Learning Outcome:  18.4
Skill Level:  1 Reviewing Facts and Terms

4) The osmoreceptors of the nephron are located in the _________________________.
Answer: macula densa
Diff: 1
Learning Outcome:  18.4
Skill Level:  1 Reviewing Facts and Terms

5) Substances that combine with hydrogen ions in solution are called _______________________.
Answer: bases
Diff: 1
Learning Outcome:  18.8
Skill Level:  1 Reviewing Facts and Terms
6) The most abundant source of hydrogen ions are those from _________________________.
Answer: metabolism
Diff: 1
Learning Outcome: 18.8
Skill Level: 1 Reviewing Facts and Terms

Essay Questions

1) David's grandfather suffers from hypertension. His doctor tells him that part of his problem stems from renal arteriosclerosis. Why would this cause hypertension?
Answer: Renal hypertension would restrict blood flow to the kidneys and produce renal ischemia. Decreased blood flow and ischemia would trigger the juxtaglomerular apparatus to produce more renin, which would lead to elevated levels of angiotensin II and aldosterone. Angiotensin II causes vasoconstriction, increased peripheral resistance, and thus increased blood pressure. Aldosterone will promote sodium retention. This would lead to more water retained by the body and an increase in blood volume. This too would contribute to a higher blood pressure. Another factor to consider would be the release of more erythropoietin in response to tissue hypoxia. The erythropoietin would stimulate the formation of red blood cells, which would lead to increased blood viscosity and again contribute to the hypertension.
Diff: 2
Learning Outcome: 18.4
Skill Level: 3 Critical Thinking & Clinical Applications

2) Sylvia is suffering from severe edema in her arms and legs. Her physician prescribes a diuretic (a substance that will increase the volume of urine produced). Why might this help to alleviate Sylvia's problem?
Answer: Increasing the volume of urine produced would decrease the total blood volume of the body. This in turn would lead to a decreased blood hydrostatic pressure. Edema is frequently the result of hydrostatic pressure of the blood exceeding the opposing forces at the capillaries in the affected area. Depending on the actual cause of the edema, decreasing the blood hydrostatic pressure would decrease edema formation and possibly cause some of the fluid to move from the interstitial space back to the blood.
Diff: 2
Learning Outcome: 18.6
Skill Level: 3 Critical Thinking & Clinical Applications

3) Fred suffers from chronic emphysema. Blood tests show that his blood pH is normal but his bicarbonate levels are elevated significantly. How can this be?
Answer: As long as the ratio of bicarbonate ion to carbonic acid is 20:1, the pH of body fluids will remain normal. Since Fred's condition is chronic (long term), his body has compensated for the excess carbonic acid (the result of hypercapnia due to poor ventilation) by increasing the amount of bicarbonate to match the elevated level of acid. This process involves the kidneys, where some of the excess carbon dioxide is converted into carbonic acid and the carbonic acid is allowed to dissociate. The hydrogen ions are secreted, and the newly formed bicarbonate is conserved to maintain a proper buffering capacity.
Diff: 2
Learning Outcome: 18.8
Skill Level: 3 Critical Thinking & Clinical Applications
Labeling Exercises

Using the figure above, identify the labeled part.

1) Label A: __________
Answer: Cortex
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

2) Label B: __________
Answer: Medulla
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

3) Label C: __________
Answer: Renal sinus
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

4) Label D: ________  
Answer: Renal pelvis  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

5) Label E: ________  
Answer: Hilus  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

6) Label F: ________  
Answer: Renal papilla  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

7) Label G: ________  
Answer: Ureter  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

8) Label H: ________  
Answer: Renal capsule  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

9) Label I: ________  
Answer: Renal columns  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

10) Label J: ________  
Answer: Minor calyx  
Diff: 1  
Learning Outcome: 18.2  
Skill Level: 1 Reviewing Facts and Terms

11) Label K: ________  
Answer: Major calyx  
Diff: 1  
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

12) Label L: ________
Answer: Renal pyramids
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

13) Label M: ________
Answer: Nephron loop
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

14) Label N: ________
Answer: Renal corpuscle
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

15) Label O: ________
Answer: Proximal convoluted tubule
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

16) Label P: ________
Answer: Distal convoluted tubule
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

17) Label Q: ________
Answer: Collecting duct
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

18) Label R: ________
Answer: Superior margin of hilus
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

19) Label S: ________
Answer: Inferior margin of hilus
Diff: 1
Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

20) Label T: ________
   Answer: Ureter
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

21) Label U: ________
   Answer: Renal papilla
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

22) Label V: ________
   Answer: Renal capsule
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

23) Label W: ________
   Answer: Renal columns
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

24) Label X: ________
   Answer: Minor calyx
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

25) Label Y: ________
   Answer: Major calyx
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

26) Label Z: ________
   Answer: Renal pelvis
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

27) Label AA: ________
   Answer: Renal sinus
   Diff: 1
   Learning Outcome: 18.2
Skill Level: 1 Reviewing Facts and Terms

28) Label BB: ________
   Answer: Renal pyramids
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

29) Label CC: ________
   Answer: Cortex
   Diff: 1
   Learning Outcome: 18.2
   Skill Level: 1 Reviewing Facts and Terms

30) Label DD: ________
    Answer: Medulla
    Diff: 1
    Learning Outcome: 18.2
    Skill Level: 1 Reviewing Facts and Terms