UNIT 11 - URINARY SYSTEM

WORKSHEET - The Urinary System

Name _____ Period _____

1. Identify three functions of the urinary system:

    1.

    2.

    3.

2. Identify the four major structures of the urinary system and state their primary function:

    1.

    2.

    3.

    4.

3. Identify the three mechanisms of moving urine from the kidneys to the bladder through the ureters:

    1.

    2.

    3.

4. List the four tissue layers of the urinary bladder from the innermost layer to the most (superficial) layer:

    1.

    2.

    3.

    4.

5. What is the name of the triangular area within the bladder between the openings of the two ureters and the urethra:

_____

6. List three terms used to describe the elimination of urine from the bladder:
   1.

   2.

   3.

7. Identify the protective layers of renal tissue from the layer next to the kidney to the most outer (superficial) layer:

   1.

   2.

   3.

8. The functional unit of the kidney is the _____ .

9. What percentage of the blood filtered by the kidney gets eliminated from the body as urine?

10. Identify the structures that make up the renal corpuscle:

11. Arrange the sections of the Renal Tubule from the proximal to distal regions: (Collecting Duct, Loop Of Henle, Proximal Convoluted Tubule, Distal Convoluted Tubule)

12. Identify and describe the three basic physiological processes in urine formation:
   1.

   2.

   3

13. The blood vessels surrounding the renal tubules that allow the processes of tubular reabsorption and tubular secretion and excretion to occur are the

_____

14. Identify the five physical characteristics of urine:

    1.

    2.

    3.

    4.

    5.

15. All of the following are normal organic components of urine EXCEPT:

-Urea	-Creatine
-Uric Acid	-Hippuric Acid
-NaCl	-Ketone Bodies

16. If the following abnormal constituents of urine were present in a routine urinalysis, what would be the most likely cause.

Abnormal Constituent:	Most Likely Cause:
1. Glucose	
2. Erythrocytes	
3. Leukocytes	
4. Ketone Bodies	
5. Microbes:	

17. Match the diseases and abnormalities commonly associated with the urinary system with the most appropriate description:

A. Incontinence	B. Diabetes Insipidus	C. Renal Ptosis
D. Urinary Tract Infections	E. Cystitis	F. Renal Failure
G. Nephrotic Syndrome (Nephritis)	H. Glomerulonephritis (Bright's Disease)	I. Kidney Stones

_____1. inflammation of the bladder usually occurring secondary to ascending urinary tract infections.

_____2. polyuria and polydipsia caused by inadequate secretion of vasopressin (ADH) by the posterior pituitary gland (Neurohypophysis).

_____3. a form of nephritis in which the lesions primarily involve the glomeruli.

_____4. the inability to retain urine, feces, or semen through the loss of sphincter control or because of cerebral or spinal lesions.

_____5. calculus or crystalline masses present in the pelvis of the kidney composed primarily of urates, oxalates, phosphates, and carbonates of varying size.

_____6. inflammation of the kidney including the glomeruli, renal tubules, and interstitial tissue.

_____ 7. failure of the kidneys to perform their essential functions. Usually less than 10% of total kidney function.

_____8. dropping or drooping of the kidney from its normal position.

_____9. infection of the urinary tract (kidneys, ureters, bladder, urethra) by microorganisms.

WORKSHEET - The Urinary System - KEY

1. Identify three functions of the urinary system:

    1. Maintains homeostasis by regulating the composition and volume of the blood by removing and restoring selected amounts of water and solutes

    2. Maintains blood pressure by influencing plasma volume of the blood

    3. Helps in metabolic processes
        a. gluconeogenesis during times of starvation
        b. secretes erythropoietin which stimulates the production of red blood cells
        c. participates in the synthesis of calcitriol (the active form of vitamin D)

2. Identify the four major structures of the urinary system and state their primary function:

    1. Kidneys - filters the blood and produces urine

    2. Ureters - transports urine to the bladder for storage

    3. Bladder - storage site of urine

    4. Urethra - passageway for urine from the bladder to the exterior of the body

3. Identify the three mechanism of movement of urine from the kidneys to the bladder through the ureters:

    1. peristaltic action of the smooth muscle of the muscularis layer of the ureters

    2. hydrostatic pressure

    3. gravity

4. List the four tissue layers of the urinary bladder form the innermost layer to the most (superficial) layer:

    1. Mucosa: innermost layer - composed primarily of transitional epithelium that has the ability to stretch and return to normal position
    2. Submucosa: second layer - a layer of connective tissue that connects the mucosa layer to the muscularis layer of the urinary bladder
    3. Detrusor: the third layer of tissue - consists of three layers of smooth muscle running:
        -inner = longitudinally arranged
        -middle = circular arrangement

-outer = longitudinally arranged

4. Serous Coat: outermost layer - formed by the peritoneum and covers only the superior surface of the organ

5. What is the name of the triangular area within the bladder between the openings of the two ureters and the urethra:

Answer: Trigone

6. List three terms used to describe the elimination of urine from the bladder:

1. Micturition 2. Voiding 3. Urination

7. Identify the protective layers of renal tissue from the layer next to the kidney to the most (superficial) layer:

1. The renal capsule: the innermost layer of the tissue surrounding each kidney comprised of smooth, transparent, fibrous membrane that serves as a barrier against trauma and the spread of infection to the kidney

2. The adipose capsule: a mass of fatty tissue surrounding the renal capsule that protects the kidney from trauma and holds it firmly in place within the abdominal cavity

3. The renal fascia: the outermost layer of renal tissue that anchors the kidney to surrounding structures within the abdominal wall

8. The functional unit of the kidney is the Nephron .

9. What percentage of the blood filtered by the kidney gets eliminated from the body as urine?

Answer: 1%

10. Identify the structures that make up the renal corpuscle:

answer: the glomerulus and the Bowman's (glomerular) capsule

11. Arrange the sections of the renal tubule from the proximal to distal regions:
(collecting duct, loop of Henle, proximal convoluted tubule, distal convoluted tubule)

answer: proximal convoluted tubule - loop of Henle - distal convoluted tubule - collecting duct

12. Identify and Describe the three basic physiological process in urine formation:

    1. Glomerular Filtration: the first step in urine production
        a. the forcing of fluids and dissolved substances through a membrane by pressure
        b. occurs in the renal corpuscle of the kidney

    2. Tubular Absorption: the movement of certain amounts of fluid and filtrate back into the blood. This is carried out by both active and passive transport

        a. occurs in the renal tubules

            i. as the filtrate passes through the renal tubules about 99% of it is reabsorbed by the body

            ii. only 1% of the filtrate actually leaves the body as urine (1.5 liters a day)

            iii. materials commonly reabsorbed include: water, glucose, amino acids, urea, and ions such as Na^{+}, K^{+}, Ca^{+2}, Cl-, HCO^{3-}, and $HPO4^{-2}$

    3. Tubular Secretion: the addition of materials to the filtrate from the blood

        a. essentially the opposite of reabsorption

        b. secreted substances include: K^{+}, H^{+}, ammonia, creatine, and the drugs penicillin and para-amino hippuric acid

        c. rids the body of certain materials

        d. helps control the body's blood pH

13. The blood vessels surrounding the renal tubules that allow the processes of tubular reabsorption and tubular secretion and excretion to occur are the Peritubular Capillaries

14. Identify the five Physical Characteristics of Urine:

1. Color: yellow or amber but can vary considerably with diet
2. Turbidity: transparent when freshly voided but becomes turbid upon standing
3. Odor: odorless but becomes ammonia like upon standing
4. pH: avg. is about 6.0 but has a range from 4.6 to 8.0
   - varies considerably with the diet
5. Specific Gravity: 1.001 to 1.035 - dependant upon the amount of solid materials in solution in the urine

15. All of the following are normal organic components of urine EXCEPT:

-Urea	-Creatine
-Uric Acid	-Hippuric Acid
-NaCl	-Ketone Bodies

Answer: NaCl is a normal ***inorganic*** component of urine.

16. If the following Abnormal Constituents of urine were present in a routine urinalysis, what would be the most likely cause of them being present be attributed to?

Abnormal Constituent:	Most Likely Cause:
1. Glucose	Ans: possibly the initial stages of Diabetes
2. Erythrocytes	Ans: kidney stones or UTI
3. Leukocytes	Ans: infection within the urinary system
4. Ketone Bodies	Ans: could indicate diabetes, starvation, or too little CHO in the diet
5. Microbes:	Ans: bacteria in the urine

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