STATION 1

1. Which of the following human body systems is NOT being tested in Anatomy & Physiology this year?
    A. Cardiovascular
    B. Excretory
    C. Nervous
    D. Lymphatic
    E. All of the above are being tested in the event this year

2. When blood is centrifuged, roughly __ % of the sample corresponds to the formed elements (not plasma).
    A. 25
    B. 35
    C. 45
    D. 55
    E. 65

3. Among the formed elements, select the choice that correctly ranks the abundance of the primary individual elements from LEAST to GREATEST.
    A. Leukocytes, Erythrocytes, Thrombocytes
    B. Thrombocytes, Leukocytes, Erythrocytes
    C. Erythrocytes, Leukocytes, Thrombocytes
    D. Erythrocytes, Thrombocytes, Leukocytes
    E. Leukocytes, Thrombocytes, Erythrocytes

4. What is the most abundant type of white blood cell present in blood?
    A. Eosinophil
    B. Basophil
    C. Monocyte
    D. Neutrophil
    E. Lymphocyte

5. True/False: Blood proteins are considered formed elements of blood.
    A. True
    B. False

STATION 2

6. Which of the following cell types produces platelets?
    A. Megakaryocyte
    B. Reticulocyte
    C. Proerythroblast
    D. Myeloblast
    E. None of the above

7. Which specific protein is responsible for the transport of molecular oxygen in the blood?
    A. Vasopressin
    B. Fibrinogen
    C. Albumin
    D. Hemoglobin
    E. Immunoglobulin

8. Which of the following components is NOT involved in the <u>extrinsic</u> pathway of coagulation?
    A. Tissue Factor
    B. Calcium Ions
    C. Coagulation Factor X
    D. Coagulation Factor XII
    E. Coagulation Factor V

9. Activation of which specific coagulation factor is responsible for the strengthening of fibrin threads in the final stage of blood clotting?
    A. II
    B. I
    C. XIII
    D. XII
    E. X

10. True/False: Blood type AB is the universal acceptor.
    A. True
    B. False

STATION 3

11. True/False: The right common carotid artery is a direct branch off of the aortic arch.
    A. True
    B. False

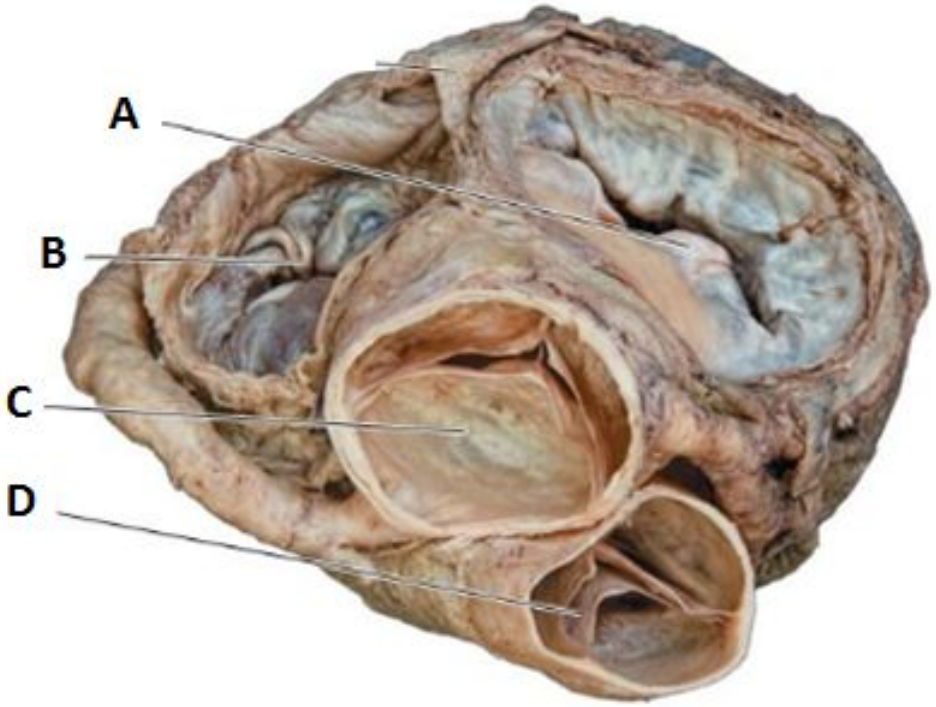
12. Select the correct flow of blood through the heart in a SINGLE loop starting with the first anatomical entity listed in each answer choice. Note that some vessels/chambers might be skipped.
    A. Aorta, Left Ventricle, Pulmonary Arteries, Right Atrium, Right Ventricle
    B. Bicuspid Valve, Aortic Valve, Tricuspid Valve, Pulmonary Trunk, Left Atrium
    C. Tricuspid Valve, Left Ventricle, Aorta, Bicuspid Valve, Left Atrium
    D. Superior Vena Cava, Bicuspid Valve, Right Ventricle, Pulmonary Valve, Aorta
    E. None of the above

13. Which chamber of the heart has the thickest myocardium?
    A. Right Atrium
    B. Right Ventricle
    C. Left Atrium
    D. Left Ventricle

14. The left coronary artery divides into which two branches?
    A. Circumflex Branch, Posterior Interventricular Branch
    B. Marginal Branch, Posterior Interventricular Branch
    C. Anterior Interventricular Branch, Marginal Branch
    D. Circumflex Branch, Anterior Interventricular Branch
    E. Marginal Branch, Circumflex Branch

15. The right coronary artery divides into which two branches?
    A. Circumflex Branch, Posterior Interventricular Branch
    B. Marginal Branch, Posterior Interventricular Branch
    C. Anterior Interventricular Branch, Marginal Branch
    D. Circumflex Branch, Anterior Interventricular Branch
    E. Marginal Branch, Circumflex Branch

STATION 4



Utilize the diagram of the heart valves above to answer the questions at this station. There is only one possible answer for each question and some answers may be repeated.

16. This valve allows for oxygenated blood to exit the heart.

17. This valve is named after a Bishop's miter (mitre).

18. This valve allows for blood to enter the largest chamber of the heart.

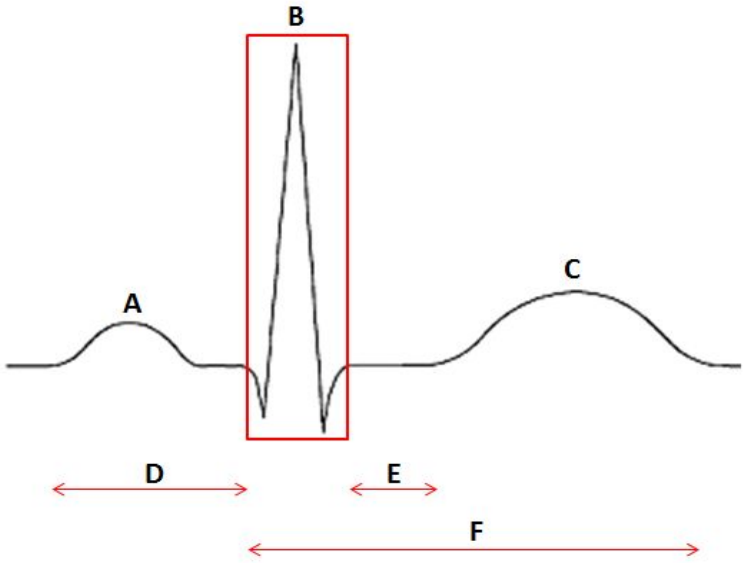
19. This valve allows for deoxygenated blood to enter a chamber of the heart.

20. This valve allows for deoxygenated blood to exit the heart.

21. This valve allows for oxygenated blood to enter a chamber of the heart.

22. This valve allows blood to travel to the lungs.

STATION 5



Utilize the EKG diagram above to answer the following questions. There is only one possible answer for each question and some answers may be repeated.

23. This aspect of the EKG represents atrial depolarization.

24. This aspect of the EKG represents ventricular repolarization.

25. This aspect of the EKG represents the conduction time between excitation of the atria and excitation of the ventricles.

26. This aspect of the EKG is elevated during a myocardial infarction.

27. This aspect of the EKG can lengthen during coronary artery disease.

28. This aspect of the EKG can lengthen during ischemia of myocardial tissue.

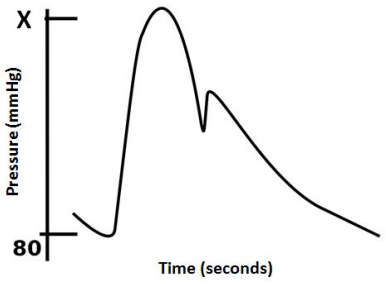
29. This aspect of the EKG is depressed when insufficient oxygen is supplied to heart tissue.

30. This aspect of the EKG is representative of ventricular depolarization.

STATION 6

31. In one experiment, you determine that an individual pumps a total 25 liters (L) of blood in a total of 5 minutes when at rest. In another experiment (also at rest), you determine that over the course of 26 minutes, the individual's heart beat a total of 1950 times. What is the best estimate of resting stroke volume for this individual in milliliters per minute (mL/min)? Note that 1000 mL = 1 L .
    A. 375 mL/min
    B. 75 mL/min
    C. 5 mL/min
    D. 67 mL/min
    E. 15 mL/min

32. What is the term for the total volume that returns to the right ventricle?
    A. Ventricular reserve
    B. Arterial return
    C. Pulmonary reserve
    D. Systemic Return
    E. Venous Return



$$MAP = \frac{A + B(X)}{C}$$

33. Blood pressure readings of an artery were graphed over time for an individual, as shown above. The mean arterial pressure (MAP) can be reduced to the expression directly adjacent to the graph. What is the value of A + B + C ?
    A. 83
    B. 85
    C. 164
    D. 165
    E. 6

STATION 7

REST STATION

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STATION 8

34. Lymphatic tissue primarily contains an abundance of _____ .
    A. Neutrophils
    B. Eosinophils
    C. Basophils
    D. Lymphocytes
    E. Monocytes

35. Which of the following is a function of the lymphatic system?
    A. Drain excess interstitial fluid.
    B. Immunity
    C. Transportation of water-soluble vitamins.
    D. A & B
    E. B & C
    F. A,B, & C

36. True/False: Lymphatic vessels convey lymph bidirectionally.
    A. True
    B. False

37. The thoracic duct drains which percentage of the body roughly?
    A. 10%
    B. 25%
    C. 50%
    D. 75%
    E. 90%

38. The right lymphatic duct drains which percentage of the body roughly?
    A. 10%
    B. 25%
    C. 50%
    D. 75%
    E. 90%

STATION 9

39. The right lymphatic duct drains into the _____ vein.
    A. Right subclavian
    B. Left subclavian
    C. Right jugular
    D. Left jugular
    E. Intercostal

40. What is the specific name of lymphatic capillaries located in the villi of the small intestine?
    A. Peyer's patches
    B. Lacteals
    C. Cisterna chyli
    D. Lymph nodes
    E. Tonsils

41. True/False: Pressure is the main driver of the flow of lymph throughout the body.
    A. True
    B. False

42. Hassall's corpuscles are located in the _____ .
    A. Spleen
    B. Thyroid Gland
    C. Thymus
    D. Bone marrow
    E. Liver

43. Which white blood cell type matures in the tissue that you selected in the previous question?
    A. T cells
    B. B cells
    C. Neutrophils
    D. Megakaryocytes
    E. None of the above

STATION 10

44. Lymphatic nodules are located within the _____ of lymph nodes.
    A. Medulla
    B. Capsule
    C. Outer Cortex
    D. Inner Cortex
    E. Hilum

45. Lymphatic nodules predominantly contain _____ .
    A. T cells
    B. B cells
    C. Neutrophils
    D. Eosinophils
    E. Dendritic Cells

46. Which two types of white blood cells are made in lymph nodes?
    A. Monocytes and Basophils
    B. Eosinophils and Lymphocytes
    C. Neutrophils and Monocytes
    D. Lymphocytes and Monocytes
    E. Basophils and Eosinophils

47. _____ lymph vessels convey lymph _____ lymph nodes.
    A. Afferent , away from
    B. Efferent, toward
    C. Afferent, toward
    D. A & B
    E. None of the above

48. True/False: Lymph nodes are the most numerous among lymphatic tissues.
    A. True
    B. False

STATION 11

49. True/False: The thymus is the largest lymphatic structure present in the body.
    A. True
    B. False

50. Based on your answer to the previous question, select the correct response.
    A. The thymus is not the largest. It is actually the liver.
    B. The thymus is not the largest. It is actually the appendix.
    C. The answer to the previous question is false.
    D. None of these statements are correct.

51. True/False: Billroth's cords are present in the largest lymphatic structure in the body.
    A. True
    B. False

52. True/False: Billroth's cords are present in the white pulp of the largest lymphatic structure in the body.
    A. True
    B. False, because they are present in the red pulp.
    C. False, because the structure lacks both white and red pulp.

53. True/False: The largest lymphatic structure present in the body has six letters in its name.
    A. True
    B. False, because it has more than six letters.
    C. False, because it has less than six letters.

STATION 12

54. Erythrocytes are broken down and salvaged for ____ , which is stored in the _____.
    A. Magnesium , Liver
    B. Iron , Spleen
    C. Calcium , Liver
    D. Sodium , Spleen
    E. Iron , Liver

55. Which of the following is not categorized as MALT?
    A. Tonsils
    B. Peyer's Patches
    C. Cisterna Chyli
    D. Appendix
    E. None of the above

56. Peyer's Patches are found in the _____ .
    A. Pharynx
    B. Esophagus
    C. Stomach
    D. Small Intestine
    E. Large Intestine

57. True/False: Research has shown that pathological bacteria generally occupy the appendix in a healthy human.
    A. True
    B. False

58. True/False: The Cisterna Chyli is where chyle from the digestive tract travels through.
    A. True
    B. False

STATION 13

59. How many tonsils are there total in a normal human being?
    A. 3
    B. 4
    C. 5
    D. 6
    E. 7

60. True/False: There exist 3 pairs of tonsils in a normal human being.
    A. True
    B. False

61. Based on your answer to the previous question, select the correct choice.
    A. The answer to the previous question is true.
    B. The answer to the previous question is false because there exists an additional tonsil in addition to the 3 pairs of tonsils
    C. The answer to the previous question is false because there exist only two pairs of tonsils along with a fifth tonsil that is not paired.
    D. None of the above.

62. Based on your answer to the previous question, select the correct choice.
    A. There exist pairs of pharyngeal, lingual, and palatine tonsils.
    B. There exist pairs of pharyngeal, lingual, and palatine tonsils, along with one additional adenoid tonsil.
    C. There exist pairs of pharyngeal and lingual tonsils, along with one palatine tonsil.
    D. There exist pairs of lingual and palatine tonsils, along with one pharyngeal tonsil.
    E. There exist pairs of pharyngeal and palatine tonsils, along with one lingual tonsil.

63. The tonsils confer immunity against foreign substances that are either inhaled or ingested.
    A. True
    B. False

STATION 14

REST STATION

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STATION 15

64. Which of the following is NOT a function of the kidneys.
    A. Regulation of blood pH
    B. Regulation of blood volume
    C. Regulation of blood pressure
    D. Excretion of wastes
    E. None of the above

65. Because the kidneys are posterior to the abdominal cavity's peritoneum, they are deemed _____ .
    A. Anteroperitoneal
    B. Superficial
    C. Superolateral
    D. Levator
    E. Retroperitoneal

66. True/False: The kidneys filter out incoming arterial blood.
    A. True
    B. False

67. Choose the path of urine flow that is correct of the following.
    A. Collecting Duct, Minor Calyx, Major Calyx, Renal Pelvis, Ureter, Bladder
    B. Renal Pelvis, Collecting Duct, Minor Calyx, Major Calyx, Ureter, Bladder
    C. Collecting Duct, Renal Pelvis, Minor Calyx, Major Calyx, Ureter, Bladder
    D. Minor Calyx, Major Calyx, Renal Pelvis, Collecting Duct, Ureter, Bladder
    E. Collecting Duct, Major Calyx, Minor Calyx, Renal Pelvis, Ureter, Bladder

68. Choose a correct path of blood through the kidney. Many vessels are skipped.
    A. Renal Artery, Arcuate Arteries, Interlobar Arteries, Arcuate Veins
    B. Segmental Arteries, Afferent Arterioles, Interlobar Veins, Arcuate Veins
    C. Interlobular Arteries, Interlobular Veins, Arcuate Veins, Segmental Arteries
    D. Arcuate Arteries, Interlobular Arteries, Arcuate Veins, Interlobar Veins
    E. None of the above

STATION 16

69. Which part of the nephron does NOT contribute in any way to water reabsorption?
    A. Renal Corpuscle
    B. Proximal Convoluted Tubule
    C. Loop of Henle (Descending)
    D. Loop of Henle (Ascending)
    E. Distal Convoluted Tubule

70. Where does filtration occur in the nephron?
    A. Renal Corpuscle
    B. Proximal Convoluted Tubule
    C. Loop of Henle
    D. Distal Convoluted Tubule
    E. Collecting Duct

71. The capillaries in the region of filtration that you chose in the previous question are categorized as _____ .
    A. Ligated
    B. Branched
    C. Fenestrated
    D. Merged
    E. None of the above

72. Which part of the nephron contains squamous epithelium?
    A. Collecting Duct
    B. Proximal Convoluted Tubule
    C. Loop of Henle (Descending)
    D. Loop of Henle (Ascending)
    E. Distal Convoluted Tubule

73. True/False: Juxtamedullary nephrons outnumber cortical nephrons.
    A. True
    B. False

STATION 17

74. During filtration, which of the following remains in the blood?
    A. Water
    B. Ions
    C. Fatty Acids
    D. Glucose
    E. Proteins

75. Which of the following occurs in the proximal convoluted tubule?
    A. Filtration
    B. Reabsorption
    C. Secretion
    D. A & B
    E. B & C

76. Which of the following occurs in the Loop of Henle?
    A. Filtration
    B. Reabsorption
    C. Secretion
    D. A & B
    E. B & C

77. Which of the following occurs in the distal convoluted tubule?
    A. Filtration
    B. Reabsorption
    C. Secretion
    D. A & B
    E. B & C

78. True/False: Both the ascending and descending aspects of the Loop of Henle contain thick and thin segments.
    A. True
    B. False

STATION 18

79. During filtration, which of the following remains in the blood?
    A. Water
    B. Ions
    C. Fatty Acids
    D. Glucose
    E. Proteins

80. Which of the following ions are secreted in the nephron?
    A. Hydrogen ions
    B. Potassium ions
    C. Phosphate ions
    D. A & B
    E. A & C

81. Blood pressure in the glomerular capillaries is referred to as _____ .
    A. Glomerular Hydrostatic Pressure
    B. Blood Colloid Osmotic Pressure
    C. Net Filtration Pressure
    D. Capsular Hydrostatic Pressure
    E. Capsular Colloid Osmotic Pressure

82. The value of this pressure is typically 0.
    A. Glomerular Hydrostatic Pressure
    B. Blood Colloid Osmotic Pressure
    C. Net Filtration Pressure
    D. Capsular Hydrostatic Pressure
    E. Capsular Colloid Osmotic Pressure

83. This pressure opposes the pressure you chose in Question 81.
    A. Glomerular Hydrostatic Pressure
    B. Blood Colloid Osmotic Pressure
    C. Net Filtration Pressure
    D. Capsular Hydrostatic Pressure
    E. Capsular Colloid Osmotic Pressure

STATION 19

84. Vasopressin acts on which of the following aspects of the nephron?
    A. Loop of Henle
    B. Distal Convoluted Tubule
    C. Collecting Duct
    D. B & C
    E. A, B, & C

85. Would you expect vasopressin to increase or decrease urine output?
    A. Increase
    B. Decrease

86. What is the general mechanism of vasopressin?
    A. Decreased thickness of the cell membrane of endothelial cells lining specific aspects of the nephron.
    B. Incorporation of aquaporins into the cell membrane of endothelial cells lining specific aspects of the nephron.
    C. Contraction of the nephron.
    D. Decreased blood flow to the kidneys.
    E. None of the above

87. What is another name for vasopressin?
    A. Thymosin
    B. Prostaglandin
    C. Antidiuretic Hormone
    D. Cortisol
    E. Glucagon

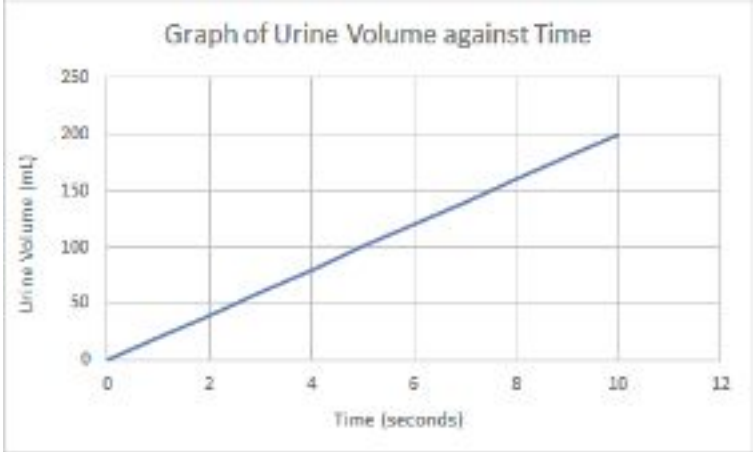
88. Urine is generally _____ .
    A. Acidic
    B. Basic
    C. Neutral

STATION 20

You and your partner are medical laboratory technicians who are trying to determine the glomerular filtration rate (GFR) of a patient at the request of a nephrologist.

First, you both conduct tests to determine the osmolarity of the patient's urine. After collecting an initial urine sample of 100 mL from the patient, you both determine that in the total of 100 mL of urine that was collected, there exists a total of 17.3 grams of dissolved substances.

Next, you both attempt to estimate the urine flow rate by assessing urine volume as a variable of time while the patient urinates. The data you both were able to acquire is graphed below.



Lastly, you both determine the blood plasma concentration to be 2.5 g/mL .

89. What is the GFR of the patient in mL/min?
    Round your answer to the nearest whole number.
    A. 98 mL/min
    B. 110 mL/min
    C. 118 mL/min
    D. 124 mL/min
    E. 135 mL/min

90. Is this a healthy GFR?
    A. Yes
    B. No