

**NBCE  
MOCK BOARD QUESTIONS  
Physiology**

1. Which of the following is **not** a primary function of the RBCs?
  - A. transport
  - B. homeostasis
  - C. phagocytosis
  - D. hemostasis
  
2. Which of the following is necessary for RBC maturation and if absent can lead to macrocytic cells?
  - A. iron
  - B. zinc
  - C. oxygen
  - D. vitamin B<sub>12</sub>
  
3. Which of the following is most commonly elevated during a bacterial infection?
  - A. eosinophil
  - B. lymphocyte
  - C. monocyte
  - D. neutrophil
  
4. Where are the majority of blood coagulation factors formed?
  - A. bone marrow
  - B. spleen
  - C. liver
  - D. megakaryocytes
  
5. Ficks law states that molecules will diffuse with a flux rate directly related to all of the following except for \_\_\_\_\_.
  - A. Area of the cell membrane
  - B. Diffusion constant
  - C. Molecular charge
  - D. Concentration gradient
  
6. Osmotic pressure is dependent on all of the following except for \_\_\_\_\_.
  - A. Ionization constant
  - B. Ideal gas constant
  - C. Temperature
  - D. Molecular weight of the solute
  
7. A graded potential has all of the following characteristics except for \_\_\_\_\_.
  - A. Can be stimulatory or inhibitory
  - B. Is a subthreshold response
  - C. Is a local response
  - D. Is propagated without decrement

8. During the after-hyperpolarization (Positive after potential) of an action potential the hypopolarizing return to base line is due to \_\_\_\_\_.
- A. The slow closure of the Na<sup>+</sup> voltage gated slow gate
  - B. The rapid closure of the K<sup>+</sup> channel
  - C. The Na<sup>+</sup>K<sup>+</sup>ATPase
  - D. The slow closure of the K<sup>+</sup> voltage gate after reaching reset
9. Velocity of action potential propagation is given by which of the following relationships?
- A. Cm/Rm
  - B. Space constant x Rm
  - C. Time constant x Cm
  - D. Space constant / time constant
10. An alpha motor neuron action potential will always result in a \_\_\_\_\_ .
- A. Post synaptic nerve action potential
  - B. Post synaptic nerve EPSP
  - C. Presynaptic nerve IPSP
  - D. Skeletal muscle action potential
11. Integration of two or more stimulatory presynaptic neurons firing at the same time is termed \_\_\_\_\_.
- A. Axonal summation
  - B. Temporal summation
  - C. Dendritic summation
  - D. Spatial summation
12. A sarcomere consists of all of the following regions except for \_\_\_\_\_ .
- A. Z line or disk
  - B. M line or disk
  - C. I zone
  - D. D zone
13. The point at which a skeletal muscle begins to lift a load starts which phase of contraction?
- A. Isometric contraction
  - B. Isotonic contraction
  - C. Isotonic relaxation
  - D. Isometric relaxation
14. An increase in sarcomere length, tendon length not changing, and endomysium lengthening would be what phase of skeletal muscle contraction?
- A. Isometric contraction
  - B. Isotonic relaxation
  - C. Isometric relaxation
  - D. Isotonic contraction

15. During an isometric contraction the skeletal muscle fiber \_\_\_\_\_.
- A. Lengthens
  - B. Shortens
  - C. Snaps
  - D. Stays the same length
16. During which phase of a normal skeletal muscle contraction does the series elastic element shorten?
- A. Isometric contraction phase
  - B. Isometric relaxation phase
  - C. Isotonic contraction phase
  - D. Isotonic relaxation phase
17. A type of skeletal muscle contraction in which the same force is generated while the muscle shortens is known as \_\_\_\_\_ contraction.
- A. Isometric
  - B. Isokenitic
  - C. Eccentric
  - D. Isotonic
18. What would cause a decrease in cardiac muscle cell contractility?
- A. An increase in sympathetic nervous activity
  - B. A decrease in parasympathetic nervous activity
  - C. An increase in parasympathetic nervous activity
  - D. A decrease in cytosolic calcium ion concentration
19. The intercalated disk connecting cardiac muscle cells to one another interdigitate increasing all of the following except for
- A. Surface area of connection
  - B. Force of contraction
  - C. Number of gap junctions
  - D. Strength of the connection
20. Cardiac muscle cells are similar to smooth muscle cells in all the following ways except for
- A. Smaller than skeletal muscle cells
  - B. Require external sources of calcium
  - C. Remove cytosolic calcium to both the SR and extracellular fluid
  - D. They are branched
21. In the order of action potential propagation through the cardiac conduction system which structure follows immediately after the AV node?
- A. Bundle branches
  - B. Internodal tracts
  - C. Purkinji fibers
  - D. Bundle of His

22. Which of the following is responsible for slowing the cardiac action potential.?
- A. SA node
  - B. Internodal tracts
  - C. AV node
  - D. Bundle of His
23. Which of the following is the major source of body water loss?
- A. urination
  - B. sweating
  - C. respiration
  - D. feces
24. What is the functional unit of the kidney?
- A. glomerulus
  - B. tubule
  - C. pelvis
  - D. nephron
25. What part of the glomerular membrane requires a significant pressure to penetrate it?
- A. slit pores
  - B. endothelial lining
  - C. basement membrane
  - D. podocytes
26. Where are chloride ions actively reabsorbed in the kidney tubule?
- A. proximal tubule
  - B. descending limb
  - C. thin loop of Henle
  - D. thick ascending limb
27. What part of the renal tubule is most influenced by hormones?
- A. proximal tubule
  - B. descending limb
  - C. thin loop of Henle
  - D. distal tubule
28. In the presence of ADH, where is the majority of water reabsorbed?
- A. proximal tubule
  - B. descending limb
  - C. thin loop of Henle
  - D. thick ascending limb
29. How does the hypothalamus respond when the osmoreceptors sense an increase in extracellular osmolality?
- A. increases ADH secretion
  - B. decreases ADH secretion
  - C. increases aldosterone secretion
  - D. decreases aldosterone secretion

30. Which of the following, within certain limits, is controlled simultaneously with blood volume?
- A. cardiac output
  - B. urine formation
  - C. urine volume
  - D. extracellular volume
31. A patient presents with a urine specimen that contains nitrites. Which of the following should be suspected?
- A. infection
  - B. dehydration
  - C. diabetes insipidus
  - D. diabetes mellitus
32. All of the following are true of the GI hormones except for \_\_\_\_\_.
- A. All are peptides
  - B. Released in response to nerve stimulus, stretch of the cell, and chemical stimulus
  - C. Include endocrine, paracrine, and neurocrine hormones
  - D. Secreted from the muscularis, submucosa, and mucosa layers
33. Mastication is normally under the control of \_\_\_\_\_.
- A. Voluntary motor cortex
  - B. CNS
  - C. ANS
  - D. Brain stem nuclei
34. Gastric emptying is enhanced by all of the following except for \_\_\_\_\_.
- A. Increased volume in the stomach
  - B. Hypertonic food
  - C. High acid foods
  - D. Gastrin
35. The inability to produce mucus in the GI tract would lead to all of the following except for \_\_\_\_\_.
- A. Slow passage of food particles
  - B. Ulceration
  - C. Protein digestion enhanced
  - D. Increased water secretion
36. Which of the following is the most plentiful acid-base regulator?
- A. bicarbonate buffer system
  - B. respiratory system
  - C. renal system
  - D. proteins

37. What part of the kidney has the greatest potential for secreting the largest amount of hydrogen ions?
- A. proximal tubule
  - B. descending limb
  - C. loop of the Henle
  - D. collecting duct
38. What is the ratio of  $\text{HCO}_3^-$  to dissolved  $\text{CO}_2$  in the bicarbonate buffer system?
- A. 1/1
  - B. 2/1
  - C. 10/1
  - D. 20/1
39. Which of the following glycosidic bonds are not digestible by the human?
- A. Alpha 1-2
  - B. Alpha 1-4
  - C. Alpha 1-6
  - D. Beta 1-4
40. Why is pepsin important in protein digestion?
- A. Self activating
  - B. Only peptidase that can operate in an acid environment
  - C. Required in order to bind intrinsic factor to B-12
  - D. Only peptidase which can digest collagen
41. Which of the following is synonymous with the posterior pituitary?
- A. adenohypophysis
  - B. neurohypophysis
  - C. pars intermedia
  - D. supraoptic nucleus
42. Which of the following cells produces ACTH?
- A. somatotropes
  - B. corticotropes
  - C. thyrotropes
  - D. gonadotropes
43. Where is the majority of ADH produced?
- A. posterior pituitary
  - B. anterior pituitary
  - C. produced by adrenocorticotropin
  - D. supraoptic nucleus
44. Which of the following stimulates the production of the testosterone in men?
- A. TSH
  - B. ACTH
  - C. FSH
  - D. LH

45. Which of the following thyroid hormones is the most biologically active?  
A. T<sub>1</sub>  
B. T<sub>2</sub>  
C. T<sub>3</sub>  
D. T<sub>4</sub>
46. Which of the following stimulates the majority of thyroid gland activities?  
A. TRH  
B. calcitonin  
C. TSH  
D. T<sub>1</sub>
47. What changes occur in urine during the presence of elevated parathormone?  
A. increased calcium  
B. increased phosphate  
C. elevated sodium  
D. decreased potassium
48. Which volume or capacity does tidal volume mix with after an inspiration?  
A. expiratory reserve volume  
B. residual volume  
C. functional residual capacity  
D. total lung capacity
49. What is the principle glucocorticoid produced by the body?  
A. aldosterone  
B. cortisol  
C. androgen  
D. cortisone
50. What is the base structure for mineralocorticoids?  
A. sodium  
B. iodine  
C. cholesterol  
D. tyrosine
51. In which of the following is testosterone produced?  
A. seminiferous tubules  
B. epididymis  
C. cells of Leydig  
D. adrenal medulla
52. Which of the following is first available at the very beginning of an exercise bout to provide the needed energy for skeletal muscle contraction?  
A. CrP  
B. Citric Acid Cycle  
C. ATP  
D. Glycogen

53. Which of the following determines the actual proportions of skeletal muscle types in a muscle?
- A. Type of exercise training
  - B. Training before age 12
  - C. Training after age 12
  - D. Genetics
54. Endurance training increases all of the following except for \_\_\_\_.
- A. VO<sub>2</sub>max
  - B. Cardiac stroke volume
  - C. Blood volume
  - D. Max heart rate
55. The Haldane effect
- A. increases carbon dioxide transport at the tissues
  - B. decreases carbon dioxide diffusion at the lungs
  - C. increases oxygen transport at the lungs
  - D. increases oxygen diffusion at the tissues
56. Which of the following is true of the loop of Henle?
- A. located in the renal medulla
  - B. located in the renal cortex
  - C. located in the renal pelvis
  - D. located in the major calyx
57. An ideal ventilation-perfusion ratio
- A. occurs at the apex of the lung
  - B. increases ventilation
  - C. provides optimum conditions for gas exchange
  - D. is determined by diet
58. Pepsinogen is activated by
- A. intrinsic factor
  - B. hydrochloric acid
  - C. trypsin
  - D. enterokinase
59. Slow waves or BER
- A. are true action potentials
  - B. determine the force of contraction
  - C. determine rhythmicity of GI smooth muscle contractions
  - D. are found only in the stomach
60. Which of the following is a propulsion movement that occurs in the interdigestive period?
- A. peristalsis
  - B. segmentation
  - C. haustrations
  - D. migrating myoelectric complex



61. The primary function of the proximal half of the large intestine is
- A. secretion of large volumes of water and electrolytes
  - B. absorption of water and electrolytes
  - C. final digestion of lipids and proteins
  - D. absorption of vitamin B 12
62. Hydrochloric acid and intrinsic factor are secreted by
- A. oxyntic or parietal cells
  - B. peptic or chief cells
  - C. goblet cells
  - D. G cells
63. Micelle formation occurs in the
- A. stomach
  - B. small intestine (lumen)
  - C. enterocytes
  - D. blood
64. Which lipids enter the liver sinusoids from the portal circulation?
- A. triglycerides
  - B. cholesterol
  - C. long-chain fatty acids
  - D. short-chain and medium-chain fatty acids
65. Cortisol blockage of prostaglandin and leukotriene production is responsible for a decrease in
- A. the immune response
  - B. reproduction
  - C. the inflammatory response
  - D. cardiac function
66. Which of the following is true of menstruation?
- A. begins on the day of ovulation
  - B. results from a decrease of progesterone levels as the corpus luteum regresses
  - C. occurs when the uterus switches from an estrogen-dominated to a progesterone-dominated environment
  - D. occurs at the time of secretory differentiation of the endometrium
67. What part of the adrenal gland produces the majority of the glucocorticoids?
- A. medulla
  - B. zona glomerulosa
  - C. zona fasciculata
  - D. zona reticularis

68. Which of the following would lead to the largest increase in  $\text{VO}_2$  max?
- A. sprint training
  - B. training with heavy weights
  - C. aerobic endurance training
  - D. anaerobic weight training
69. The baroreceptor reflex is MOST effective in controlling
- A. rapidly changing blood pressure
  - B. blood pressure when systolic pressure is below 60 mm. Hg.
  - C. long-term blood pressure
  - D. barometric pressure
70. The renin-angiotensin-aldosterone mechanism is related to
- A. maintaining normal renal filtration pressure
  - B. regulation of peripheral resistance
  - C. the baroreceptor reflex
  - D. the mass sympathetic response
71. The two determinates of long-term blood pressure are
- A. cardiac output and venous return
  - B. salt and water intake and urine output
  - C. sympathetic and parasympathetic input
  - D. peripheral resistance and salt and water intake
72. Which of the following mechanisms is the MOST important in regulating coronary blood flow?
- A. Local blood flow mechanisms
  - B. Arterial blood pressure regulatory mechanisms
  - C. Direct effect of the sympathetic nervous system
  - D. Arterial chemoreceptors
73. Long-term venous return (at rest) is determined by
- A. cardiac reserve
  - B. peripheral resistance
  - C. ANS
  - D. heart rate
74. Cardiac reserve is
- A. the ability of the heart to increase cardiac output
  - B. cardiac output correlated to body mass and surface area
  - C. output per unit time
  - D. the volume of blood located in the ventricular chamber
75. The aortic pulse pressure is determined by
- A. End diastolic volume minus end systolic volume
  - B. Heart rate times stroke volume
  - C. Systolic pressure minus diastolic pressure
  - D. Pressure times volume

76. The cardiac atrio-ventricular valves close in response to blood flow at the onset of?
- A. atrial systole
  - B. isovolumic contraction
  - C. ejection
  - D. isovolumic relaxation
77. End diastolic volume is determined by the venous return and
- A. the afterload
  - B. rapid inflow
  - C. end systolic volume
  - D. diastasis
78. The third and fourth heart sounds are the result of
- A. closure of the atrio-ventricular valves
  - B. ventricular filling
  - C. closure of the semilunar valves
  - D. ejection
79. Which component of the ECG would you look at to determine if conduction through the AV node is normal?
- A. P wave
  - B. P-R interval
  - C. QRS complex
  - D. S-T interval
80. Which component of the ECG is used to determine the conduction time through the bundle branches?
- A. P-R interval
  - B. QRS complex
  - C. J point
  - D. S-T segment
81. Which component of the circulation is most affected by local factors?
- A. large muscular arteries
  - B. small arteries
  - C. small arterioles and precapillary sphincters
  - D. veins
82. An increase in blood flow to skeletal muscle during exercise is an example of
- A. The myogenic theory
  - B. reactive hyperemia
  - C. active hyperemia
  - D. actiemia

83. Adjustments of blood flow to a tissue or organ based on its metabolic activity is largely achieved by
- A. sympathetic reflexes
  - B. parasympathetic reflexes
  - C. local control
  - D. hormonal control
84. Contraction of the diaphragm and external intercostals causes
- A. the volume of the thorax to increase and pressure in the alveoli to decrease
  - B. pressure in the alveoli to increase
  - C. forced expiration
  - D. pressure in alveoli to be the same as atmospheric pressure
85. Which of the items below would not be true during inspiration?
- A. atmospheric pressure of 0 mm. Hg.
  - B. pleural pressure of -4 or -5 cm. H<sub>2</sub>O or higher
  - C. alveolar pressure of -2 cm. H<sub>2</sub>O
  - D. a decrease in the transpulmonary pressure
86. Which pressure holds the lungs against the thorax?
- A. alveolar pressure
  - B. pleural pressure
  - C. alveolar pressure + pleural pressure
  - D. transpulmonary pressure
87. Functional residual capacity includes
- A. ERV + RV
  - B. TV + ERV
  - C. RV + VC
  - D. VC – RV
88. Most of the cross-sectional area of the tracheobronchial tree is located in the
- A. conductance zone
  - B. transitional zone
  - C. terminal bronchioles
  - D. respiratory bronchioles
89. Which structure contains upper motor neurons?
- A. globus pallidus
  - B. VPL nucleus
  - C. inferior olivary nucleus
  - D. red nucleus
90. The tectospinal tract is characterized by all of the following EXCEPT
- A. It is found at cervical and thoracic levels of the spinal cord.
  - B. It is involved in reflex turning of the head in response to visual stimuli.
  - C. It originates in the superior colliculus.
  - D. It is found in the anterior funiculus.

91. Which one of the following tracts specifically facilitates flexor muscles?
- A. rubrospinal
  - B. pontine reticulospinal
  - C. tectospinal
  - D. medial longitudinal fasciculus
92. Which one of the following tracts is involved in the synchronization of limb movements?
- A. rubrospinal
  - B. pontine reticulospinal
  - C. tectospinal
  - D. medial longitudinal fasciculus
93. The “gate controller” in the Pain Gate Theory is the
- A. large diameter non-nociceptor fiber
  - B. small diameter nociceptor fiber
  - C. substantia gelatinosa cell
  - D. Rexed laminae IV and V cell
94. In the descending pain modulating system periaqueductal gray neurons project their axons to
- A. the nucleus raphe magnus
  - B. enkephalin-containing inhibitory interneurons
  - C. Rexed lamina V interneurons
  - D. the substantia gelatinosa
95. The dorsal column medial lemniscal pathway is responsible for all of the following sensory modalities EXCEPT
- A. two point discriminative touch
  - B. vibration
  - C. pressure
  - D. unconscious proprioception
96. The ascending sensory pathways begin in
- A. the dorsal root ganglion
  - B. a receptor
  - C. the sensory cerebral cortex
  - D. an effector
97. The inner layer of the optic cup becomes the
- A. lens
  - B. retinal pigment epithelium
  - C. primary vitreous body
  - D. neural retina

98. The optic nerve originates from
- bipolar cell axons
  - interplexiform cell axons
  - ganglion cell axons
  - amacrine cell axons
99. In the pupillary light reflex fibers from the nucleus of Edinger Westphal project to the
- sphincter pupillae muscle of the iris
  - pretectal nucleus
  - lateral geniculate nucleus
  - ciliary ganglion
100. What structure is essential for the transduction of sound waves to the electrical potential of a nerve impulse in the Organ of Corti?
- vestibular membrane
  - basilar membrane
  - tectorial membrane
  - Reissner's membrane
101. Cranial nerves conveying autonomic afferent information include all of the following except:
- V
  - VII
  - IX
  - X
102. Which cranial nerve nucleus sends efferent fibers for the papillary light reflex?
- Pterygopalatine ganglion
  - Edinger Westpal nucleus
  - Solitary nucleus
  - Submandibular nucleus
103. Where are the cell bodies of the Preganglionic Sympathetic neurons located?
- Intermediomedial Horn of spinal segments T1 to L2
  - Intermediolateral Horn of spinal segments S2 to S4
  - Intermediolateral Horn of spinal segments T1 to L2
  - None of the above
104. Which of the following autonomic receptors are most numerous in the bronchial smooth muscle?
- Acetylcholine receptors
  - $\beta_1$  – Adrenergic receptors
  - $\alpha$  - Adrenergic receptors
  - $\beta_2$  – Adrenergic receptors

105. Which of the following cranial nerve lesion may result in the dysfunction of the submandibular and sublingual glands?
- A. CN V
  - B. CN VII
  - C. CN IX
  - D. CN X
106. Lesion of which of the following cortical areas results in “Apraxia” if lesioned?
- A. Sensory Association area
  - B. Prefrontal cortex
  - C. Precentral gyrus
  - D. Premotor cortex
107. Lesion of which cortical area presents with “Loss of executive functions and divergent thinking”?
- A. Sensory Association area
  - B. Prefrontal cortex
  - C. Precentral gyrus
  - D. Premotor cortex
108. Which lobe of the brain, if lesioned, may present with “Loss of conscious localization of sounds”
- A. Frontal lobe
  - B. Occipital lobe
  - C. Temporal lobe
  - D. Parietal lobe
109. A patient presents with inability to express oneself using language. The ability to understand language and to control the muscles used in speech for other purposes [swallowing, chewing] are not affected. Which cortical area is involved in this lesion?
- A. Wernicke’s area
  - B. Wernicke’s analogue
  - C. Broca’s area
  - D. Broca’s analogue
110. What type of memory is tested clinically?
- A. Declarative
  - B. Procedural
  - C. Emotional
  - D. None of the above

**NBCE  
MOCK BOARD  
QUESTIONS  
Physiology  
Answer Key**

- 1. C
- 2. D
- 3. D
- 4. C
- 5. C
- 6. D
- 7. D
- 8. C
- 9. D
- 10. D
- 11. D
- 12. D
- 13. B
- 14. B
- 15. D
- 16. B
- 17. D
- 18. D
- 19. B
- 20. D
- 21. D
- 22. C
- 23. A
- 24. D
- 25. C
- 26. D
- 27. D
- 28. A
- 29. A
- 30. D
- 31. A
- 32. D
- 33. D

- 34. B
- 35. C
- 36. D
- 37. D
- 38. D
- 39. D
- 40. D
- 41. B
- 42. B
- 43. D
- 44. D
- 45. C
- 46. C
- 47. B
- 48. C
- 49. B
- 50. C
- 51. C
- 52. C
- 53. D
- 54. D
- 55. A
- 56. A
- 57. C
- 58. B
- 59. C
- 60. D
- 61. B
- 62. A
- 63. B
- 64. D
- 65. C
- 66. B
- 67. C
- 68. C
- 69. A
- 70. A
- 71. B
- 72. A

- 73. B
- 74. A
- 75. C
- 76. B
- 77. C
- 78. B
- 79. B
- 80. B
- 81. C
- 82. C
- 83. C
- 84. A
- 85. D
- 86. B
- 87. A
- 88. D
- 89. D
- 90. D
- 91. A
- 92. B
- 93. C
- 94. A
- 95. D
- 96. B
- 97. D
- 98. C
- 99. D
- 100. B
- 101. A
- 102. B
- 103. C
- 104. D
- 105. B
- 106. D
- 107. B
- 108. C
- 109. C
- 110. A