

Biology 251
17 September 2015
Exam One
FORM G KEY

PRINT YOUR NAME AND ID NUMBER in the space that is provided on the answer sheet, and then blacken the letter boxes below the corresponding letters of your name and ID number. You will have 4 points DEDUCTED if you fail to do this!!!!

WRITE YOUR TEST FORM LETTER above your name on the answer sheet.

WRITE YOUR LAB SECTION # AND TA'S NAME on the upper margin of your answer sheet.

Your exam should have 27 questions. Please check to make sure it is complete.

For each of the following questions, please indicate the most correct answer by blackening the corresponding letter on the accompanying answer sheet. Each correct answer is worth 2 points. Partial credit of ½ point *may* be available for questions that have answers such as “all the above”, “both a and b are true”, etc.

1. Temporal summation is caused by multiple excitatory presynaptic neurons firing at one time.
 - a. True
 - b. False**

2. At resting membrane potential, Na⁺ ions are at equilibrium across the membrane.
 - a. True
 - b. False**

3. The largest of the cytoskeletal elements that maintain asymmetrical cell shapes, such as that seen in an axon, are the microfilaments.
 - a. True
 - b. False**

4. Neurotransmitters are quickly removed from a synapse by diffusing back into the pre-synaptic neuron.
 - a. True
 - b. False**

5. The four types of primary tissue are
 - a. Digestive, muscle, nervous and epithelial
 - b. Digestive, muscle, nervous and connective
 - c. Glands, muscle, nervous and epithelial
 - d. Blood, muscle, nervous and connective
 - e. Epithelial, muscle, nervous and connective**

6. Which process produces the vast majority of ATP during aerobic respiration?
 - a. Glycolysis
 - b. The linking step
 - c. Krebs cycle
 - d. Oxidative phosphorylation**

7. When an action potential reaches the axon terminal of a presynaptic neuron, it causes Ca^{++} channels to open so that Ca^{++} _____ the cell by _____;
- enters; active transport
 - enters; diffusion**
 - enters; osmosis
 - exits; active transport
 - exits; diffusion
8. which in turn causes the release of _____ through exocytosis, which, when binding to receptors on the postsynaptic membrane at an inhibitory synapse causes _____.
- neurotransmitter; the membrane to depolarize a little
 - neurotransmitter; the membrane to hyperpolarize a little**
 - Na^+ ; the membrane to depolarize a little
 - Na^+ ; the membrane to hyperpolarize a little
 - K^+ ; the membrane to hyperpolarize a little
9. The potassium equilibrium potential is -94 mV. What does this mean?
- at the resting membrane potential of neurons, potassium is at equilibrium
 - at -94 mV, the concentration gradient for potassium movement is zero
 - at -94 mV, the electrical gradient for potassium movement is zero
 - at -94 mV, the concentration gradient for potassium movement is opposed exactly by the electrical gradient**
 - at -94 mV, potassium movement is opposed exactly by sodium movement
10. Which of the following can move by passive diffusion between the ECF and the ICF?
- Na^+
 - K^+
 - Glucose
 - Ca^{++}
 - None of the above**
11. Which of the following statements about action potentials is (are) false?
- Action potentials only occur in myelinated portions of the axon*
 - The refractory period forces action potentials to be unidirectional
 - Action potentials are proportional to the size of the stimulus*
 - All the above are false
 - Both a and c are false**
12. Which process converts glucose to pyruvate?
- Glycolysis**
 - The linking step
 - Krebs cycle
 - Oxidative phosphorylation
13. Prevents release of GABA from inhibitory presynaptic inputs that terminate on skeletal muscle neurons.
- Tay Sachs
 - Cocaine
 - Multiple Sclerosis
 - Tetanus toxin**
 - Cystic Fibrosis

14. Which of the following accurately represents the order of complexity for the components of the body, from least to most complex?
- tissues, cells, organs, organ systems
 - organ systems, organs, tissues, cells
 - cells, tissues, organs, organ systems**
 - organ systems, cells, tissues, organs
 - cells, tissues, organ systems, organs
15. Imagine an experimental situation in which a cell contains only D^+ and G^- ions in equal amounts, only has channels that allow D^+ to cross the membrane, and is in a solution containing no ions. Initially, D^+ will diffuse ____ the cell, going down its ____ gradient; ultimately at equilibrium the net diffusion of D^+ will ____ because of the ____ gradient.
- Out of; concentration; stop; electrical**
 - Out of, electrical; stop; concentration
 - Out of; concentration; continue; concentration
 - Into; concentration; stop; electrical
 - Out of; electrical; continue; concentration
16. How does a neuron utilize energy to separate charged ions across its membrane?
- Using the energy created by Na^+ entering the cell following its concentration gradient being opposed by Na^+ exiting the cell following its electrical gradient.
 - Using the energy created by K^+ exiting the cell following its concentration gradient being opposed by K^+ entering the cell following its electrical gradient.
 - Using the energy from ATP to operate the Na-K-ATPase pump.**
 - All the above are true
 - Both a and b are true
17. Excitatory Postsynaptic Potentials always result in an action potential in the postsynaptic neuron.
- True
 - False**
18. During part A of Figure 2, what is causing the rapid change in membrane potential?
- Na^+ entering the cell by passive diffusion
 - Na^+ exiting the cell by passive diffusion
 - Na^+ entering the cell by active transport
 - Na^+ entering the cell by facilitated diffusion**
 - Na^+ exiting the cell by facilitated diffusion
19. Information in DNA is transcribed into RNA, then translated into proteins, which are then sent to the appropriate part of the cell or into the ECF to perform their function. Which of the following correctly describes the sequence of cellular structures through which this occurs?
- Nucleus to RER to SER to Golgi Complex**
 - Nucleus to SER to RER to Golgi Complex
 - Nucleus to Golgi Complex to RER to SER
 - Nucleus to Golgi Complex to SER to RER
 - Golgi Complex to RER to SER to Nucleus

20. How can Na^+ cross the cell membrane?
- Diffuse through directly
 - Facilitated diffusion*
 - Active transport*
 - All the above
 - Both b and c**
21. Each of the following accurately describes a biological situation, but which one of them describes maintenance of homeostasis?
- During labor, contractions of the uterus cause oxytocin release which causes stronger uterine contractions which cause release of more oxytocin which causes stronger uterine contractions until the baby is born.
 - During the menstrual cycle, a hormone called FSH released by the pituitary causes the ovaries to release estrogen; in response the estrogen causes more FSH release, which causes more estrogen release, until finally ovulation occurs.
 - During exercise, the pH of the ECF decreases; in response, buffers in the blood release chemicals that increases the pH of the ECF.**
 - During anaerobic metabolism, no oxygen is present; in response, glucose is metabolized into lactic acid.
 - During cardiac contractions, positively charged ions move from one heart muscle cell to another via gap junctions, causing coordinated contraction of all the heart muscle cells.
22. Which of the following statements about graded potentials is (are) true?
- Graded potentials only occur in myelinated portions of the axon
 - The refractory period forces graded potentials to be unidirectional
 - Graded potentials are proportional to the size of the stimulus**
 - All the above are true
 - Both a and c are true
23. What are the wastes produced by aerobic metabolism?
- ADP
 - O_2
 - CO_2
 - Water*
 - Both c and d**
24. Which of the following cause(s) electrical potentials on membranes?
- The uniform distribution of Na^+ across membranes
 - The differential permeability of membranes to Na^+ and K^+*
 - The non-uniform distribution of A- molecules (large negatively charged proteins) across the membrane.*
 - All the above
 - Both b and c**
25. What type of ion channels is necessary in the membrane of an axon for action potentials to occur?
- receptor-gated
 - mechanically-gated
 - ligand-gated
 - voltage-gated**
 - chemically-gated

26. Which of the graphs in Figure 1 best show a pattern of negative feedback regulating a response variable (e.g., temperature)?
- Panel a
 - Panel b
 - Panel c
 - Panel d**
 - Panel e
27. A protein that regulates Cl^- channels in the membranes of exocrine gland cells is defective and gets stuck in the endoplasmic reticulum and/or Golgi complex.
- Tay Sachs
 - Cocaine
 - Multiple Sclerosis
 - Tetanus toxin
 - Cystic Fibrosis**

