

1. Which body compartment holds the largest amount of total body water?
 - A. Interstitial Fluid
 - B. Extracellular Fluid
 - C. Intracellular Fluid
 - D. Plasma
 - E. Cerebrospinal Fluid

2. Which of the following cell types is an excitable cell?
 - A. Schwann cell
 - B. Oligodendrocyte
 - C. Astrocyte
 - D. Skeletal muscle cell
 - E. All of the above

3. Sir Charles Sherrington was awarded the Nobel Prize in Physiology and Medicine:
 - A. for his studies on olfaction (smell)
 - B. for his work on homeostasis
 - C. for his discovery of how the heart functions
 - D. for his discoveries in neuroscience
 - E. for deciphering Da Vinci's paintings

4. During an action potential, what mechanism best explains the rapid repolarization of the membrane potential from +40 to -70 mV?
 - A. Na^+ moving out of the cell through voltage-gated Na^+ channels
 - B. K^+ moving into the cell through voltage-gated K^+ channels
 - C. Na^+ moving into the cell through voltage-gated Na^+ channels
 - D. K^+ moving out of the cell through voltage-gated K^+ channels
 - E. Active transport of Na^+ and K^+ by the Na^+/K^+ pump

5. A patient suffering from Broca's aphasia can understand speech but has difficulty producing words. Damage most likely occurred in which part of the brain?

- A. Occipital Lobe
- B. Temporal Lobe
- C. Parietal Lobe
- D. Basal ganglia
- E. Frontal lobe

6. Which of the following terms is best associated with the blind spot?

- A. Fovea
- B. Optic disc
- C. Optic chiasm
- D. Optic tract
- E. Cornea

7. Which of the following does NOT directly influence the speed or direction of the propagation of action potentials on a nerve fibre?

- A. Lateral inhibition
- B. Inactivation of the Na^+ voltage-gated channel
- C. Myelination of the nerve fibre
- D. Diameter of the nerve fibre
- E. The absolute refractory period

8. A red blood cell (300 mosm) will shrink in which of the following solutions?

- A. Pure water
- B. 300 mM Glucose
- C. 50 mM CaCl_2 + 150 mM Glucose
- D. 50 mM CaCl_2 + 150 mM KCl
- E. None of the above

9. A sound wave has 1,000 cycles in 100 ms. What is the frequency of this sound?

- A. 1 Hz
- B. 10 Hz
- C. 100 Hz
- D. 1,000 Hz
- E. 10,000 Hz

10. The frequency of action potentials conveyed along the auditory nerve best encodes which sound feature?
- A. The frequency of a sound
 - B. The location of a sound
 - C. The duration of a sound
 - D. The intensity of a sound
 - E. The wavelength of a sound
11. Which of the following best explains why humans CANNOT see ultraviolet light?
- A. Ultraviolet light cannot go through the lens
 - B. Ganglion cells cannot sustain action potentials at a rate high enough to encode photons with short wavelengths
 - C. The photopigment within photoreceptors is not sensitive to ultraviolet light
 - D. Action potentials generated in response to ultraviolet light do not reach the primary visual cortex
 - E. Lateral inhibition within the primary visual cortex
12. Which of the following statements best describes the differential ion concentrations found across a membrane at the end of depolarization (i.e., when the membrane potential is about 40 mV)?
- A. Na^+ and K^+ concentrations are higher inside the cell, and Cl^- concentrations are higher outside the cell
 - B. K^+ concentrations are higher outside the cell, and Na^+ are higher inside the cell
 - C. K^+ and Cl^- concentrations are higher outside the cell, and Na^+ concentrations are higher inside the cell
 - D. Na^+ and Cl^- concentrations are higher outside the cell, and K^+ concentrations are higher inside the cell
 - E. Na^+ concentrations are higher outside the cell, K^+ concentrations are higher inside the cell, and Cl^- concentrations are equal inside and outside the cell
13. Where are the ossicles located?
- A. Outer ear
 - B. Middle ear
 - C. Cochlea
 - D. Inner ear
 - E. Vestibular apparatus

14. Which of the following cell types is best associated with the production of cerebrospinal fluid?

- A. Oligodendrocytes
- B. Ependymal cells
- C. Astrocytes
- D. Neurons
- E. Microglia

15. The hypothalamus:

- A. provides control over the autonomic nervous system, has many connections with the cerebral cortex, controls food and water intake but has no endocrine function.
- B. provides conscious control for skeletal muscle activity.
- C. provides control of the autonomic nervous system, temperature regulation, emotional behavior, but not sexual function.
- D. provides control over the autonomic nervous system, water balance, emotional behavior, and controls anterior pituitary function.
- E. controls endocrine function, the autonomic nervous system, sexual functions and vision.

16. A receptor conveying the sense of touch is most likely what type of receptor?

- A. Osmoreceptor
- B. Nociceptor
- C. Thermoreceptor
- D. Photoreceptor
- E. Mechanoreceptor

17. How long does the typical action potential last (recall “ms” = “millisecond”)?

- A. 0.03 ms
- B. 0.3 ms
- C. 3 ms
- D. 30 ms
- E. 300 ms

Directions: For each of the incomplete statements below, ONE or MORE of the completions given is correct.

- Answer:**
- (A) if only 1,2 and 3 are correct
 - (B) if only 1 and 3 are correct
 - (C) if only 2 and 4 are correct
 - (D) if only 4 is correct
 - (E) if ALL are correct

18. Which of the following modes of membrane transport do NOT require the direct input of energy?

1. Diffusion of polar molecules through protein-lined pores
2. Facilitated diffusion
3. Diffusion of non-polar molecules
4. Active transport

19. Which of the following statements concerning voltage-gated channels is/are TRUE?

1. During an action potential, voltage-gated Na^+ and K^+ channels located at the same point of the membrane are open at the same time.
2. Voltage-gated channels are found on any cell with a resting membrane potential.
3. The opening of voltage-gated Na^+ channels occurs during repolarization.
4. The absolute refractory period is caused by the inactivation of voltage-gated Na^+ channels.

Compartment A	Compartment B
2M Glucose in 1 L of water	2M KCl in 1 L of water

20. The two compartments above show the initial concentrations of two solutions. The compartments are separated by a semi-permeable membrane that is permeable ONLY to water. Once electrochemical equilibrium has been established, which of the following statements is/are TRUE?

1. Neither compartment will have changed volumes.
2. The concentration of glucose in compartment A will increase.
3. There will be a membrane potential.
4. Compartment B will have increased in volume.

Compartment A	Compartment B
2M Glucose in 1 Kg of water	1M NaCl in 1 Kg of water

21. The two compartments above show the initial concentrations of two solutions. The compartments are separated by a semi-permeable membrane that is permeable ONLY to Cl⁻. Once electrochemical equilibrium has been established, which of the following statements is/are TRUE?

1. The Cl⁻ concentration gradient will favor the movement of Cl⁻ into compartment A.
2. There will be a membrane potential.
3. The electrical gradient will favor the movement of Cl⁻ into compartment B.
4. Compartment A will have a higher osmolality than compartment B.

22. A polar molecule is also:

1. Lipophilic
2. Lipophobic
3. Hydrophobic
4. Hydrophilic

23. Which of the following statements about the central pathways for somatosensation is/are TRUE?

1. The pathways conveying proprioception and touch synapse in the spinal cord
2. The pathways conveying proprioception and touch synapse in the thalamus
3. The pathways conveying temperature and pain synapse in the brainstem
4. The pathways conveying temperature and pain synapse in the thalamus

24. Which of the following are receptors?

1. Rods
2. Bipolar cells
3. Cones
4. Ganglion cells

25. Which of the following is/are found in the Organ of Corti?

1. Hair cells
2. Ossicles
3. Tectorial membrane
4. The oval and round windows

26. Receptor potentials:

1. can be generated in hair cells
2. always require voltage-gated channels
3. can be generated in photoreceptors
4. are all-or-none, like action potentials

27. Retinal ganglion cells that terminate in the *left* lateral geniculate nucleus:

1. may originate from the nasal portion of the right retina
2. transduce images from the left visual field
3. may originate from the temporal portion of the left retina
4. may originate from the temporal portion of the right retina

28. A neurological patient who becomes anorexic may have:

1. increased sensitivity (increased number of receptors) in the hypothalamus to the hormone leptin
2. a tumor that damages the lateral hypothalamus
3. overactive POMC neurons in the arcuate hypothalamic nucleus
4. increased activity of hypothalamic orexin containing neurons

29. The two hormones of the posterior pituitary

1. are produced by hypothalamic neurons.
2. are synthesized within the supraoptic nucleus.
3. move down their axons and are released directly into the circulation.
4. have direct but opposite effects on body weight.

30. A stronger stimulus tends to

1. produce a larger receptor potential
2. be transduced into a higher frequency of action potentials
3. produce a longer-lasting receptor potential
4. excite a larger number of receptors

31. Activation of the posterior hypothalamus may stimulate:

1. neurons of the sympathetic nervous system that cause peripheral vasoconstriction
2. neurons of the sympathetic nervous system that cause vasodilation in skeletal muscle
3. the release of adrenaline into the circulation
4. a decrease in blood pressure

32. The parietal cortex:

1. is where the primary somatosensory cortex is found
2. devotes a disproportionately large area of tissue to large body parts like the leg
3. processes somatosensory information originating from the opposite side of the body
4. is where the primary visual cortex is found

33. The autonomic nervous system has the following characteristics:

1. preganglionic axons release acetylcholine
2. postganglionic axons release noradrenaline
3. activation of the sympathetic nervous system releases adrenaline
4. parasympathetic activation causes blood vessels in skeletal muscles to dilate

34. Physiology is the study of the functions of the living body. The approaches used to explain the events that occur in the body include:

1. understanding body function in terms of meeting bodily needs
2. understanding body function in terms of its anatomy without considering how the outcome is accomplished
3. viewing the body as a machine whose mechanism of action can be explained by physical and chemical processes
4. viewing the body as a machine that is hard wired and with predictable outcomes to perturbations

35. Heat in the body may be produced by:

1. chemical reactions
2. changes in muscle activity
3. endocrine factors
4. radiation

36. A tumor of the supraoptic nucleus that produces an excessive activation of the neurons would result in

1. increased water intake
2. Increased blood volume.
3. increased urine production.
4. hypertension.

Ques	Ans	Def	Wght	Alt	Ans
1	C	1.0			
2	D	1.0			
3	D	1.0			
4	D	1.0			
5	E	1.0			
6	B	1.0			
7	A	1.0			
8	D	1.0			
9	E	1.0			
10	D	1.0			
11	C	1.0			
12	off	1.0			
13	B	1.0			
14	B	1.0			
15	D	1.0			
16	E	1.0			
17	C	1.0			
18	A	1.0			
19	D	1.0			
20	C	1.0			
21	E	1.0			
22	C	1.0			
23	C	1.0			
24	B	1.0			
25	B	1.0			
26	B	1.0			
27	B	1.0			
28	A	1.0			
29	A	1.0			
30	E	1.0			
31	off	1.0			
32	B	1.0			
33	A	1.0		B(1)	
34	B	1.0			
35	A	1.0			
36	C	1.0			