

1. A unicellular protist may use a contractile vacuole to expel excess water. Contractile vacuoles most likely would be found in protists that are
 - a. In a freshwater environment.
 - b. In a marine environment.
 - c. Hyperosmotic to their environment.
 - d. A & C only.
 - e. All of the above.

2. Transport epithelia are responsible for
 - a. Pumping water across a membrane.
 - b. Transporting urine in the ureter and urethra.
 - c. The movement of solutes for osmoregulation or excretion.
 - d. None of the above.
 - e. All of the above.

3. Which of the following is not part of the filtrate entering Bowman's capsule?
 - a. Water, salt, electrolytes.
 - b. Glucose.
 - c. Urea.
 - d. Amino acids.
 - e. Plasma proteins.

4. Aldosterone
 - a. Stimulates the active reabsorption of sodium ion in the distal tubules.
 - b. Is secreted by the adrenal glands in response to a high osmolarity in blood.
 - c. Is converted from a blood protein by the action of renin.
 - d. Is a hormone that stimulates thirst.
 - e. All of the above.

5. Which of the following statements is incorrect?
 - a. Long loops of Henle are associated with steep osmotic gradients and the production of hyperosmotic urine.
 - b. Uric acid is the form of nitrogenous waste that requires the least amount of water to excrete.
 - c. Ammonia is a toxic nitrogenous waste molecule that passively diffuses out of the bodies of aquatic invertebrates.
 - d. In the mammalian kidney, urea diffuses out of the collecting duct and contributes to the osmotic gradient within the medulla.
 - e. Uric acid is produced by a mammalian fetus and removed through the placenta to the mother's excretory system.

6. The peritubular capillaries
 - a. Intertwine with the proximal and distal tubules and exchange solutes with the interstitial fluid.
 - b. Rejoin to form the efferent arteriole.
 - c. Form a countercurrent flow of blood through the medulla to supply nutrients without interfering with the osmolarity gradient.
 - d. A & C only.
 - e. All of the above.

7. Which of the following sections of the mammalian nephron is incorrectly paired with its function?
- Bowman's capsule & glomerulus – blood filtration.
 - Proximal tubule – secretion of ammonia and H⁺ into filtrate and transport of glucose and amino acids out of tubule.
 - Descending loop of Henle – diffusion of urea out of filtrate.
 - Ascending loop of Henle – diffusion and pumping of NaCl out of filtrate.
 - Distal tubule – regulation of pH and K⁺
8. What is the mechanism for the filtration of blood within the nephron?
- The active transport of Na⁺ and glucose, followed by osmosis.
 - Both active and passive secretion of ions, toxins, and ammonia into the tubule.
 - High hydrostatic pressure of blood forcing water and small molecules out of the capillary.
 - A lower osmotic pressure in Bowman's capsule compared to that in the glomerulus.
 - All of the above.
9. What stimulus causes the juxtaglomerular apparatus to release renin?
- A drop on blood pH.
 - A drop in blood pressure.
 - A rise in blood osmolarity.
 - A & C only.
 - All of the above.
10. Which of the following would be a good mechanism for a drug to treat hypertension?
- Increase the production of ADH.
 - Block the production of ANP.
 - Vasoconstriction of renal arteries.
 - Inhibit enzyme involved in producing angiotensin II.
 - All of the above.
11. Which of the following is incorrectly paired with its function?
- Scrotum – encases testes and suspends them below abdominal cavity.
 - Prostate gland – adds fluid to semen.
 - Vas deferens – transports sperm from epididymis to ejaculatory duct.
 - Epididymis – produces sperm.
 - All of the above are correctly paired with their functions.
12. The function of the developing follicle is to
- Secrete estradiol.
 - Secrete progesterone.
 - Nourish and protect the egg cell.
 - A & C only.
 - All of the above.
13. The primary spermatocyte is _____ and undergoes _____ to produce the secondary spermatocyte.
- Diploid; meiosis
 - Diploid, mitosis
 - Haploid; meiosis

- d. Haploid; mitosis
- e. None of the above.

14. What would you expect a healthy 25-year old female to ovulate each month?

- a. Oogonia.
- b. Primary oocyte.
- c. Secondary oocyte.
- d. Ovum.
- e. Zygote.

15. Which of the following does not occur during the luteal phase?

- a. Progesterone levels reach their peak.
- b. Estradiol levels reach their peak.
- c. The endometrium continues to thicken.
- d. LH levels decrease drastically at first and then continue to decrease on a gradual basis.
- e. All of the above occurs during the luteal phase.

16. Which of the following birth control methods prevent the production or release of gametes?

- a. Sterilization and chemical contraception.
- b. Birth control pills and IUD's.
- c. Condoms and diaphragms.
- d. Abstinence and coitus interruptus.
- e. MAP's and abortion.

17. Which of the following is involved in triggering and maintaining child labor?

- a. hCG produced by the fetus.
- b. Oxytocin produced by fetus and mother, and prostaglandins produced by the placenta.
- c. Prolactin produced by the fetus and mother.
- d. A surge in the production of LH.
- e. All of the above.

18. Progesterone

- a. Is responsible for maintaining a pregnancy.
- b. Initiates thickening of the endometrium.
- c. Is produced by the maturing follicle.
- d. Causes a rise in LH & FSH release when secreted at high levels.
- e. Inhibits the release of LH & FSH when secreted at low levels.

19. In maternal immune tolerance, the Fas Ligand (FasL)

- a. Is an enzyme produced by the placenta that disables the mother's cytotoxic T cells
- b. Binds to and destroys the mother's activated cytotoxic T cells by promoting apoptosis.
- c. Produces antibodies that protect the developing embryo from the mother's cytotoxic T cells.
- d. A & C only.
- e. All of the above.

20. What is the correct order of occurrence for the following processes?

- a. Cleavage, fertilization, implantation, ovulation
- b. Fertilization, ovulation, cleavage, implantation
- c. Ovulation, fertilization, cleavage, implantation
- d. Fertilization, cleavage, ovulation, implantation

- e. Ovulation, cleavage, implantation, fertilization.
21. The blastocoel
- a. Develops into the archenteron or embryonic gut.
 - b. Is a fluid-filled cavity in the blastula.
 - c. Opens to the exterior through a blastopore.
 - d. Forms a hollow chamber during gastrulation.
 - e. Is lined with mesoderm.
22. Which of the following is incorrectly paired with its embryonic germ layer?
- a. Muscles – mesoderm
 - b. Central nervous system – ectoderm
 - c. Liver and pancreas – endoderm
 - d. Heart – endoderm
 - e. All of the above are correctly paired with their embryonic germ layers.
23. Somites are
- a. Blocks of mesoderm circling the archenteron.
 - b. Condensations of cells from which the notochord arises.
 - c. Serially arranged mesoderm blocks lateral to the notochord in a vertebrate embryo.
 - d. Structures arising from neural crest cells.
 - e. All of the above.
24. What forms the fetal portion of the placenta?
- a. The trophoblast and some mesoderm.
 - b. The epiblast.
 - c. The allantois and yolk sac.
 - d. The endometrium.
 - e. None of the above.
25. During egg fertilization, the sperm must first bind to
- a. ZP1
 - b. ZP2
 - c. ZP3
 - d. A & C only.
 - e. The sperm binds to all of the above at the same time.
26. Which of the following is not true of the resting potential of a typical neuron?
- a. The inside of the cell is more negative than the outside.
 - b. The concentration gradient of sodium is higher outside the cell.
 - c. It results from the combined equilibrium potentials of potassium and sodium.
 - d. It is about -70 mV.
 - e. The concentration gradient of potassium is lower inside the cell.
27. Nodes of Ranvier are
- a. Gaps where Schwann cells abut and at which action potentials are generated.
 - b. Neurotransmitter-containing vesicles located in the synaptic terminals.
 - c. The parts of neurons where action potentials are initiated.
 - d. Ganglia adjacent to the spinal cord.
 - e. None of the above.

28. After the depolarization of an action potential, the fall in the membrane potential occurs due to the
- Closing of sodium inactivation gates.
 - Closing of potassium and sodium channels.
 - Refractory period in which the membrane is hyperpolarized.
 - Opening of voltage-gated potassium channels and the closing of sodium inactivation gates.
 - All of the above.
29. The threshold of a membrane
- Is an all-or-none event.
 - Is a graded potential that is proportional to the strength of a stimulus.
 - Is the depolarization that is needed to generate an action potential.
 - A & C only.
 - All of the above.
30. Which of the following is incorrectly paired with its function?
- Axon hillock – originates action potential.
 - Schwann cells – create myelin sheath around axon in CNS.
 - Synapse – space between presynaptic and postsynaptic cells into which neurotransmitter is released.
 - Dendrite – receives signals from other neurons.
 - All of the above are correctly paired with their functions.
31. Why is signal transmission faster in myelinated axons?
- These axons are thicker and provide less resistance to voltage flow.
 - These axons use electrical synapses rather than chemical synapses.
 - The action potential can jump from node to node along the insulating myelin sheath.
 - A & C only.
 - All of the above.
32. What is the main effect of the neurotransmitter GABA in the CNS?
- Increase pain.
 - Create excitatory postsynaptic potentials.
 - Create inhibitory postsynaptic potentials.
 - Induce sleep.
 - Decrease pain and induce euphoria.
33. Which of the following is not true of the autonomic nervous system?
- It is a subdivision of both the CNS & PNS.
 - It consists of the sympathetic, parasympathetic, and enteric divisions.
 - It controls smooth and cardiac muscles.
 - Control is generally involuntary.
 - All of the above are true of the autonomic nervous system.
34. What makes up the white matter of the spinal cord?
- Myelinated sheaths of axons.
 - Motor and interneuron cell bodies.
 - Sympathetic ganglia.
 - A & C only.

e. All of the above.

35. Which of the following structures is incorrectly paired with its function?

- a. Pons – conducts information between spinal cord and brain.
- b. Thalamus – sorts and relays incoming impulses to the cerebrum.
- c. Corpus callosum – bands of axons connecting left and right hemispheres.
- d. Hypothalamus – homeostatic regulation, pleasure centers.
- e. All of the above are correctly paired with their functions.

36. When striated muscle fibers contract

- a. The Z lines are pulled closer together.
- b. The sarcomere expands.
- c. The thin filaments become shorter.
- d. The thick filaments become longer.
- e. All of the above occur.

37. What is the role of ATP in muscle contraction?

- a. To form cross-bridges between thick and thin filaments.
- b. To release myosin head from actin when it binds to myosin and to provide energy when hydrolyzed to form myosin's high-energy form.
- c. To remove the tropomyosin-troponin complex from blocking the binding sites of actin.
- d. To bend the cross-bridge and pull the thick filaments toward the center of the sarcomere.
- e. All of the above.

38. How does calcium affect muscle contraction?

- a. It is released from the T tubules in response to an action potential to initiate contraction.
- b. The binding of acetylcholine opens calcium channels in the plasma membrane, creating an action potential that travels down the T tubules.
- c. It binds to tropomyosin and helps to stabilize cross-bridge formation.
- d. Its binding to troponin causes tropomyosin to move away from myosin-binding sites on the actin filament.
- e. Its release from the sarcoplasmic reticulum changes the membrane potential of the muscle cell so that contraction can occur.

39. Which of the following is not a characteristic of cardiac muscle?

- a. Intercalated disks that spread action potentials between cells.
- b. Action potentials that last a long time
- c. Ability to generate action potentials without nervous input.
- d. Striations.
- e. All of the above are characteristics of cardiac muscle.

40. A drug that causes potassium to leak out of a neuron, increasing the positive charge on the outside would:

- a. Make it easier to trigger action potentials in the neuron
- b. Cause the cell to release its neurotransmitter
- c. Speed up nerve signals traveling the length of the cell
- d. Act as a stimulant
- e. Inhibit transmission of nerve signals by the neuron

41. Acetylcholinesterase is the enzyme that degrades acetylcholine. What effect on nerve transmission would occur following the administration of a chemical that inhibited acetylcholinesterase?
- a. There would be no effect
 - b. Synaptic transmission would be prevented; muscle paralysis would occur
 - c. It would be identical to giving an anesthetic, but it would last permanently
 - d. Extra excitatory post synaptic potentials would occur in the post synaptic neuron
 - e. The presynaptic neuron would be inactivated