

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
 - Haploid; mitosis
 - None of the above.

14. What would you expect a healthy 25-year old female to ovulate each month?
- Oogonia.
 - Primary oocyte.
 - Secondary oocyte.
 - Ovum.
 - Zygote.
15. Which of the following does not occur during the luteal phase?
- Progesterone levels reach their peak.
 - Estradiol levels reach their peak.
 - The endometrium continues to thicken.
 - LH levels decrease drastically at first and then continue to decrease on a gradual basis.
 - All of the above occurs during the luteal phase.
16. Which of the following birth control methods prevent the production or release of gametes?
- Sterilization and chemical contraception.
 - Birth control pills and IUD's.
 - Condoms and diaphragms.
 - Abstinence and coitus interruptus.
 - MAP's and abortion.
17. Which of the following is involved in triggering and maintaining child labor?
- hCG produced by the fetus.
 - Oxytocin produced by fetus and mother, and prostaglandins produced by the placenta.
 - Prolactin produced by the fetus and mother.
 - A surge in the production of LH.
 - All of the above.
18. Progesterone
- Is responsible for maintaining a pregnancy.
 - Initiates thickening of the endometrium.
 - Is produced by the maturing follicle.
 - Causes a rise in LH & FSH release when secreted at high levels.
 - Inhibits the release of LH & FSH when secreted at low levels.
19. In maternal immune tolerance, the Fas Ligand (FasL)
- Is an enzyme produced by the placenta that disables the mother's cytotoxic T cells
 - Binds to and destroys the mother's activated cytotoxic T cells by promoting apoptosis.
 - Produces antibodies that protect the developing embryo from the mother's cytotoxic T cells.
 - A & C only.
 - All of the above.
20. What is the correct order of occurrence for the following processes?
- Cleavage, fertilization, implantation, ovulation
 - Fertilization, ovulation, cleavage, implantation
 - Ovulation, fertilization, cleavage, implantation
 - Fertilization, cleavage, ovulation, implantation
 - Ovulation, cleavage, implantation, fertilization.

21. The blastocoel
- Develops into the archenteron or embryonic gut.
 - Is a fluid-filled cavity in the blastula.
 - Opens to the exterior through a blastopore.
 - Forms a hollow chamber during gastrulation.
 - Is lined with mesoderm.
22. Which of the following is incorrectly paired with its embryonic germ layer?
- Muscles – mesoderm
 - Central nervous system – ectoderm
 - Liver and pancreas – endoderm
 - Heart – endoderm
 - All of the above are correctly paired with their embryonic germ layers.
23. Somites are
- Blocks of mesoderm circling the archenteron.
 - Condensations of cells from which the notochord arises.
 - Serially arranged mesoderm blocks lateral to the notochord in a vertebrate embryo.
 - Structures arising from neural crest cells.
 - All of the above.
24. What forms the fetal portion of the placenta?
- The trophoblast and some mesoderm.
 - The epiblast.
 - The allantois and yolk sac.
 - The endometrium.
 - None of the above.
25. During egg fertilization, the sperm must first bind to
- ZP1
 - ZP2
 - ZP3
 - A & C only.
 - 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?
- The inside of the cell is more negative than the outside.
 - The concentration gradient of sodium is higher outside the cell.
 - It results from the combined equilibrium potentials of potassium and sodium.
 - It is about -70 mV.
 - The concentration gradient of potassium is lower inside the cell.
27. Nodes of Ranvier are
- Gaps where Schwann cells abut and at which action potentials are generated.
 - Neurotransmitter-containing vesicles located in the synaptic terminals.
 - The parts of neurons where action potentials are initiated.
 - Ganglia adjacent to the spinal cord.
 - 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.
 - All of the above.

35. Which of the following structures is incorrectly paired with its function?
- Pons – conducts information between spinal cord and brain.
 - Thalamus – sorts and relays incoming impulses to the cerebrum.
 - Corpus callosum – bands of axons connecting left and right hemispheres.
 - Hypothalamus – homeostatic regulation, pleasure centers.
 - All of the above are correctly paired with their functions.
36. When striated muscle fibers contract
- The Z lines are pulled closer together.
 - The sarcomere expands.
 - The thin filaments become shorter.
 - The thick filaments become longer.
 - All of the above occur.
37. What is the role of ATP in muscle contraction?
- To form cross-bridges between thick and thin filaments.
 - To release myosin head from actin when it binds to myosin and to provide energy when hydrolyzed to form myosin's high-energy form.
 - To remove the tropomyosin-troponin complex from blocking the binding sites of actin.
 - To bend the cross-bridge and pull the thick filaments toward the center of the sarcomere.
 - All of the above.
38. How does calcium affect muscle contraction?
- It is released from the T tubules in response to an action potential to initiate contraction.
 - The binding of acetylcholine opens calcium channels in the plasma membrane, creating an action potential that travels down the T tubules.
 - It binds to tropomyosin and helps to stabilize cross-bridge formation.
 - Its binding to troponin causes tropomyosin to move away from myosin-binding sites on the actin filament.
 - 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?
- Intercalated disks that spread action potentials between cells.
 - Action potentials that last a long time
 - Ability to generate action potentials without nervous input.
 - Striations.
 - All of the above are characteristics of cardiac muscle.
40. Smooth muscle contracts relatively slowly because
- The only ATP available is supplied by fermentation.
 - Its contraction is stimulated by hormones, not motor neurons.
 - It does not have a well-developed sarcoplasmic reticulum, and Ca^{2+} enters the cell through the plasma membrane during an action potential.
 - It is not striated.
 - It is composed exclusively of slow-twitch muscle fibers.