

True (0) or false (X): (1 point for each question)

1. Cells lacking rough endoplasmic reticulum would be unable to synthesize proteins.
2. Cells in the G2 phase of the cell cycle contain half as much DNA as cell in the S phase.
3. Carbohydrates are added to proteins by the Golgi apparatus.
4. The rate of diffusion increases as the concentration gradient increases.
5. Neurotransmitters are released from nerve cells by exocytosis.
6. Reducing agents accept electrons from molecules undergoing oxidation.
7. Oxygen is reduced by the action of the electron transport chain.
8. Sodium ions are the principle intracellular ion.
9. The Krebs cycle completes the reduction of glucose started by glycolysis.
10. Action potentials of greater magnitude result from increased stimulus intensity.
11. Both excitatory and inhibitory postsynaptic potentials undergo summation.
12. Nicotinic receptors utilize G-protein to regulate the opening of ion channels.
13. An excitatory postsynaptic potential would be produced by a neurotransmitter opening K^+ channel.
14. The absolute refractory period results from the inactivation of voltage-regulated Na^+ channels.
15. Cells become more positive during depolarization.
16. The duration of the cell cycle is decreased in response to increased amount of cyclin.
17. Adding telomerase in PCR method increases the length of DNA.
18. Mitosis can be observed in reproductive system
19. During DNA replication, DNA polymerase breaks the hydrogen bonds between complementary bases.
20. During DNA replication, DNA polymerase makes primer first.
21. Kinetochore formation is required for mitotic chromosomal movement.
22. The products of oncogenes can bind to the receptor of the cell membrane and induce cell division.
23. Acetylcholine is always an excitatory neurotransmitter.
24. Neurotransmitters are actively transported across the synaptic cleft.
25. Spatial summation occurs when a single neuron releases neurotransmitter rapidly.

26. The action of acetylcholine can be stopped by enzymatic destruction.
27. Cancer cells continue to divide even when supply is insufficient.
28. Growth factors trigger mitosis by the induction of p53 protein.
29. Growth factor trigger mitosis by both phosphorylation and dephosphorylation of some proteins in the cells.
30. The Nernst equation can be used to calculate the equilibrium potential for an ion.
31. All cells have resting membrane potential.
32. DNA is only found in the nucleus.
33. Blocking K^+ channels would prevent neuronal repolarization.
34. Myelinated axon can transmit action potentials with the absence of Na^+ in extracellular fluid.
35. A lack of extracellular Ca^{2+} would cause increased release of neurotransmitter.
36. Cilia and flagella have the same arrangement of microtubules.
37. Thick filaments are composed of myosin and tropomyosin.
38. During skeletal muscle contraction the A band decreased in size.
39. Crossbridge formation occurs when myosin heads attach to troponin molecules located on the thin filaments.
40. Myosin will not bind to actin unless ADP is bound to the myosin head.
41. Anabolic reactions use energy to synthesize large molecules.
42. Prior to entering the Krebs cycle amino acids must be deaminated.
43. Crossing over allows for the exchange of genetic materials between identical chromosomes.
44. In some organisms, mitosis occurs without cytokinesis occurring. This will result in gametes with $2n$ of chromosome.
45. After DNA replication, the duplicate strands are called homologous chromosomes.
46. The decline of MPF at the end of mitosis is caused by the enzymatic destruction of the cyclin.
47. Oncogenes often stimulate cyclin-dependent kinase.
48. The primary intracellular cation is K^+ .
49. The Na^+ / K^+ pump establishes equilibrium concentrations of sodium and potassium ions.
50. Poisoning the Na^+ / K^+ pump would increase cellular permeability to Na^+ .

(1) Please describe the mechanisms of how different polypeptides encoded by nuclear genes can be directed to (1) ER lumen (2) cytosol (3) nucleus (4) mitochondria (5) peroxisome (20%).

(2) Please describe how G protein-linked receptor can activate protein kinase A (10%).

(3) Please describe the essential features of the fluid mosaic model of membrane structure that Singer and Nicholson proposed in 1972 (10%).

(4) Please use epidermal growth factor (EGF) and its receptor as example to describe the mechanism of receptor-mediated endocytosis (10%).