Biology Keystone Practice Exam Questions Key

\*Short answer questions are explained on the second page.

1. A
2. D
3. SHORT ANSWER
4. D
5. C
6. B
7. D
8. B
9. SHORT ANSWER
10. D
11. A
12. B
13. B
14. A
15. SHORT ANSWER
16. B
17. B
18. SHORT ANSWER
19. C
20. D
21. C
22. A
23. SHORT ANSWER
24. D
25. D
26. D
27. SHORT ANSWER
28. D
29. B
30. C
31. A
32. A
33. A
34. D
35. C
36. C
37. SHORT ANSWER
38. D
39. C
40. C
41. D
42. A
43. A
44. C
45. B
46. SHORT ANSWER
47. Part A: Due to the lack of organelles, the total volume of a prokaryotic cell is smaller than a eukaryotic cell. Cells with organelles have the ability to metabolize materials and retain a larger size.

Part B: Eukaryotic cells contain organelles. These structures are specialized for a specific function within the cell. Because these organelles are surrounded by their own membrane, the overall cell size can be larger because the inside of the cell is compartmentalized based on function.

Part C: Prokaryotic cells and eukaryotic cells both contain ribosomes to make proteins, a plasma membrane to control what enters and leaves the cell, genetic material, and a cytoplasm.

9. Part A: A protein is a polymer consisting of many subunits called amino acids. Amino acids are joined together by dehydration synthesis. The elements carbon, hydrogen, oxygen, and nitrogen are commonly found in an amino acid. An amino acid has an amine group, carboxyl group, and an R or variable group that changes based on the amino acid; there are 20 amino acids found in the human body.

Part B: Proteins contain the elements carbon, hydrogen, oxygen, and nitrogen; carbohydrates only contain the carbon, hydrogen, and oxygen. The ratio of elements in carbohydrates are also fixed in a 1:2:1 ratio of C:H:O. Proteins also contain peptide bonds that connect the amino acids to form a polypeptide chain. Carbohydrates do not form these types of bonds.

Part C: Carbohydrates are the main energy source for the cell. Proteins are not used as an energy source and are instead used to create many of the structures inside the cells and throughout the human body, such as muscles and some components of the cell membrane. Many proteins are enzymes, these help catabolize the thousands of chemical reactions that occur in the human body. Some proteins also serve as hormones.

15. Part A: Photosynthesis energy transformation: carbon dioxide and water are used in the chloroplast to transform light energy from the sun to create C6H12O6 and O2. The light energy is captured and stored in the bonds of the glucose molecules (C6H12O6)

Cellular respiration energy transformation: oxygen and glucose are broken down in the mitochondria for form carbon dioxide, water, and ATP, the energy molecule for the cell. The energy stored in the bonds of the glucose molecule is converted and stored in the molecules of ATP

Part B: Photosynthesis and cellular respiration are opposite reactions. The products of one of the processes become the reactants for the other. For example, if you look at the reactions for photosynthesis you will see that process produces glucose and oxygen. Looking at the equation for cellular respiration, you see this process requires glucose and oxygen.

18. Part A: The process that cells use to pump potassium ions against their concentration gradient is active transport. Active transport requires energy in the form of ATP because the potassium ions are being moved from an area of low concentration to an area of high concentration. Naturally, potassium ions will want to move from an area of high concentration to an area of low concentration.

Part B: There are specialized proteins in the cell membrane that act like pumps for these potassium ions. These pumps use ATP to move sodium ions out of the cell and, in return, move potassium ions into the cell. Because there are different numbers of sodium ions and potassium ions being moved across the membrane, an electrical gradient forms where one side of the cell membrane is more positively charged than the other.

Part C: Active transport is specific and also uses energy; this is a key distinction between active transport and facilitated diffusion. Facilitated diffusion also acts on a specific molecule but it does not require energy. An example would be glucose. This molecule is too big to pass through the membrane on its own, but it can go through with the help a specific protein embedded in the cell membrane.

23. Part A: The phases during meiosis where homologous chromosomes and sister chromatids separate is during Anaphase I and II of meiosis. If homologous chromosomes or sister chromatids fail to separate during either of these phases, Patau syndrome may result; this process is called nondisjunction.

Part B: During meiosis cells and the genetic materials is divided twice. The first division in meiosis (Meiosis I) separates the homologous chromosomes. In the second division of meiosis (Meiosis II) the sister chromatids separate. In mitosis, there is only one division of the cell and genetic material. Also, the sister chromatids separate in the single division during mitosis.

Part C: Due to the improper number of chromosomes, the organism has an incorrect amount of genetic material in the form of DNA of the sperm or egg. This mutation will be found in every cell of the organism’s body. If chromosomes fail to separate during mitosis, it does not affect the sex cells but a body cell. This mutant body cell then can be reproduced and produce more of the abnormal cells. The cell either dies or is replicated quickly. This could possible lead to cancer if the cells are not destroyed by the immune system.

27. Part A

|  |  |  |
| --- | --- | --- |
|  | R | R |
| R’ | RR’ | RR’ |
| R’ | RR’ | RR’ |

Part B: In cattle, R is the red allele and R’ is the white allele. Since this trait is codominant, when both alleles are present, both are expressed, making the color roan. A white cow must have the genotype R’R’ and a red bull must be RR. Since each parent is homozygous, they can only pass on one allele for red and one for white, creating only roan offspring.

Part C: If you do a Punnett square, 25% of the offspring will be red, 50% will be roan, 25% will be white.

|  |  |  |
| --- | --- | --- |
|  | R | R’ |
| R | RR | RR’ |
| R’ | RR’ | R’R’ |

1. Part A: Limiting factors for the moose can include quantity of food, physical space, and number of predators. If there is not enough food to support the population of moose, those who do not get enough food will starve and die. If there is not enough physical space, disease can spread quickly and kill some of the population. Lastly, if there are a lot of predators, they will kill and eat more moose than if there are few predators, in which case, the moose population will grow until one of the other limiting factors causes the population to decrease.

Part B: The wolf population increased between 1975 and 1980 because the moose population was at its highest between 1970 and 1975. This meant there was plenty of food for the wolves which allowed the wolf population to grow until the moose population began to decrease.