

請清楚標示題號並依序作答於試卷上

I. For each question, please select the most appropriate answer from the "Answer choices": (20%)

1. The most significant difference between living organism and non-living organism is ____.
2. The major component of plasma membrane and other cellular membrane is ____.
3. The fundamental packing unit of eukaryotic chromatin is a ____.
4. ____ is the specific DNA sequence recognized by the kinetochore proteins
5. The universal energy-harvesting process from bacteria to human is ____.
6. DNA supercoils could be removed by the action of ____.
7. Most of the mobile DNA elements in eukaryote are ____.
8. DNA replication is based on the ____ property of DNA double helix structure.
9. The chromosome behavior in ____ is consistent with Mendel's principles
10. The mechanism for sexual differentiation in *Drosophila* is related to ____.

Answer choices

- | | | | |
|-------------------------|------------------|---------------------|--------------------|
| A. metabolism | B. complementary | C. cholesterol | D. topoisomerase |
| E. phospholipid | F. telomere | G. growth | H. histone |
| I. meiosis I | J. glycolysis | K. reproduction | L. centrosome |
| M. fermentation | N. glucose | O. nucleotide | P. DNA transposons |
| Q. anti-parallel | R. meiosis II | S. nucleosome | T. centromere |
| U. helicase | V. silencer | W. retrotransposons | X. enhancer |
| Y. alternative splicing | Z. Y chromosome | | |

II. Essay questions (60%)

1. What are the differences between sexual reproduction and asexual reproduction?
2. What are the two advantages provided by membranous organelles in eukaryotic cells?
3. Describe the polarity relationship among DNA coding strand, DNA template strand, mRNA and polypeptide.
4. What is the ordinary route for a secreted protein from its production site to its exit from the cell?
5. When a single nucleotide insertion occurs within a gene at the middle of the protein-coding region, what will happen?
6. There are only one dominant allele and one recessive allele for a particular gene in the gene pool of a population at Hardy-Weinberg equilibrium. The proportion of homozygotes for the recessive allele in the population is 16%. What is the frequency of heterozygotes in the population?
7. In mammals, blood is pumped at high pressures in arteries from the heart to ensure that all parts of the body receive adequate blood flow. Capillary beds, however, would hemorrhage under direct arterial pressures. How does the design of the circulatory network contribute to avoiding this scenario?
8. How do birds obtain sufficient oxygen when they fly over the Hymalayas where the air is thin?
List some adaptations about their lungs and blood.
9. Why does vaccination work? Why do people need to get a new shot every year?
10. What limits the length of food chains in ecosystems?
11. How are hormones involved in homeostasis? Explain with an example.
12. Give an evidence to support that differentiated cells retain all the genes of developing cells.

III. Explain the following terms (20%)

1. ectothermy
2. monophyletic group
3. niche differentiation
4. transduction in hair cell (in the cochlea)
5. enterokinase

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