

1. Other than cell size, please list five features that largely distinguish eukaryotes from prokaryotes. (10分)
2. Protozoa can be classified into four groups by organelles for movement. Please name any three of the four groups. Also, write down one pathogen from each group you list and disease that it causes. (10分)
3. The following statements describe some transformation processes of a malignant tumor cell from a normal cell.
 - a. The machinery of anti-growth, such as telomerase, is not working.
 - b. Cancer cell shows dedifferentiation phenomenon.
 - c. Cancer cell is limited by extracellular matrix.
 - d. The growth machinery is constantly turned on, such as RB and DNA polymerase.
 - e. The cell is able to promote angiogenesis.

Choose answer that contains the wrong statements and explain why it is wrong. (10分)

4. A woman is a carrier of hemophilia, an X-linked disorder and married to a normal healthy man. Consider the following questions (10分):
 - a. What is the probability for her having a son?
 - b. What is the probability for her having an affected daughter?
 - c. What is the probability for her having an affected son?
5. Please describe in brief the Hardy-Weinberg principle (哈帝-溫柏格定律)? (10分)

6. The F1 from a cross of AB/AB x ab/ab is test-crossed, resulting in the following phenotypic ratios:

AB265
Ab235
ab285
aB215

What is the frequency of recombination between genes a and b? (10分)

(背面仍有題目,請繼續作答)

7. Mitochondria are the power plants of cells and are also involved in regulating apoptosis (the programmed cell death). List five biochemical activities in mitochondria. List two possible biochemical activities linked to apoptosis and explain the reasons. (12 分)
8. The fetal erythrocytes contain a hemoglobin F ($\alpha_2\gamma_2$), whereas adult erythrocytes contain the hemoglobin A ($\alpha_2\beta_2$). Is the switch of the subunit made at the level of transcription, RNA splicing or translation? What type of the hemoglobin has higher affinity for oxygen? What is the physiological significance of this difference? (8 分)
9. Define the steady state and equilibrium. Which status is maintained in the metabolic pathways of biological systems? Why? (10 分)
10. Explain the following terms (10 分)
- Autotroph
 - Amphipathic
 - Ribozymes
 - Stem cells
 - Telomere