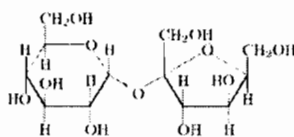


系所名稱：海洋生物研究所

科目名稱：普通生物學（一）

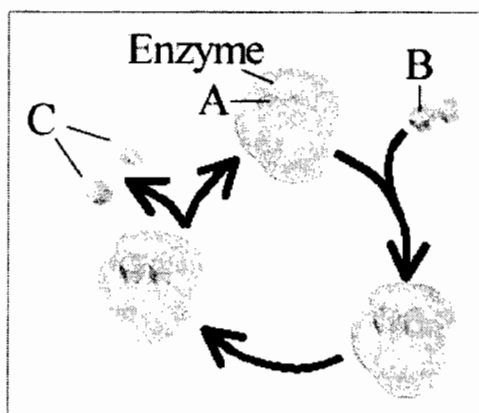
1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

1. 如果說『葡萄糖與澱粉的關係就好像是氨基酸與核酸的關係一樣』，請問這個敘述錯在那裡？說明你的理由並列出正確的敘述。(5分)
2. 下圖是蔗糖的結構，請由此說明蔗糖在小腸中如何被分解成兩個單糖？同時請列出這兩個單糖的名稱，最後列出整個反應的名稱。(5分)



Sucrose

3. 下圖是酵素反應的示意圖，請列出 A、B、C 三個箭頭所指部位的名稱。(5分)



4. 細胞製造 ATP 的方法主要有兩種：chemiosmosis 及 substrate-level phosphorylation，請說明兩者間的差異。(5分)
5. 光合作用包括那兩個階段，這兩個階段依賴那些分子連繫在一起？(5分)
6. Please describe the general structure of a cell membrane. (5%)
7. What is a polar molecule? Which of the following chemicals is a polar molecule?
 H_2O , CH_4 , H_2 , O_2 (5%)
8. Internal compartmentalization by membrane is important in a eukaryotic cell. Why? Please explain. (5%)
9. One micrometer (μm) = _____ centimeter (cm)
= _____ nanometer (nm)
= _____ millimeter (mm)
= _____ meter (m) (4%)

10. Mr. Wang mixed six electron micrographs. The micrographs included two of bean leaf cells, two of fish cells and two of *E. coli* bacteria. The microstructures of the six micrographs are showed as follows. Please help Mr. Wang to identify the micrographs. Which ones are the micrographs of bean leaf cells, fish cells or *E. coli* cells? Please explain your identification.

Picture A: Nucleus, rough ER

Picture B: Plasma membrane, ribosomes

Picture C: Microtubules, Golgi apparatus

Picture D: Mitochondrion, cell wall, plasma membrane

Picture E: Cell wall, plasma membrane

Picture F: Chloroplast, ribosomes, nucleus (6 %)

11. Explain how a single hormone, such as epinephrine, can cause different responses in different tissues. (5 %)
12. What are the fundamental processes involved in all excretory system, regardless of their anatomical differences or evolutionary origins? (5 %)
13. The movement of salt from the surrounding water to the blood of a freshwater fish requires the expenditure of energy in the form of ATP. Why? (5 %)
14. Describe the main role of each of the following cell types, once it is activated by antigens and cytokines: helper T cell, cytotoxic T cell, and B cell. (5 %)
15. Some birds in tropical dry forests periodically go into torpor, especially in the dry season. Explain. (5 %)
16. What are the major differences between mitosis and meiosis? (5 分)
17. Explain why fruit flies (*Drosophila melanogaster*) make good subjects for genetic experiments. (5 分)
18. Sketch a simple picture of part of a DNA molecule consisting of five nucleotide pairs. Make the sugars triangles, the phosphate groups circles, and the base rectangles. Label these parts, and show hydrogen bonds and complementary base pairing. (5 分)
19. Explain how operons enable a bacterium to adjust efficiently to a changing environment. (5 分)
20. Explain how to engineer *E. coli* to produce human growth hormone using the following: *E. coli* containing plasmid, a gene for GH, DNA ligase, a restriction enzyme, equipment for manipulating and growing bacteria. (5 分)