

一. 是非題 (60%, 標明題號, 依序回答, 以 O 或 X 表示對或錯; 每題 2.5 分, 答錯倒扣 0.5 分.)

1. Different atoms of a same element may have the same number of neutrons but different numbers of protons. These atoms are called isotopes and have a wide use in biological research.
2. Hydrophilic molecules usually can pass through the cytoplasmic membrane more easily than hydrophobic ones.
3. Polysaccharides are made up of monosaccharides linked together in long chains. They constitute storage forms for sugars and may also play structural roles both in animals and in plants.
4. The precise conformation of a protein molecule is of critical importance in its capacity to carry out a specific biological function.
5. Miller's experiment proved that almost any source of energy including lightning could convert some simple molecules into a variety of complex organic compounds, thus explaining how the life began on the primitive earth.
6. Fungi are prokaryotic organisms.
7. Microtubules, the largest structures of the cytoskeleton, play an important role in cell division.
8. Cilia and flagella on the surface of eukaryotic cells have a characteristic "9 + 1" structure.
9. Root pressure instead of turgor pressure can keep the cell walls stiff and plant body crisp.
10. The cell cycle consists of five major phases: G1, S, G2, mitosis, and cytokinesis. The former three phases are known collectively as prophase.
11. All enzymes have their own specific active sites, into which specific substrate molecules can fit.
12. The proton gradient formed across the inner mitochondrial membrane can power the production of ATP in oxidative phosphorylation.
13. Promoter is a DNA polymerase entry site on DNA molecule and can control the expression of associated structural genes.
14. The application of various restriction enzymes have promoted the progress of recombinant DNA technology by which the gene manipulation is easily achieved.
15. The vascular bundles in the stems of dicot angiosperms are scattered throughout the ground tissue.
16. The companion cell is one of the plant vascular tissues and can provide energy for the nearby tracheids.
17. The cooperation of Casparian strip and endoderms in a root can regulate the passage of substances into the vascular tissues.
18. The remaining light yellow liquid after blood clotting is called "serum".
19. After sensitization by a foreign antigen, T cells will differentiate into plasma cells with a large increase in endoplasmic reticulum and ribosomes, which are responsible for the production of immunoglobulin.
20. Multicellular organisms have far more capacity for homeostasis than unicellular ones.

21. The continuous cooperation between the nervous system and the endocrine system is the main regulatory system for controlling the animal's activities. Plants, however, rely largely on an elaborate interplay of hormones to coordinate their activities.
22. The functional unit of the nervous system is the neuron. It consists of an axon, which receives stimuli; a cell body, which contains the nucleus and metabolic machinery; and dendrites, which relay stimuli to other cells.
23. Hormones are characteristically active in tiny amounts and categorized into three general chemical types: steroids, peptides or proteins, and amino acid derivatives.
24. Competition, predation, and symbiosis are three major types of interspecific interaction of populations living in a common environment. Symbiosis is the relationship usually beneficial to both species.

二. 問答題 (40%)

1. The cohesion-tension theory can explain how the movement of water from the root to the top of plant body could be achieved, no matter how tall the plant is. Please design an experiment to support this theory. (20%)
2. Population explosion is a serious problem. List 5 methods of birth control. (10%)
3. Describe what you know about viruses. (10%)