

※ 務必標明題號並依序作答 ※

A. 選擇題 (30%)

1. The primary carbohydrate used in the transport of food from the leaves to the root is?
  - a. cellulose
  - b. glucose
  - c. sucrose
  - d. fructose
  - e. starch
2. Four of the five answers listed below are organelles found in eukaryotic cells. Select the **exception**.
  - a. mitochondrion
  - b. vacuole
  - c. nucleoid
  - d. microbody
  - e. Golgi body
3. In an attempt to visualize the fluid mosaic model of a membrane, we could describe the \_\_\_ as floating in a sea of \_\_\_\_.
  - a. phospholipids; protein
  - b. phospholipids; carbohydrate
  - c. protein; phospholipids
  - d. glycolipids; protein
  - e. carbohydrate; phospholipids
4. The Krebs cycle takes place in the?
  - a. ribosomes
  - b. cytoplasm
  - c. mitochondria
  - d. nucleus
  - e. stroma
5. Plant tissue noted for storage, healing wounds, and regeneration is?
  - a. parenchyma
  - b. collenchyma
  - c. sclerenchyma
  - d. meristem
  - e. phloem
6. If mutation prevented the formation of lignin, which tissue or cell would be most affected?
  - a. vascular cambium
  - b. epidermis
  - c. fiber
  - d. sieve tube member
  - e. companion cell

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7. Root and shoots lengthen through activity at?
  - a. vascular cambium
  - b. apical meristem
  - c. lateral meristem
  - d. cork cambium
  - e. intercalary meristem
8. The binomial for the coast redwood is *Sequoia sempervirens*. What is the species name of this plant?
  - a. *Sequoia*
  - b. *sempervirens*
  - c. *Sequoia sempervirens*
  - d. coast redwood
  - e. *Sequoia sempervirens* coast redwood
9. In the course of evolution of eukaryotic cell, some mitochondrial DNA was transferred to?
  - a. the host cell's chloroplast
  - b. bacterial cell
  - c. the host cell's nucleus
  - d. the host cell's plasma membrane
  - e. a plasmid
10. A unicellular, eukaryotic organism would be classified in the kingdom?
  - a. *Protista*
  - b. *Monera*
  - c. *Animalia*
  - d. *Plantae*
  - e. *Eukarya*
11. Prokaryotes that grow in the 140°C water near deep-sea vents are examples of?
  - a. aerobes
  - b. facultative anaerobes
  - c. psychrophiles
  - d. extreme thermophiles
  - e. methanogens
12. Planktons are organisms that inhabit?
  - a. the deepest parts of a pond, lake, or ocean
  - b. the surface layers of the water
  - c. freshwater only
  - d. saltwater only
  - e. fast-moving water only
13. A viral capsid is a?
  - a. protein coat
  - b. strand of DNA
  - c. strand of RNA
  - d. plasma membrane
  - e. type of organelle

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14. What is the ecological role of lichen acids?
  - a. weathering rock and formation of soil
  - b. protecting trees against predators
  - c. increasing rates of photosynthesis
  - d. absorbing minerals from the soil
  - e. contributing fixed nitrogen to the soil
15. In the evolution of vascular plants, there is a trend toward the?
  - a. above-ground parts becoming structurally similar to the below-ground parts
  - b. progressive reduction of the sporophyte
  - c. sporophyte becoming nutritionally dependent on the gametophyte
  - d. increased protection of the gametophyte by the sporophyte
  - e. production of seeds in all lineages
16. "Movement proteins" aid in the transport of \_\_\_\_\_ through plasmodesmata.
  - a. DNA
  - b. Proteins
  - c. Viruses
  - d. Cyclic AMP
  - e.  $\text{Ca}^{2+}$
17. Which of the following lists the correct sequence of cell wall layers, beginning with the outermost layer and progressing inward?
  - a. middle lamella, primary wall, secondary wall
  - b. secondary wall, primary wall, middle lamella
  - c. secondary wall, middle lamella, primary wall
  - d. primary wall, middle lamella, secondary wall
  - e. middle lamella, secondary wall, primary wall
18. The main function of cutin and suberin is to:
  - a. serve as structural components of cellular membranes.
  - b. prevent water loss.
  - c. catalyze chemical reactions.
  - d. provide strength to the cell wall.
  - e. serve as hormones.
19. Which of the following statements about an exergonic reaction is FALSE?
  - a. The potential energy of the final state is greater than that of the initial state.
  - b. It takes place spontaneously.
  - c. It takes place without an input of energy from the outside.
  - d. It releases energy.
  - e. It has a negative  $\Delta G$  value.
20. Which of the following statements about iron-sulfur proteins is FALSE?
  - a. They are components of the electron transport chain.
  - b. Their iron is not attached to a porphyrin ring.
  - c. Their iron is attached to sulfides.
  - d. Their iron is attached to the sulfur of sulfur-containing amino acids.
  - e. They carry both electrons and protons.

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21. Which of the following is characteristic of Photosystem I but NOT Photosystem II?
- It contains chlorophylls but not carotenoids.
  - It can function only in association with the other photosystem.
  - It donates electrons to an electron transport chain.
  - It contains P700 at the reaction center.
  - It splits water to release oxygen.
22. Which of the following directly ensures that daughter cells contain identical sets of chromosomes?
- Sister chromatids are joined at the centromere.
  - Sister chromatids move to opposite poles in anaphase.
  - Nuclear envelopes form in telophase.
  - Motor proteins pull daughter chromosomes apart.
  - The energy of ATP is used to separate daughter chromosomes.
23. Which of the following statements about meiosis is FALSE?
- It consists of two successive nuclear divisions.
  - It produces a total of two daughter nuclei.
  - It produces cells with half as many chromosomes as the parent cell.
  - It produces cells with one homolog of each homologous pair.
  - It is a source of new combinations of chromosomes.
24. In snapdragons, a cross between a red-flowered plant and a white-flowered plant produces a plant with pink flowers. What offspring would you expect from a cross between two pink-flowered plants?
- all pink
  - 1/2 pink and 1/2 white
  - 1/2 pink and 1/2 red
  - 1/4 red, 1/2 pink, 1/4 white
  - 1/4 pink, 1/2 red, 1/4 white
25. When a trait exhibits continuous variation in a population of organisms, it most likely is due to:
- one gene having multiple effects.
  - one allele not completely masking another allele.
  - several alleles of the same gene interacting.
  - one gene masking the effect of another gene.
  - several different genes interacting.
26. Which of the following statements about promoters is FALSE?
- They are specific nucleotide sequences of DNA.
  - They consist of three nucleotides that bind to a codon.
  - They determine the position where RNA synthesis begins.
  - They determine which DNA strand is used as a template.
  - They are binding sites for RNA polymerase.
27. Which of the following events is NOT part of the initiation stage of translation?
- The smaller ribosomal subunit attaches to mRNA.
  - GTP is hydrolyzed.
  - The larger ribosomal subunit attaches to the smaller subunit.
  - fMet-tRNA binds at the P site.
  - The initiator tRNA is released from the E site.

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28. Which of the following statements about plant hormones is FALSE?
- The same hormone can elicit different responses in different tissues.
  - The same hormone can elicit different responses at different times in the same tissue.
  - A tissue's response to a hormone depends on the sensitivity of the tissue to that hormone.
  - All plant hormones can be classified into five groups.
  - Many details of the mechanism of hormone action are unknown.
29. Cell wall extensibility, and thus cell expansion, is increased by \_\_\_\_\_ but decreased by \_\_\_\_\_.
- auxin and ethylene; GA and ABA
  - auxin and GA; ABA and ethylene
  - auxin and ABA; GA and ethylene
  - ABA and ethylene; auxin and GA
  - ABA and GA; auxin and ethylene
30. Which of the following statements about cold treatments and flowering is FALSE?
- In winter rye, after cold treatment, plants require long days in order to flower.
  - In spinach, cold treatment shortens the daylength required for flowering.
  - In clover, cold treatment completely removes the day length requirement for flowering.
  - In henbane, gibberellin treatment can substitute for cold treatment in hastening flowering.
  - In nonrosette long-day plants, gibberellin treatment can substitute for cold treatment in hastening flowering.

**B. 解釋名詞：(30%)**

- |                            |                            |                                   |
|----------------------------|----------------------------|-----------------------------------|
| 1. cytoskeleton            | 2. double fertilization    | 3. seed dormancy                  |
| 4. mycorrhiza              | 5. rootcap                 | 6. sporophyte                     |
| 7. vegetative reproduction | 8. somatic hybrids         | 9. totipotency                    |
| 10. phytochrome            | 11. cotranslational import | 12. Kranz anatomy                 |
| 13. greenhouse effect      | 14. chemiosmotic coupling  | 15. receptor-mediated endocytosis |

**C. 申論題：(40%)**

- 一般而言，植物產生的化合物可區分為兩大類，即初級代謝物（primary metabolites）與次級代謝物（secondary metabolites），初級代謝物如簡單的糖類、氨基酸、蛋白質、核酸等，其存在於所有的植物細胞中，為植物生長所必須；次級代謝物如植物鹼（alkaloids）、類萜（terpenoids）、與酚類（phenolics）等，其分布則較侷限於植物或僅某些植物的特定部位。試就你所知，分別舉例說明植物的次級代謝物，並指出其對於植物的功能以及人類應用的情形。
- 試述維管束植物的起源與演化，並舉例說明之。
- 試提出證據並討論植物體中存在著一些促進植物開花或抑制植物開花的物質。
- 雖然 C4 植物進行光合作用時比 C3 植物需要更多的 ATP 分子，但是 C4 的途徑仍然較有效率，試提出你的觀點解釋之。

**試題必須隨卷繳回**