

※ 注意：請於試卷上「選擇題作答區」依序作答。

(一) 單選題(70 分)

1. A dormant seed will germinate only when:
  - a. the temperature becomes milder.
  - b. water becomes available.
  - c. oxygen becomes available.
  - d. precise environmental cues are received.
  - e. water and oxygen become available at the same time.
  
2. Which of the following statements about circadian rhythms is FALSE?
  - a. They are endogenous.
  - b. They can be entrained by light-dark cycles.
  - c. They can be entrained by temperature cycles.
  - d. They speed up as the temperature rises.
  - e. They enable the plant to measure changing daylength.
  
3. Lenticels function primarily in:
  - a. water transport.
  - b. gas exchange.
  - c. mineral uptake.
  - d. protection.
  - e. hormone production.
  
4. Plants that grow completely submerged have leaves with:
  - a. no stomata.
  - b. stomata only on the upper surface.
  - c. stomata only on the lower surface.
  - d. stomata sunken in depressions.
  - e. many epidermal hairs.
  
5. The sequence of regions in a growing root, beginning immediately behind the rootcap, is:
  - a. elongation, maturation, cell division.
  - b. cell division, maturation, elongation.
  - c. cell division, elongation, maturation.
  - d. elongation, cell division, maturation.
  - e. maturation, elongation, cell division.
  
6. Which of the following is NOT a function of trichomes?
  - a. Providing structural support
  - b. Defending against insects
  - c. Secreting salts
  - d. Absorbing water and minerals from the soil
  - e. Reflecting solar radiation

7. Legumes have long been important in the human diet because they are:
- low in fats.
  - low in carbohydrates.
  - high in protein.
  - high in fats.
  - high in carbohydrates.
8. The most promising approach to solving the world's food problems is:
- increasing the use of pesticides.
  - increasing the use of fertilizers.
  - increasing the availability of water.
  - cultivating more land.
  - improving the existing crops.
9. In most angiosperms, petals are probably evolutionary derivatives of:
- stamens.
  - sepals.
  - carpels.
  - receptacles.
  - peduncles.
10. Which of the following is NOT an example of coevolution of bees and flowers?
- Bees have body parts adapted to collect and carry nectar.
  - Bees have body parts adapted to collect and carry pollen.
  - Flowers pollinated by bees are usually red.
  - Flowers pollinated by bees have distinctive markings.
  - Flowers pollinated by bees have showy, brightly colored petals.
11. The fertile parts of a flower are the:
- |                        |                         |                        |
|------------------------|-------------------------|------------------------|
| a. sepals and petals.  | b. sepals and stamens.  | c. petals and stamens. |
| d. sepals and carpels. | e. carpels and stamens. |                        |
12. In the process of double fertilization, one sperm fuses with the \_\_\_\_\_, and the other sperm fuses with the \_\_\_\_\_.
- egg; synergids
  - egg; polar nuclei
  - egg; antipodals
  - synergid; polar nuclei
  - synergid; antipodals

13. Seed plants evolved most directly from:
- a. lycophytes.
  - b. ferns.
  - c. progymnosperms.
  - d. angiosperms.
  - e. trimerophytes.
14. In gymnosperms, pollination occurs usually by:
- a. insects.
  - b. water.
  - c. wind.
  - d. birds.
  - e. mammals.
15. The main tissue systems of the vascular plant are the \_\_\_\_\_ systems.
- a. root and shoot
  - b. root, shoot, and reproductive
  - c. root, stem, and leaf
  - d. dermal, vascular, and ground
  - e. xylem, phloem, and ground
16. Which of the following statements about primary growth is FALSE?
- a. It occurs close to the tips of stems and roots.
  - b. It primarily leads to thickening of the plant body.
  - c. It is initiated by the apical meristems.
  - d. It gives rise to primary tissues.
  - e. It gives rise to the primary plant body.
17. Bryophytes are a group of organisms at the transition between:
- a. brown algae and green algae.
  - b. fungi and plants.
  - c. green algae and vascular plants.
  - d. nonvascular and vascular plants.
  - e. aquatic and terrestrial plants.
18. Which of the following lists the taxonomic categories in the correct hierarchy, from most to least inclusive, under kingdom?
- a. Class, phylum, order, family, genus, species
  - b. Order, class, phylum, family, genus, species
  - c. Phylum, class, order, family, genus, species
  - d. Phylum, order, class, family, genus, species
  - e. Order, phylum, family, class, genus, species

19. Which of the following best indicates the correct sequence in which the evolution of these organelles occurred?
- mitochondrion, lysosome, chloroplast
  - lysosome, mitochondrion, chloroplast
  - lysosome, chloroplast, mitochondrion
  - chloroplast, mitochondrion, lysosome
  - chloroplast, lysosome, mitochondrion
20. One clear evolutionary trend in the vascular plants is the increasing dominance of:
- the sporophyte.
  - the gametophyte.
  - zygotic meiosis.
  - gametic meiosis.
  - isomorphic life cycles.
21. The raw material for evolutionary change is provided by:
- sexual reproduction.
  - asexual reproduction.
  - mutations.
  - meiosis.
  - mitosis.
22. When plants self-pollinate, they are undergoing:
- |                       |                      |               |
|-----------------------|----------------------|---------------|
| a. mutation.          | b. genetic drift.    | c. gene flow. |
| d. natural selection. | e. nonrandom mating. |               |
23. Which of the following statements concerning restriction enzymes is FALSE?
- They are a type of endonuclease.
  - They recognize DNA sequences typically four to six nucleotides long.
  - They recognize single-stranded DNA sequences.
  - Some make straight cuts in the DNA.
  - They recognize specific palindromic sequences.
24. In the Ti plasmid of *Agrobacterium tumefaciens*, the vir region is essential for the:
- synthesis of auxin.
  - synthesis of opine.
  - synthesis of cytokinin.
  - transfer of T-DNA.
  - utilization of nitrogen and carbon.

25. Mutant forms of the ethylene receptor gene from *Arabidopsis* are inserted into plants for the purpose of:
- increasing starch content.
  - increasing levels of  $\beta$ -carotene.
  - stimulating fruit ripening.
  - conferring resistance to pesticides.
  - delaying flower wilting.
26. In DNA replication, the lagging strand differs from the leading strand in that the lagging strand is synthesized:
- in a 5' to 3' direction.
  - in a 3' to 5' direction.
  - in fragments.
  - using DNA polymerase.
  - outside the replication bubble.
27. Which of the following events is NOT involved in mRNA processing?
- the addition of a 5' "cap"
  - the addition of a poly-A tail
  - the splicing together of exons
  - the forming of peptide bonds
  - the removal of introns
28. Which of the following statements about transposons is FALSE?
- They occur only in bacteria.
  - They are also called "jumping genes."
  - They are movable genetic elements.
  - They may lead to mutation.
  - Plasmids can function as transposons.
29. 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

30. Which of the following statements about asexual reproduction is FALSE?
- It is also known as vegetative reproduction.
  - It results in offspring that are genetically identical to the parent.
  - It is common in higher plants.
  - Many plants reproduce asexually and sexually.
  - It increases the ability of a population to adapt to differing conditions.
31. In photophosphorylation, the role of the ATP synthase complex is to provide a channel for protons to flow back into the:
- lumen of the thylakoid.
  - chloroplast stroma.
  - intermembrane space of the mitochondrion.
  - intermembrane space of the chloroplast.
  - cytosol.
32. Which of the following conditions favors photorespiration?
- A ratio of  $\text{CO}_2$  to  $\text{O}_2$  that favors  $\text{CO}_2$
  - Conditions that cause the stomata to open
  - Plants growing far apart
  - A hot, dry environment
  - Darkness
33. Which of the following is most likely to occur in a leaf cell of a CAM plant during the day?
- Entry of  $\text{CO}_2$  through stomata
  - Exit of water through stomata
  - Decarboxylation of malic acid
  - fixation of  $\text{CO}_2$  by PEP carboxylase
  - Conversion of oxaloacetate to malate
34. Within the plant cell, glycolysis occurs in:
- |                               |                 |                  |
|-------------------------------|-----------------|------------------|
| a. mitochondria.              | b. the cytosol. | c. chloroplasts. |
| d. the endoplasmic reticulum. | e. the nucleus. |                  |
35. Which of the following is NOT a stage of respiration?
- Citric acid cycle
  - Formation of acetyl CoA
  - Glycolysis
  - Hydrolysis of starch to glucose
  - Electron transfer/oxidative phosphorylation

※ 注意：請於試卷上「非選擇題作答區」標明大題及小題題號，並依序作答。

(二) 解釋名詞(10 分)

1. Parenchyma
2. Inflorescence
3. Secondary metabolite
4. Integument
5. Hypocotyl

(三) 問答題 (20 分)

1. Discuss some of the evolutionary adaptations of fruits and seeds to dispersal by animals. (10 分)
2. The pollinator insects or other animals play the role to accelerate the evolution of angiosperms. The flowers of the earliest members might coevolve with the pollinators, as the angiosperms continued to evolve. Please describe four evolutionary trends of flowers for attracting the pollinators? (10 分)