

※注意：請於試卷上「選擇題作答區」依序作答。

(一) 單選題(60分)

1. Which of the following is/are NOT part of the protoplast?
A) Cytoplasm B) Nucleus C) Organelles D) Ribosomes
E) Cell wall
2. Which of the following is NOT a function of membrane proteins?
A) Convert energy from one form to another.
B) Make the membrane impermeable.
C) Transport specific molecules or ions into and out of the cell.
D) Catalyze chemical reactions.
E) Act as receptors for chemical signals.
3. Most enzymes that catalyze phosphorylation reactions require _____ as a cofactor.
A) NAD^+ B) Ca^{2+} C) Mg^{2+} D) AMP
E) an iron-sulfur cluster
4. Which statement about the reaction $\text{ATP} + \text{H}_2\text{O} \rightarrow \text{ADP} + \text{phosphate}$ is FALSE?
A) It is exergonic.
B) The reactants are more stable than the products.
C) It releases about 7.3 kilocalories of energy per mole.
D) It involves the breaking of phosphoanhydride bonds.
E) It is catalyzed by an ATPase.
5. Cellulose synthase is an enzyme situated in the:
A) vacuole. B) chloroplasts. C) cell wall. D) mitochondria.
E) plasma membrane.
6. Oxidative phosphorylation depends on a gradient of _____ across the mitochondrial membrane.
A) ADP B) protons C) phosphate D) glucose
E) electrons
7. Because the first detectable product of the Calvin cycle is _____, the cycle is also known as the _____ pathway.
A) ribulose 1,5-bisphosphate; C_5
B) oxaloacetate; C_4
C) 3-phosphoglycerate; C_3
D) glyceraldehyde 3-phosphate; C_3
E) Rubisco; C_4

見背面

8. Under extremely _____ conditions, CAM plants would most likely grow _____ C₃ and C₄ plants.
- A) wet; more slowly than
 - B) wet; more rapidly than
 - C) wet; just as rapidly as
 - D) arid; more rapidly than
 - E) arid; more slowly than
9. Which of the following statements about transposons is FALSE?
- A) They are also called "jumping genes."
 - B) They are movable genetic elements.
 - C) They may lead to mutation.
 - D) Plasmids can function as transposons.
 - E) They occur only in bacteria.
10. Which of the following events is NOT part of the initiation stage of translation?
- A) The smaller ribosomal subunit attaches to mRNA.
 - B) GTP is hydrolyzed.
 - C) The larger ribosomal subunit attaches to the smaller subunit.
 - D) fMet-tRNA binds at the P site.
 - E) The initiator tRNA is released from the E site.
11. In the Ti plasmid of *Agrobacterium tumefaciens*, the *vir* region is essential for the:
- A) synthesis of auxin.
 - B) synthesis of opine.
 - C) synthesis of cytokinin.
 - D) transfer of T-DNA.
 - E) utilization of nitrogen and carbon.
12. Which of the following statements about particle bombardment is FALSE?
- A) It is used to deliver DNA but not RNA into a cell.
 - B) It involves the use of gold or tungsten beads.
 - C) It involves high-velocity microprojectiles.
 - D) It involves the use of a gene gun.
 - E) It has been used to create a virus-resistant strain of papaya.
13. By definition, autotrophs differ from heterotrophs in that autotrophs:
- A) use inorganic compounds as an energy source.
 - B) use light as an energy source.
 - C) use carbon dioxide as their sole source of carbon.
 - D) obtain their carbon from dead organic matter.
 - E) obtain their energy from dead organic matter.

國立臺灣大學109學年度轉學生招生考試試題

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14. Which of the following processes does NOT involve genetic recombination?
A) Binary fission. B) Transduction. C) Transformation. D) Conjugation.
E) Meiosis.
15. 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.
16. Which of the following was NOT a step in the evolution of the ovule?
A) Retention of the megaspores in the megasporangium.
B) Production of only four megaspore mother cells per megasporangium.
C) Formation of a highly reduced endosporic megagametophyte.
D) Production of only one functional megaspore per megasporangium.
E) Development of the embryo within the megagametophyte.
17. Which of the following statements about pollen grains is FALSE?
A) They vary considerably in size and shape.
B) They are poorly represented in the fossil record.
C) They differ in the number, arrangement, and shape of their apertures.
D) They provide insights into past climates.
E) They provide a means of identifying flowering plants.
18. Triaperturate pollen is characteristic of:
A) eudicots. B) dicots. C) monocots. D) magnoliids.
E) gymnosperms.
19. The largest angiosperm family is the:
A) Magnoliaceae. B) Asteraceae. C) Piperaceae. D) Orchidaceae.
E) Aristolochiaceae.
20. Which of the following statements about most bat-pollinated flowers is FALSE?
A) They are dull colored.
B) They produce copious nectar.
C) They are relatively odorless.
D) They often hang down on long stalks.
E) They open only at night.

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21. What is TRUE about the xylem transport and phloem translocation?
- A) Both are driven by pressure gradient.
 - B) Both are driven by negative pressure.
 - C) Only xylem transport involves water movement.
 - D) Both movements are bidirectional.
22. About the nutrient uptake, which statement is WRONG?
- A) Clay has the highest cation capacity.
 - B) Most nutrients are available when the pH of the soil is between 5.0 and 6.0.
 - C) The more fertilizers, the better for plant growth.
 - D) If the symptoms of nutrient deficiency occur in the young leaves, this nutrient is immobile.
23. Which one is related to secondary growth of plants?
- A) Apical meristems
 - B) Primary xylem
 - C) Vascular cambium
 - D) Pith
24. What are the three basic tissues of plants?
- A) Dermal, ground, and vascular tissues.
 - B) Lateral, ventral, and dorsal tissues.
 - C) Epithelial, ground and vascular tissues.
 - D) Epithelial, connective, and ground tissues.
25. Lateral roots are differentiated from which part of plants?
- A) Cortex
 - B) Endodermis
 - C) Vascular cambium
 - D) Pericycle
26. Which description about Casparian strip is WRONG?
- A) Casparian strip located at endodermis of roots.
 - B) Casparian strip will reduce the uptake activity of roots.
 - C) Casparian strip may be composed by lignin or suberin.
 - D) Casparian strip help plants to select suitable substances transported into vascular tissues.
27. Which statement about water movement in a plant is WRONG?
- A) The growing root tips are the major sites for water uptake.
 - B) The water movement is influenced by the solute concentration.
 - C) Because water can diffuse directly through the membrane, there is no membrane protein for water uptake.
 - D) Water uptake by a cell will generate turgor.

28. Which description about sexual and asexual reproduction is WRONG?
- A) The progeny of asexual reproduction has less genetic variation and has advantage in stable environment.
 - B) The sexual reproduction always has more offspring.
 - C) The asexual reproduction is suitable for keeping beautiful orchid flowers species.
 - D) The sexual reproduction may need the help of animals.
29. Which description about signal transduction pathway is WRONG?
- A) Generally, there are three steps which are reception, transduction, and response.
 - B) The receptors responsible for the reception are always membrane proteins.
 - C) The second messengers are used in transduction step.
 - D) In most cases, the responses involve increased activity of enzymes.
30. Which description about apical dominance is CORRECT?
- A) Both auxin and strigolactones repress the growth of axillary buds.
 - B) Auxin induces the synthesis of cytokinins to repress growth of axillary buds.
 - C) Apical dominance enhances the growth of axillary buds.
 - D) Auxin, cytokinins and strigolactones have the same effect on apical dominance.

見背面

※ 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)

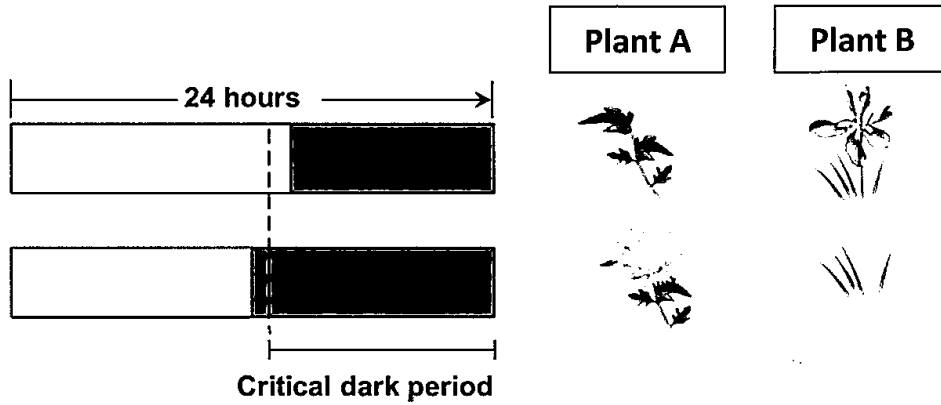
1. Indehiscent fruit
2. Chromatin
3. Monoecious
4. Inflorescence
5. Epiphyte

(三) 填空題 (請寫英文) Cloze test (English only) (20 分)

1. The word that describe a plant cell with the ability to development into a whole plant. (A).
2. Light will induce stem to bend. This phenomenon is called (B).
3. The protein with pink color keeps low oxygen concentration in the nodules. (C).
4. The pathway of water or ions moving through the plasmodesmata of the root cells is called (D).
5. Water diffusing through a selective membrane is called (E).
6. Water evaporating from the leaves is called (F).
7. What determine the direction of water movement? (G).
8. (H) differentiates into secondary xylem and secondary phloem.
9. (I) has Casparian strip that can select which substances can enter into the (J).

(四) 問答題 (10 分)

1. Flowering is controlled by photoperiod. So, according to the figure below, what kind of plant (long-day or short day) is Plant A and Plant B? (2 分)



2. In the table, there are 6 species of Monkey Flowers. Which species of Monkey Flowers reproduce sexually? which ones reproduce asexually? Give your explanations for each situation. (8 分)



Data from the Experiment

Species	Nectar Volume (μL)	Nectar Concentration (% weight of sucrose/total weight)	Seeds per Flower	Visits per Flower	Rooted Branches per Gram Shoot Weight
<i>M. rupestris</i>	4.93	16.6	2.2	0.22	0.673
<i>M. eastwoodiae</i>	4.94	19.8	25	0.74	0.488
<i>M. nelson</i>	20.25	17.1	102.5	1.08	0.139
<i>M. verbenaceus</i>	38.96	16.9	155.1	1.26	0.091
<i>M. cardinalis</i>	50.00	19.9	283.7	1.75	0.069

Data from S. Sutherland and R. K. Vickery, Jr. Trade-offs between sexual and asexual reproduction in the genus *Mimulus*. *Oecologia* 76:330-335 (1998).