

※ 務必標明題號並依序作答 ※

一、選擇題：(20%)

- 1) Which of the following statements about meiosis is **FALSE**?
- A) It consists of two successive nuclear divisions.  
B) It produces cells with one homolog of each homologous pair.  
C) It produces a total of two daughter nuclei.  
D) It produces cells with half as many chromosomes as the parent cell.
- 2) If mutation prevented the formation of lignin, which plant tissue would be most affected ?  
A) vascular cambium.      B) epidermis.      C) fiber.      D) collenchyma.
- 3) Which of the following is characteristic of Photosystem I but **NOT** Photosystem II?
- A) It can function only in association with the other photosystem.  
B) It donates electrons to an electron transport chain.  
C) It contains P700 at the reaction center.  
D) It splits water to release oxygen.
- 4) The nutrition of some plants depends on a root-fungus association known as a \_\_\_\_\_.  
A) root nodule.      B) haustorium.      C) mycorrhiza.      D) root hypha.
- 5) Development of a new plant from a structure that is separated from parent plant is called \_\_\_\_\_.  
A) vegetative propagation.      B) exocytosis.      C) secondary growth.      D) fertilization.
- 6) When comparing root systems of plants growing on a square foot in a cornfield and on a meadow, what result do you expect to receive?
- A) The overall mass of roots will be identical in a cornfield and on a meadow.  
B) The mass and length of roots in a cornfield will be higher because soil is fertilized.  
C) The mass and length of roots on a meadow will be higher because soil is poorer and there is higher diversity of plants.  
D) The overall mass of roots on a meadow will be lower, but the length will be higher since roots need to grow deeper to reach nutrients.
- 7) Imagine that you bought three identical young tomato plants. One you put to grow in the sunny location in a tranquil part of your garden, one on the windy and sunny hill nearby, and one in the shady part of the garden. How will these plants look in two months' time?

	The first one	the second one	the third one
A)	medium size	short with small leaves	spindly with big leaves
B)	short with small leaves	medium size	spindly with big leaves
C)	spindly with big leaves	short with small leaves	medium size
D)	medium size	spindly with big leaves	short with small leaves

見背面

- 8) The surface area of a plant's root system is substantially larger than the surface area of its shoot system. Which hypothesis best explains the extensive surface area of roots?
- A) needed for contact with soil particles for mineral and water absorption
  - B) provides structure for vascular tissue in the roots
  - C) provides good anchoring ability of the root system
  - D) needed to store sugars for overwintering capability
- 9) You find a plant unfamiliar to you and observe that it has vascular bundles scattered throughout the stem cross section. What do you conclude about the plant?
- A) It is probably an herbaceous eudicot.
  - B) It will probably get annual rings of wood.
  - C) It is probably a monocot.
  - D) It could be either a young eudicot or a monocot.
- 10) Feeding your Venus flytrap a common brand of all-purpose plant fertilizer would likely cause
- A) it to die from nitrogen overload.
  - B) its traps to become large enough to capture small mammals.
  - C) no change, because these plants can only use nitrogen from insects.
  - D) its traps to fall off, because it would not need to acquire nitrogen from insects.

二、配合題：(10%)

1. Populations of plant undifferentiated cells that produce new cells: \_\_\_\_\_
2. Stems that grow horizontally in the soil instead of vertically over the soil: \_\_\_\_\_
3. A waxy layer that forms a continuous sheet on the surface of plant epidermal cells: \_\_\_\_\_
4. A gland of plant produces the sugar-rich fluid which may be harvested by pollinators: \_\_\_\_\_
5. Pollen-producing organs: \_\_\_\_\_
6. Direct connections between the cytoplasm of adjacent plant cells: \_\_\_\_\_
7. Small cysteine-rich proteins that bind to toxic metal in plant cells and tissues: \_\_\_\_\_
8. Blue-light receptor located in the cell membrane of higher plant: \_\_\_\_\_
9. A peptide hormone released from leaves eaten by herbivores: \_\_\_\_\_
10. To initiate seed germination, what enzyme is induced by GA to digest starch: \_\_\_\_\_

A: ABA	E: cuticle	I: meristems	M: phytochromes
B: auxin	F: ethylene	J: nectary	N: phototropins
C: anthers	G: flavonoids	K: plasmodesmata	O: rhizomes
D: collenchyma	H: metallothioneins	L: phytoalexins	P: systemin

三、問答題：(70%)

- 1、 What is a hypothesis in science? Please discuss two important qualities of scientific hypotheses. (10%)
- 2、 What is the current view of the successive levels of DNA packing in a eukaryotic chromosome? (10%)
- 3、 Based on the molecular phylogeny, the animal phyla that are not in Deuterostomia have been assigned to two taxa rather than one, i.e., Protostomia. Please name and describe the characteristics of these two taxa. (15%)
- 4、 Please comment on a common mistaken idea that “ingestion of collagen from one’s diet could provide collagen needed in one’s dermis”. (15%)
- 5、 In the evolution of land plants, the most advanced plants have a dominant diploid generation, and the less advanced plants have a dominant gametophyte generation. What adaptations, both vegetative and reproductive, have influenced this evolutionary trend? (6%)
- 6、 How would the morphology of a tree trunk growing in a tropical rain forest differ from that of a tree growing in a temperate climate? (6%)
- 7、 On some mornings, water droplets can be seen on the tips of leaves of various herbaceous plants, including grasses and strawberries. This exudation of water, caused by the buildup of hydrostatic pressure in the xylem cells of the roots, is known as guttation. (8%)
  - a) Under what conditions does guttation occur?
  - b) Why is guttation most prominent in the early morning?
  - c) Why doesn’t guttation occur later in the day?
  - d) In this example, water movement is due to positive pressure, which forces water up the xylem. Why doesn’t this pressure explain the movement of water in trees?