

※ 注意：選擇題請於答案卷之「選擇題作答區」依序作答。

(一) 選擇題 (每題1分, 共50分)

1. As the vascular cambium continues to divide, the cambial cells:
  - a. are displaced inward.
  - b. are displaced outward.
  - c. cease to divide anticlinally.
  - d. cease to divide periclinally.
2. Functional phloem:
  - a. is composed of primary tissue.
  - b. consists of living or dead sieve elements.
  - c. is part of the inner bark.
  - d. makes up the majority of secondary phloem in older plants.
3. In the angiosperm shoot apex, the corpus and overlying tunica constitute the:
  - a. pith meristem.
  - b. peripheral meristem.
  - c. meristematic cap.
  - d. central zone.
4. Which of the following statements about palisade parenchyma is FALSE?
  - a. It is lacking in the leaves of maize and other grasses.
  - b. It is usually located on the lower side of the leaf.
  - c. It consists of columnar cells.
  - d. It is where most of the photosynthesis in the leaf occurs.
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.
6. In angiosperms, cells of the \_\_\_\_\_ and the \_\_\_\_\_ contribute to lateral root formation.
  - a. endodermis; pericycle
  - b. epidermis; pericycle
  - c. epidermis; endodermis
  - d. pith; cortex
7. Which of the following statements about primary growth is FALSE?
  - a. It results in extension of the plant body.
  - b. It involves the formation of primary tissues.
  - c. It results in the thickening of the stem and root.
  - d. It results from activity of the root and shoot apical meristems.
8. Morphogenesis refers to:
  - a. an irreversible increase in size.
  - b. the acquisition of a particular shape.
  - c. the sum of all the events that lead to formation of an organism's body.
  - d. the process by which cells become different from one another.
9. Which of the following statements about P-protein is FALSE?
  - a. It is found in the protoplasts of sieve-tube elements of magnoliids, eudicots, and some monocots.
  - b. In undisturbed cells, it lines the sieve-plate pores.
  - c. It may serve to seal the sieve-plate pores when the cell is wounded.
  - d. The "P" stands for protection.
10. Which of following lists the correct developmental sequence in eudicots, where I, is the globular stage; II, the heart stage; III, the proembryo; IV, the torpedo stage; and V, the zygote?
  - a. V, I, III, II, IV
  - b. V, III, I, II, IV
  - c. I, V, IV, II, III
  - d. III, V, II, IV, I
11. When the seed coat is ruptured during germination, the seed:
  - a. switches to anaerobic glucose breakdown.
  - b. switches to aerobic respiration.
  - c. first begins to use glucose as a fuel molecule.
  - d. is no longer able to use oxygen.
12. Crops can be improved by increasing each of the following EXCEPT:
  - a. the quantity of proteins.
  - b. the quality of proteins.
  - c. nitrogen requirements.
  - d. disease resistance.
13. Which of the following is NOT a group of secondary plant products?

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a. Alkaloids

b. Carotenoids

c. Essential oils

d. Flavonoids

14. A monoecious species has:

- a. floral parts united with other members of the same whorl.
- b. floral parts united with members of other whorls.
- c. staminate and carpellate flowers on the same plant.
- d. staminate and carpellate flowers on different plants.

15. The process of double fertilization occurs:

- a. only in angiosperms.
- b. in all angiosperms and gymnosperms.
- c. only in angiosperms and *Ephedra*.
- d. only in angiosperms, *Ephedra*, and *Gnetum*.

16. Which of the following statements about pine seeds is FALSE?

- a. They are often shed from the cones during the first year following pollination.
- b. They are often dispersed by the wind.
- c. Some are dispersed only after the cones are scorched by fire.
- d. Some are dispersed by birds.

17. 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. increased protection of the gametophyte by the sporophyte.
- c. progressive reduction of the sporophyte.
- d. sporophyte becoming nutritionally dependent on the gametophyte.

18. Leaves of leafy liverworts differ from those of mosses in that liverwort leaves:

- a. are entire rather than lobed or dissected.
- b. are spirally arranged.
- c. are arranged in two rows with a third row of smaller leaves.
- d. have a thickened midrib.

19. Which of the following statements about algal blooms is true?

- a. They are associated with water disturbed by fish.
- b. Some are known as green tides.
- c. The frequency of marine algal blooms has decreased globally.
- d. They are often correlated with the release of toxic compounds.

20. Green algae differ from plants in that the green algae:

- a. include unicellular and colonial forms.
- b. have flagellated reproductive cells.
- c. store their food reserves inside plastids.
- d. do not have cellulose-containing cell walls.

21. Which of the following statements does NOT describe the plasma membrane of prokaryotes?

- a. It has attachment sites for daughter chromosomes during cell division.
- b. Like eukaryotic plasma membranes, it contains proteins and sterols.
- c. In aerobic species, it is the site of the electron transport chain.
- d. In some photosynthetic species it is the site of photosynthesis.

22. Which archaeans synthesize ATP using light energy and bacteriorhodopsin?

- a. Mycoplasmas
- b. Extreme thermophiles
- c. Members of the genus *Thermoplasma*
- d. Extreme halophiles

23. Which of the following statements about nuclear division in fungi is FALSE?

- a. In many species, the nuclear envelope does not disintegrate.
- b. Except for the chytrids, all fungi have centrioles.
- c. In most fungi, the spindle forms within the nuclear envelope.
- d. In some fungi, spindle pole bodies function as microtubule organizing centers.

24. In the mushroom life cycle, karyogamy occurs in a:

- a. stipe.
- b. volva.
- c. basidium.
- d. basidiospore.

25. Which of the following describes zygotic meiosis?

- a. It occurs in most plants.      b. The zygote is the only diploid cell in the life cycle.  
c. It results directly in gametes.      d. It is characteristic of organisms having an alternation of generations.
26. Which light wavelengths will Chlorophyll absorb principally?  
a. blue and green  
b. green and violet  
c. blue and violet  
d. violet and green
27. Which of the following is/are produced during noncyclic electron flow?  
a. ATP only  
b. NADPH only  
c. ATP and O<sub>2</sub> only  
d. ATP, NADPH, and O<sub>2</sub>
28. Which of the following events occurs in eukaryotic cells but NOT in prokaryotic cells?  
a. RNA polymerase attaches to a particular nucleotide sequence on the DNA.  
b. RNA is synthesized using the 3' to 5' DNA strand as a template.  
c. Two or more structural genes are transcribed onto a single RNA molecule.  
d. mRNA transcripts are extensively modified before they leave the nucleus.
29. Which of the following statements about C<sub>3</sub> and C<sub>4</sub> plants is FALSE?  
a. Carbon-fixation in C<sub>4</sub> plants has a larger energy cost than in C<sub>3</sub> plants.  
b. C<sub>4</sub> plants have more leaf nitrogen than C<sub>3</sub> plants.  
c. The optimal temperature range for photosynthesis in C<sub>4</sub> plants is higher than that for C<sub>3</sub> plants.  
d. C<sub>4</sub> plants have less Rubisco than C<sub>3</sub> plants.
30. Which of the following is unique to cell division in plants?  
a. migration of the nucleus to the center of the cell  
b. migration of the mitochondria to the periphery of the cell  
c. duplication of the centrosome  
d. duplication of the mitochondria
31. Which of the following statements about lignin is FALSE?  
a. It adds compressive strength and rigidity to the wall.  
b. It is commonly found in cells that have a supporting function.  
c. It replaces the water in the cell wall.  
d. It is a hydrophilic compound.
32. Which of the following statements about chloroplasts is FALSE?  
a. They can reorient themselves under the influence of light.  
b. Stroma thylakoids interconnect the grana.  
c. Both nuclear and plastid DNA are involved in the formation of chloroplasts.  
d. Chloroplasts of plants kept in the dark usually contain starch grains.
33. Which of the following secondary metabolites consists of isoprene units?  
a. Morphine  
b. atropine  
c. anthocyanin  
d. taxol
34. Meristem culture is an effective technique for producing pathogen-free plants because meristems:  
a. grow faster in culture than other organs.  
b. grow more slowly in culture than other organs.  
c. lack vascular tissues.  
d. develop embryos.
35. Which of the following statements about abscisic acid is FALSE?

- a. Ethylene triggers cell wall dissolution in leaves.  
b. Ethylene promotes abscission.  
c. Auxin increases the sensitivity of abscission zone cells to ethylene.  
d. Auxin prevents abscission.
36. Suppose that a plant has two genes that are linked, with *Ab* on one homolog of a homologous pair of chromosomes and *aB* on the other homolog. What gametes could the plant produce if crossing-over occurred between these genes during meiosis?  
a. *Ab* and *aB* only.  
b. *AB* and *ab* only  
c. *Aa* and *Bb* only  
d. *Ab*, *aB*, *AB*, and *ab* only
37. Which of the following statements about the use of auxin or synthetic auxin is FALSE?  
a. It is used to kill grasses.  
b. It is used to kill broad-leaf weeds.  
c. It inhibits the growth of already-growing roots.  
d. It stimulates the formation of parthenocarpic fruits.
38. All of the following are associated with fruit ripening EXCEPT:  
a. an increase in cellular respiration.  
b. the digestion of pectin.  
c. the metabolism of sugars to starches.  
d. the degradation of chlorophyll.
39. The climacteric is the phase in which fruits undergo a(n):  
a. increase in respiration.  
b. increase in pectin synthesis.  
c. decrease in photosynthesis.  
d. decrease in respiration.
40. Auxin is transported through:  
a. vessels only.  
b. sieve tubes only.  
c. parenchyma cells only.  
d. both vessels and sieve tubes.
41. If wounding causes the destruction of vascular tissues in a herbaceous eudicot stem:  
a. replacement vascular tissues will not form under any conditions.  
b. replacement vascular tissues will form if the leaves and buds above the wound are intact.  
c. water will be transported in pith cells instead of in xylem.  
d. food will be transported in pith cells instead of in phloem.
42. The pigments that absorb the light necessary for the phototropic response are most likely:  
a. proteins.  
b. chlorophylls.  
c. flavins.  
d. carotenoids.
43. In roots, statoliths are localized in the:  
a. epidermal cells.  
b. columella.  
c. vascular tissues.  
d. epidermis of the rootcap.
44. If a short-day plant receives a one-minute exposure to light in the middle of the dark period rather than continuous darkness, it will:  
a. produce more flowers.

- b. produce smaller flowers.
- c. produce larger flowers.
- d. not flower.

45. Compared with similar plants growing in full sunlight, plants growing in the shade of other vegetation:
- a. have a higher equilibrium ratio of Pr to Pfr.
  - b. receive more red light and less far-red light.
  - c. are usually shorter.
  - d. receive more wavelengths below 700 nanometers than above.

46. Which of the following statements about cold treatments and flowering is FALSE?
- a. In winter rye, after cold treatment, plants require long days in order to flower.
  - b. In spinach, cold treatment shortens the daylength required for flowering.
  - c. In nonrosette long-day plants, gibberellin treatment can substitute for cold treatment in hastening flowering.
  - d. In henbane, gibberellin treatment can substitute for cold treatment in hastening flowering.

47. The direction of a nastic movement is always \_\_\_\_\_ the direction of the stimulus.
- a. away from
  - b. toward
  - c. at right angles to
  - d. independent of

48. In plants, necrosis is the:
- a. localized death of tissues.
  - b. yellowing of leaves.
  - c. loss of chlorophyll.
  - d. development of tumors.

49. In magnesium-deficient plants, older leaves become more severely chlorotic than younger leaves because:
- a. magnesium is less phloem-mobile than chlorophyll.
  - b. magnesium is more phloem-mobile than chlorophyll.
  - c. younger leaves withdraw magnesium from older leaves.
  - d. magnesium is more mobile in younger leaves than in older leaves.

50. Which of the following is NOT a phloem-mobile element?
- a. nitrogen
  - b. potassium
  - c. magnesium
  - d. calcium

(二) Give a brief definition or make a comparison of the following terms (每題1.5分, 共18分)

1. heterocyst
2. psychophiles
3. symplastic transport
4. storied cambium
5. epigeous germination
6. leghemoglobin
7. Kranz anatomy
8. euchromatin and heterochromatin
9. auxin basipetal transport and acropetal transport
10. apical dominance
11. photomorphogenic response
12. Nastic movement and tropism

(三) 簡答題: (每題 4分, 共32分)

1. Describe the asexual and sexual reproduction of *Rhizopus stolonifer* (麵包黴).
2. Draw and label the embryo sac of *Lilium* (百合).

3. Compare and contrast the two main types of cells of xylem tissue in angiosperms.
4. Describe the sequence of events that culminates in leaf abscission.
5. Epistasis is often used for determination of gene action order in a signal transduction pathway by generation of double mutants. Three mutants (A, B and C) are involved in ethylene signaling pathway. Mutant A and C show ethylene-insensitive phenotype, mutant B displays a constitutive triple response phenotype. Double mutant AB plants have the constitutive triple response phenotype of mutant B plants; however, double mutant BC plants have the ethylene-insensitive phenotype of mutant C. Based on the epistatic relationship above, please indicate these gene action order in this signal transduction pathway.
6. In Jimson weed, the allele for violet petals ( $W$ ) is dominant over the white petals ( $w$ ), the allele for prickly capsules ( $S$ ) is dominant over the allele for smooth capsules ( $s$ ). A plant with white petals and prickly capsules was crossed with one that had violet petals and smooth capsules. The F1 generation was composed of 47 plants with white petals and prickly capsules, 45 plants with white petals and smooth capsules, 50 plants with violet petals and prickly capsules, and 46 plants with violet petals and smooth capsules. What were the genotypes of the parents?
7. What are the principal differences between the  $C_3$ ,  $C_4$ , and CAM pathways for carbon fixation? What features do they have in common?
8. Distinguish between noncyclic and cyclic electron flow and photophosphorylation. What products are produced by each? Why is cyclic photophosphorylation essential to the Calvin cycle?

