

臺灣綜合大學系統 111 學年度學士班轉學生聯合招生考試試題

科目名稱	普通植物學	類組代碼	A05
		科目碼	A0501

※本項考試依簡章規定所有考科均「不可」使用計算機。 本科試題共計 6 頁

I. Choose one best answer for the following questions (3 points for each question, total 90 points)

- Which of the following is the probable sequence in which organisms evolved?
 [A] Prokaryotic bacteria → eukaryotic algae → cyanobacteria → land plants
 [B] Eukaryotic bacteria → cyanobacteria → eukaryotic algae → land plants
 [C] Cyanobacteria → prokaryotic bacteria → eukaryotic algae → land plants
 [D] Cyanobacteria → eukaryotic algae → prokaryotic bacteria → land plants
 [E] Prokaryotic bacteria → cyanobacteria → eukaryotic algae → land plants
- Respiration breaks down glucose and transfers its energy to:
 [A] carbohydrate.
 [B] starch.
 [C] water.
 [D] ATP.
 [E] chlorophyll.
- Concerning the interactions among organisms, which of the following term with its definition is NOT correct?
 [A] Neutralism: neither organism benefits or is harmed.
 [B] Mutualism: both organisms benefit.
 [C] Competition: both organisms harm each other.
 [D] Predation: one organism benefits by harming another.
 [E] Amensalism: one organism benefits whereas the other is neither harmed nor helped.
- Oily seeds, such as peanuts, that store energy in fat molecules can convert that fat to the carbohydrates needed for growth in:
 [A] nuclei.
 [B] chloroplasts.
 [C] dictyosomes.
 [D] glyoxysomes.
 [E] peroxisomes.
- Which of the following is the order of events in one cell cycle?
 [A] Interphase → prophase → metaphase → anaphase → telophase
 [B] Prophase → metaphase → anaphase → telophase
 [C] Interphase → metaphase → anaphase → prophase → telophase
 [D] Prophase → metaphase → anaphase → interphase → telophase
 [E] Interphase → prophase → anaphase → telophase
- Mature tracheary elements are unique in a plant because they:
 [A] have an elongated shape.
 [B] are alive and transport mainly sugars.
 [C] are alive and lack a nucleus.
 [D] have a primary wall only and are dead.
 [E] are dead and transport mainly water and minerals.

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<p>7. In a foliage leaf, the majority of photosynthesis occurs in the: [A] upper epidermis. [B] palisade parenchyma. [C] bundle sheath parenchyma. [D] spongy mesophyll. [E] lower epidermis.</p> <p>8. If a water molecule entered a mature root at the root surface, it would cross what tissues, in their correct order, on its way to the center? [A] Epidermis, endodermis, cortex, phloem, xylem [B] Epidermis, cortex, pericycle, endodermis, phloem, xylem [C] Cortex, endodermis, phloem, pericycle, xylem [D] Epidermis, cortex, endodermis, pericycle, phloem, xylem [E] Endodermis, epidermis, cortex, pericycle, phloem, xylem</p> <p>9. It is likely that asexual reproduction would be more advantageous to a species than sexual reproduction under what conditions? [A] A rare late spring frost [B] An unusually severe summer drought [C] A stable climate [D] Global warming [E] Introduction of a fungal disease</p> <p>10. Many organisms are oogamous and produce: [A] small, motile sperm cells and large, nonmotile egg cells. [B] large, motile sperm cells and small, nonmotile egg cells. [C] sperm and egg cells that are the same size and are both motile. [D] small, motile sperm cells and large, motile egg cells. [E] small, nonmotile sperm cells and large, nonmotile egg cells.</p> <p>11. To promote plant growth, lights called <i>grow lights</i> should produce light enriched in what wavelengths? [A] Red and green [B] Red and blue [C] Yellow and blue [D] Blue and violet [E] Orange and violet</p> <p>12. Which of the following is NOT a difference between aerobic respiration and photosynthesis? [A] Function of the electron transport chain [B] Site of the process [C] Energy source for phosphorylation [D] General type of redox process [E] Role of O₂</p>			

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13. Water moves from the soil into the xylem of a root via:

- [A] diffusion.
- [B] diffusion and osmosis.
- [C] active transport.
- [D] membrane vesicles.
- [E] translocation.

14. The conversion of N_2 into ammonia is called:

- [A] nitrogen reduction.
- [B] nitrate reduction.
- [C] nitrogen assimilation.
- [D] denitrification.
- [E] nitrogen fixation.

15. Which of the following about chloroplasts and mitochondria is **incorrect**?

- [A] They are of the appropriate size to be the descendants of bacteria.
- [B] They contain circular DNA not associated with histones.
- [C] They contain their own genome and produce all proteins they need.
- [D] Their ribosomes are more similar to those of bacteria than to those of eukaryotes.
- [E] Their membranes have enzymes and transport systems that resemble those in the plasma membrane of prokaryotes.

16. What is the appropriate order for oxidation of glucose to CO_2 , H_2O and ATP?

1. convert pyruvate to acetyl CoA
2. electron-transport chain
3. citric acid cycle
4. oxidative-phosphorylation
5. glycolysis

- [A] 51324
- [B] 35142
- [C] 14523
- [D] 31425
- [E] 41352

17. If we use $^{14}CO_2$ as a radioactive tracer to track the carbon transition, which one of the following molecule could be incorporated in the last reaction of Calvin cycle?

- [A] Glucose
- [B] Glyceraldehyde-3-phosphate (G3P)
- [C] Ribulose biphosphate (RuBP)
- [D] 1,3-biphosphoglycerate (1,3-BPG)
- [E] 3-phosphoglycerate (3PG)

18. Which of the following statements is **true**?

- [A] In Crassulacean acid metabolism (CAM) plants, carbon fixation and the Calvin cycle occur in the same cells at different times. The Calvin cycle of CAM plants occurs during the night, so that the Calvin cycle is also named the dark reaction.
- [B] Pineapples are CAM plants.
- [C] For C_4 plants, the Calvin cycle is mainly carried out in the mesophyll cells.
- [D] C_4 plants are less resistant to drought than C_3 plants.
- [E] Photorespiration occurs when stomata of C_3 plants are fully open during the day.

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19. Which one of the following organism contain endosymbiont organelles?
 1. Chlamydomonas, 2. Euglenids, 3. Red algae, 4. Green algae, 5. Cabbage, 6. Corn
 [A] 1,2
 [B] 3,4
 [C] 5,6
 [D] 3,4,5,6
 [E] 1,2,3,4,5,6
20. Which of the following plant hormone helps plants to adapt with environmental stresses?
 [A] Auxin
 [B] Cytokinin
 [C] Ethylene
 [D] Abscisic acid
 [E] Gibberellins
21. If a long-day plant has a critical night length of 11 hours, which of the 24-hour cycles would prevent flowering?
 [A] 16 hours light/8 hours dark
 [B] 12 hours light/12 hours dark
 [C] 15 hours light/9 hours dark
 [D] 4 hours light/8 hours dark/4 hours light/8 hours dark
 [E] 8 hours light/8 hours dark/light flash/8 hours dark
22. Given the parents AABBCc × AabbCc, assume simple dominance for each trait and independent assortment. What proportion of the progeny will be expected to phenotypically resemble the first parent (AABBCc)?
 [A] 1/8
 [B] 1/4
 [C] 3/8
 [D] 3/4
 [E] 1
23. If a DNA segment has the base sequence TGACTCAAGCTT, then the anticodons of the tRNA molecules that bind to the mRNA transcribed from that sequence would be:
 [A] ACU, GAG, UUC, GAA.
 [B] TGA, CTC, AAG, CTT.
 [C] UGA, CUC, AAG, CUU.
 [D] UG, AC, UC, AA, GC, UU.
 [E] UGAC, UCAA, GCUU.
24. A common ancestor with dark green leaves has given rise to four species, G, H, I, and J. G, H, and I have dark leaves; J has mottled leaves. A classification scheme has included G, H, and I but omitted J. This classification scheme would be considered to be:
 [A] paraphyletic.
 [B] monophyletic.
 [C] polyphyletic.
 [D] semiphyletic.
 [E] orthophyletic.

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<p>25. Which of the following mutations is the most likely to be harmful to a plant? [A] A point mutation in an rRNA gene [B] An insertion in an intron of an enzyme gene [C] A deletion in spacer DNA [D] An inversion in a tRNA gene [E] A point mutation in the region of DNA coding for a start codon</p>			
<p>26. An example of a postzygotic isolating mechanism between closely related species would be which of the following? [A] One species flowers in April, the other in August. [B] The two species are pollinated by different species of bees. [C] A zygote produced by syngamy of sperm and egg of the two species contains an uneven number of chromosomes. [D] The pollen from one species will not germinate on the stigma of the other. [E] One species is terrestrial, the other totally aquatic.</p>			
<p>27. Eudicots are recognized by: [A] straplike leaves. [B] flower parts generally in threes. [C] parallel leaf venation. [D] vascular bundles in the stem arranged in one ring. [E] no members having secondary growth.</p>			
<p>28. Throughout its range, a species of fern is locally adapted to wetter conditions in some areas. In other areas, it is locally adapted to drier conditions. Other populations are adapted to higher light intensities; some populations are adapted to lower light intensities. These locally adapted populations are referred to as: [A] ecotypes. [B] ecotones. [C] populons. [D] edaphonomes. [E] competitors.</p>			
<p>29. Which of the following characteristic and biome does NOT match? [A] Transitional biome often between grasslands and forests: Woodlands (p. 743) [B] Richest soil in essential elements: Tropical savanna (p. 742) [C] Majority of plant biomass may be underground: Arctic tundra (p. 746) [D] May be dominated by 1 to 2 species: Taiga (p. 746) [E] Soil thin and rocky, in some cases reduced to pebbles: Desert (p. 744)</p>			
<p>30. Radiolabelled isotope dating is an important method to determine the age of a fossil. A ^{14}C content analysis of a plant fossil showed that its content is 0.03125 fold as much ^{14}C as the atmosphere. The half-life of ^{14}C is 5730 years. The age of the fossil is close to which of the following? [A] 1000 years [B] 5730 years [C] 28000 years [D] 35000 years [E] 70000 years</p>			

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II. Short Essay (5 points for each, total 10 points)

1. Explain the expression “One rotten apple spoils the barrel.”
2. If a hormone is transported from its site of synthesis to all parts of a plant, why don't all parts of the respond to the hormone?