請清楚標示題號並依序作答於試卷上

I. 選擇題: (45%) ※ 注意：請於試卷內之「選擇題作答區」依序作答。
(1-25 每題 1 分; 26-35 每題 2 分)

1. Plant spores directly give rise to
A) sporophytes. B) gametes. C) gametophytes. D) zygotes. E) seeds.

2. Both _____ and _____ are sugar sinks.
A) a growing root; a developing fruit B) a photosynthesizing leaf; a growing root C) a growing shoot tip; a tuber where starch is being broken down D) a photosynthesizing leaf; a tuber where starch is being broken down E) a photosynthesizing leaf; a developing fruit

3. The most reliable way to stimulate branching in a plant is to
A) apply auxin to the axillary buds. B) remove the terminal buds. C) give short-day light treatments. D) apply ethylene. E) add extra fertilizer.

4. Plants with a dominant sporophyte are successful on land because
A) having no stomata, they lose less water. B) they all disperse by means of seeds. C) diploid plants are protected from the effects of mutation. D) their gametophytes are all parasitic on the sporophytes. E) eggs and sperm need not be produced.

5. The binomial for poison ivy is *Toxicodendron radicans*. To what genus does this plant belong?
A) *Toxicodendron* B) *radicans* C) *Toxicodendron radicans* D) poison ivy
E) *Toxicodendron radicans poison ivy*

6. Which of the following does ***NOT*** occur during the Krebs cycle?
A) decarboxylation B) substrate-level phosphorylation C) oxidation
D) oxidative phosphorlation E) regeneration of oxaloacetate

7. Sister chromatids become daughter chromosomes at the beginning of
A) prophase B) metaphase C) anaphase D) telophase E) interphase

8. Cyanide binds with at least one molecule involved in producing ATP. If a cell is exposed to cyanide, most of the cyanide would be found within the
A) endoplasmic reticulum. B) ribosomes. C) peroxisomes. D) lysosomes. E) mitochondria.

9. Mendel's principles of inheritance are consistent with which of the following biological events:
A) Mitosis B) Meiosis C) Movement D) Development E) Differentiation

10. Sports physiologists at an Olympic training center wanted to monitor athletes to determine at what point their muscles were functioning anaerobically. They could do this by checking for a buildup of
A) ATP B) lactic acid C) carbon dioxide D) ADP E) oxygen

11. As a youngster, you drive a nail in the trunk of a young tree that is 3 meters tall. The nail is about 1.5 meters from the ground. Fifteen years later, you return and discover the tree has grown to a height of 30 meters. The nail is now ____meters above the ground.
A) 0.5 B)1.5 C) 3.0 D) 15.0 E) 28.5

12. A certain poison disrupts the cytoskeleton of cells. Which of the following functions would be affected most directly by this drug?
A.) cell division B) cellular respiration C) photosynthesis D) protein synthesis
E) digestion within lysosomes

13. Gram-positive and gram-negative bacteria are distinguished by differences in their
A) plasma membranes. B) cell walls. C) storage materials. D) size. E) shape.

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14. How is photosynthesis similar in C_4 plants and CAM plants?
A) In both case, the light reactions and the Calvin cycle. B) Both types of plants make sugar without the Calvin cycle. C) In both cases, rubisco is not used to fix carbon initially. D) Both types of plants make most of their sugar in the dark. E.) In both cases, thylakoids are not involved in photosynthesis.

15. In a root , a vessel element completes its development in which area of growth?
A) zone of cell division B) zone of elongation C) zone of differentiation
D) root cap E) apical meristem

16. Protists are alike in that all are
A) unicellular. B) eukaryotic. C) symbionts. D) monophyletic. E) autotrophic.

17. Which of the following cells has the greatest surface-to-volume ratio?
A) bacterium B) human red blood cell C) human muscle cell D) frog egg E) ostrich egg

18. Which of the following organisms can make organic molecules from water and carbon dioxide?
A) bear B) mushroom C) wheat D) crayfish E) honeybee

19. Most genetic disorders of humans are caused by
A) multiple alleles. B) recessive alleles. C) drinking during pregnancy.
D) a mutation that occurs in the egg, sperm, or zygote. E) dominant alleles.

20. Centromere is made up of
A) protein B) DNA C) RNA D) sugar E) lipid

21. Chlorophyll appears green because it:
A) absorbs green light. B) both absorbs and reflects green light. C) both absorbs and transmits green light. D) both reflects and transmits green light. E) transmits violet light.

22. Assume a thylakoid is somehow punctured so that the interiors of the thylakoids are no longer separated from the stroma. This damage will have the most direct effect on which of the following processes?
A) the splitting of water B) the absorption of light energy by chlorophyll C) the flow of electrons from photosystem II to photosystem I D) the synthesis of ATP E) the reduction of NADP

23. Which of the following is not true of ribulose bisphosphate carboxylase?
A) It is a protein. B) It speeds up a chemical reaction. C) It lowers the energy of activation.
D) It catalyzes a phosphorylation reaction. E) It has an affinity for both O_2 and CO_2.

24. In chemiosmosis, energy from electron flow is used to transport _____ from the _____ to the thylakoid compartment, generating a concentration gradient of _____.
A) electrons, grana, H^+ B) H^+, grana, electrons C) H^+, stroma, H^+
D) electrons, stroma, H^+ E) H^+, stroma, ATP

25. If you were shipping green bananas to a supermarket thousands of miles away, which of the following chemicals would you want to eliminate from the plants' environment?
A) CO_2 B) cytokinins C) ethylene D) auxin E) gibberellic acids

26. Which of the following nucleotide sequences represents the complement to the DNA strand 5′ – AGAGCCGT- 3′?
A) 5′-AGAGCCGT- 3′ B) 3′ -AGAGCCGT- 5′ C) 5′ -CTCTAATG- 3′
D) 3′ -CTCTAATG- 5′ E) 3′ -TCTCGGCA- 5′

27. What prevents tangling and knot formation in replicating DNA?
A) protostomes B) topoisomerases C) helicase D) chromatin E) histones

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28. _____, the ends of eukaryotic chromosomes, shorten with every cell replication event.
A) Centromeres B) Telomeres C) Kinetochores D) Primosomes E) Nucleosomes

29. Which of the following is not found in a bacterial mRNA molecule?
A) start codon B) stop codon C) promoter sequence D) upstream leader sequence
E) downstream trailing sequence

30. A gene can now be defined as:
A) a DNA sequence that carries information to produce a specific RNA or protein product.
B) a DNA nucleotide sequence that carries information to produce a specific polypeptide.
C) a DNA nucleotide sequence that carries information to produce an enzyme.
D) a DNA or RNA sequence that carries information to produce a specific polypeptide.

31. Which of the enzymes removes the RNA nucleotides from the primer and adds equivalent DNA nucleotides to the 3' end of Okazaki fragments?
A) helicase B) DNA polymerase I C) ligase D) DNA polymerase III E) primase

32. A cDNA clone contains
A) introns B) exons C) anticodons D) A and B E) B and C

33. If a *Drosophila* female has a homozygous mutation for a maternal effect gene,
A) she will not develop past the early embryonic stage.
B) only her female offspring will show the mutant phenotype.
C) all of her offspring will show the mutant phenotype, regardless of their genotype.
D) her offspring will show the mutant phenotype only if they are homozygous for the mutation.

34. A stable toad population living at carrying capacity in a lake. If an average female produces 5,000 eggs during her lifetime and an average of 250 tadpoles hatch from these eggs, how many of these tadpoles will, on average, survive to reproduce?
A) 0 B) 2 C) 15-25 D)150-250 E) 1000-2500

35. The three greatest current threats to biodiversity, in order starting with the greatest, are
A) habitat loss, overharvesting, and invasive species.
B) invasive species, habitat loss, and overharvesting.
C) habitat loss, invasive species, and overharvesting.
D) invasive species, overharvesting, and habitat loss.

II. 解釋名詞: (每題 3 分，30%)

1. plasmodesmata
2. osmosis
3. photolysis
4. resolving power
5. mycorrhizae
6. monophyletic group
7. K-selected species
8. competitive exclusion
9. Evo Devo
10. dendritic cell

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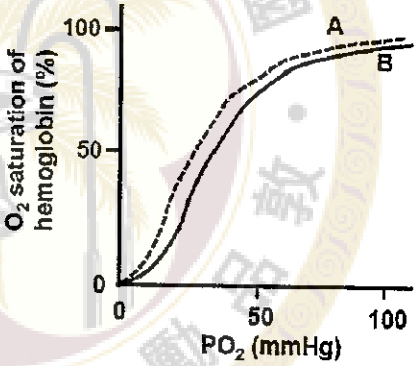
III. 簡答題 (25%)

1. Several lines of evidence that accumulated during the 1940s and early 1950s demonstrated that DNA is the genetic material. What are the questions that these classical experiments addressed: (1) Griffith's transformation experiment, (2) Avery's contribution to Griffith's work, and (3) the Hershey-Chase experiments. (9%)
2. Describe how an inhibitory synapse produces an inhibitory postsynaptic potential (IPSP) using potassium (K^+) as an example. (5%)
3. List three inputs that act directly on endocrine gland cells to stimulate or inhibit hormone secretion? (6%)
4. Curve A below represents the oxygen-hemoglobin dissociation curve for normal body temperature, arterial hydrogen ion concentration, and DPG concentration. (a) There is ____ (more or less) oxygen unloaded from hemoglobin in curve B (compared with curve A) when the tissue has a PO_2 of 30 mmHg? (b) Curve B may represent the dissociation at _____ (higher or lower level) of arterial hydrogen ion concentration. (5%)



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