

\* 答案一律寫在試卷上，不可寫在試題紙上，否則不予計分。

I. Multiple choice questions (52%)

- ( ) 1. Four of the five answers listed below are names of kingdoms. Select the exception.  
a. Animalia b. Protista c. Bacteria d. Fungi e. Plantae
- ( ) 2. Which element is not characteristic of the primary structure of proteins?  
a. sulfur b. carbon c. phosphorus d. oxygen e. nitrogen
- ( ) 3. The secondary structure of proteins is  
a. helical b. sheetlike c. globular d. the sequence of amino acids e. both a and b
- ( ) 4. The nucleotide associated with chemical messages is  
a. cyclic AMP b. FAD c. NAD<sup>+</sup> d. ATP e. all of above
- ( ) 5. Four of the five answers listed below are amino acids. Select the exception.  
a. glycine b. adenine c. phenylalanine d. valine e. tyrosine
- ( ) 6. Which microscope has the highest magnification?  
a. compound light b. transmission electron c. scanning electron d. phase contrast e. dissecting
- ( ) 7. If the volume of a cell increases, its surface area will  
a. decrease b. remain the same c. increase proportionately d. increase to a greater degree  
e. increase to a lesser degree
- ( ) 8. Energy stored in which of the following molecules is converted by mitochondria to form usable by the cell?  
a. water b. carbon compounds c. NAD d. ATP e. carbon dioxide
- ( ) 9. Plasmodesmata are related to  
a. gap junctions b. tight junctions c. wall junctions d. adhering junctions e. both b and d
- ( ) 10. Which of the following is not a form of passive transport?  
a. osmosis b. facilitated diffusion c. bulk flow d. exocytosis e. none of the above
- ( ) 11. Four of the five answers listed below are related by energy requirements. Select the exception.  
a. active transport b. endocytosis c. facilitated diffusion d. exocytosis e. sodium potassium pump
- ( ) 12. Which of the following may show enzymatic activity? I. lipids II. proteins III. RNA  
a. I only b. II only c. III only d. I and II e. II and III
- ( ) 13. Four of the five answers listed below are cofactors or coenzymes. Select the exception.  
a. mineral b. water soluble vitamin c. metallic ions d. NAD<sup>+</sup> e. protein
- ( ) 14. The internal membrane system of the chloroplast is called a  
a. thylakoid b. stroma c. lamella d. mitochondrion e. tracheid.
- ( ) 15. The C<sub>4</sub> pathway involves  
a. RuBP b. FAD c. PEP d. ATP e. water.
- ( ) 16. Which are molecules with both water-soluble and water insoluble regions?  
a. polysaccharides b. proteins c. starches d. phospholipids e. none of the above
- ( ) 17. Four of the five answers listed below are related by a common division association. Select the exception.  
a. mitochondria b. chromosomes c. ribosomes d. plastids e. microbodies
- ( ) 18. The F<sub>2</sub> phenotypic ratio of a monohybrid cross is  
a. 1:1 b. 2:1 c. 9:3:3:1 d. 1:2:1 e. 3:1
- ( ) 19. The F<sub>2</sub> phenotypic ratio of a monohybrid cross involving a gene with incompletely dominant alleles is  
a. 1:1 b. 2:1 c. 9:3:3:1 d. 1:2:1 e. 3:1
- ( ) 20. If the chances are 5 in 100 that a male has a recessive X-linked gene, the chances for the disorder in females are  
a. 5 in 100 b. 11 in 100 c. 5 in 1000 d. 25 in 1000 e. 25 in 10000
- ( ) 21. Bacteriophages are  
a. large bacteria b. pathogens c. viruses d. cellular components e. protists.
- ( ) 22. The nuclear code is made up of units consisting of how many nucleotides?  
a. 2 b. 3 c. 5 d. 6 e. 12

(背面仍有題目，請繼續作答)

- ( ) 23. If the DNA triplets were ATG-CGT, the tRNA anticodons would be  
a. AUGCGU b. ATGCGT c. UACGCA d. UAGCGU e. none of the above
- ( ) 24. Three of the four answers listed below are steps in translation. Select the exception.  
a. initiation b. replication c. chain elongation d. termination
- ( ) 25. A repressor protein binds with  
a. messenger RNA b. the operator. c. the regulator. d. a product. e. a substrate.
- ( ) 26. Four of the five answers listed below are features of the lac operon. Select the exception.  
a. regulator b. terminator c. operator d. promoter e. structural gene
- ( ) 27. The cell type that is found only in secondary tissue is  
a. epidermis b. sclereids c. periderm cork cells d. collenchyma e. cuticle
- ( ) 28. The Casparian strip is associated with the  
a. cortex b. endodermis c. pericycle d. epidermis e. vascular cylinder
- ( ) 29. Which element is found as a component of amino acids, proteins, chlorophyll, nucleic acids, and coenzymes?  
a. nitrogen b. potassium c. sulfur d. phosphorus e. magnesium
- ( ) 30. Approximately what percent of the water absorbed by a plant is used in photosynthesis?  
a. 2 b. 10 c. 25 d. 60 e. 85
- ( ) 31. Which color are most insects unable to see?  
a. yellow b. blue c. red d. green e. orange
- ( ) 32. Abscission affects  
a. leaves b. fruits c. flowers d. all of the above e. none of the above
- ( ) 33. Adipose tissue cells are filled with  
a. minerals b. fat c. cartilage d. fibers e. muscles
- ( ) 34. Which region of the brain contains the reflex centers involved in respiration?  
a. cerebrum b. hypothalamus c. pons d. cerebellum e. medulla oblongata
- ( ) 35. Which region of the brain controls carbohydrate metabolism?  
a. cerebrum b. hypothalamus c. pons d. cerebellum e. medulla oblongata
- ( ) 36. Which gland plays a central role in the immune response?  
a. adrenal cortex b. ovary c. pineal d. thyroid e. thymus
- ( ) 37. Which gland controls calcium concentration in the blood?  
a. adrenal cortex b. ovary c. pineal d. thyroid e. thymus
- ( ) 38. Four of the five answers listed below are somatic senses. Select the exception.  
a. light b. pressure c. touch d. temperature e. pain
- ( ) 39. Which of the following includes all the others?  
a. actin b. myofibril c. myosin d. myofilament e. muscle fiber
- ( ) 40. The element specially associated with muscle contraction is  
a. phosphorus b. potassium c. calcium d. sodium e. chlorine
- ( ) 41. Which cell produces the fibrin used in blood clots?  
a. lymphocytes b. basophils c. erythrocytes d. neutrophils e. platelets
- ( ) 42. Which of the following is transported in greater quantities in the lymphatic system than in the blood?  
a. red blood cells b. wastes c. fats d. amino acids e. white blood cells
- ( ) 43. Phagocytes are derived from stem cells in the  
a. spleen b. thymus c. bone marrow d. blood e. liver
- ( ) 44. Which cells produce antibodies?  
a. helper T b. suppressor T c. killer T d. memory e. B
- ( ) 45. Which of the following is not an active form of an enzyme?  
a. trypsin b. amylase c. pepsin d. pepsinogen e. chymotrypsin

(背面仍有題目,請繼續作答)

- ( ) 46. Of the 20 amino acids, how many are considered to be essential in that human body cannot synthesize them?  
a. 2 b. 5 c. 8 d. 10 e. 12
- ( ) 47. A kidney machine removes solutes from the blood by means of  
a. osmosis b. diffusion c. dialysis d. active transport e. bulk flow
- ( ) 48. Complete reproductive isolation is evidence that what has occurred?  
a. extinction b. speciation c. polyploidy d. hybridization e. gene flow
- ( ) 49. Nitrifying bacteria convert  
a.  $\text{NH}_3$  to  $\text{NO}_2^-$  and  $\text{NO}_3^-$  b.  $\text{NO}_3^-$  to  $\text{NO}_2^-$  to  $\text{N}_2$  c.  $\text{NO}_3^-$  to  $\text{NH}_3$  d. urea to  $\text{NH}_3$
- ( ) 50. Oligotrophic lakes are characterized by all but which of the following?  
a. deep water b. steep banks c. abundant oxygen d. low nutrients e. high production of fish
- ( ) 51. The most harmful element in coal that causes serious pollution problems is  
a. nitrogen b. silver c. carbon d. sulfur e. chlorine
- ( ) 52. Which substance is the most common in cells?  
a. carbohydrate b. salts and minerals c. proteins d. fats e. water

II. Explaining the following terms (48%)

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|------------------------|--------------------------|
| 1. Ecological niche    | 2. Essential amino acids |
| 3. Transport proteins  | 4. Glycolysis            |
| 5. $\text{C}_4$ plants | 6. Translation           |
| 7. Restriction enzymes | 8. Plankton              |
| 9. Electrocardiogram   | 10. Pheromones           |
| 11. Schwann cells      | 12. Coevolution          |