一、單選題 (60%) 不倒扣，答案請填寫於電腦卡。

1. Which tissue type contains gland cells?

(A) epithelial tissues (B) connective tissues (C) muscular tissues

(D) neural tissues (E) all of these

2. What tissue type constructs the outer layer of the skin?

(A) simple squamous epithelia (B) simple cuboidal epithelia (C) simple columnar epithelia

(D) stratified squamous epithelia (E) stratified columnar epithelia

3. What organ is used as a respiratory system in insects?

(A) lungs (B) gills (C) integument exchange (D) tracheal exchange (E) none of these

4. During the cardiac cycle, which of the following is the correct order of events?

(A) ventricles contract, atria contract, atria and ventricles relax

(B) ventricles contract, atria and ventricles relax, atria contract

(C) atria contract, atria and ventricles relax, ventricles contract

(D) atria and ventricles relax, atria contract, ventricles contract

(E) none of these

5. Inhalation

(A) is always active. (B) causes the thoracic cavity to expand.

(C) causes the diaphragm to flatten downwards. (D) causes the rib cage to move upward.

(E) does all of these.

6. The difference between an embolus and a thrombus is that

(A) only a thrombus can cause a stroke. (B) an embolus is a clot; a thrombus is a scab.

(C) an embolus is a clot that is stationary; a thrombus is a clot that travels in the blood.

(D) an embolus is a clot that travels in the blood; a thrombus is a clot that is stationary.

(E) both A and C are true.

參考用

7. Which of the following statements is correct in comparing innate immunity to adaptive immunity?

(A) Innate immunity has a long persistence; adaptive immunity does not persist.

(B) Innate immunity has a response time of about a week; adaptive immunity has an immediate response time.

(C) Innate immunity uses billions of different antigen receptors to detect antigens; adaptive immunity has a fixed set of receptors.

(D) Innate immunity does not target specific antigens; adaptive immunity does target specific antigens.

(E) none of these

8. _____is often the first white blood cell to encounter a pathogen.

(A) Eosinophil (B) Macrophage (C) Natural killer cell (D) B cell (E) T cell

注意：背面有試題

9. Which cell is NOT capable of acting as an antigen-presenting cell in adaptive immune responses?

(A) Macrophage (B) Dendritic cell (C) B cell (D) T cell (E) all of these are capable

10. Which molecule is absorbed in the small intestine by diffusing into the lymph vessels?

(A) simple sugars (B) amino acids (C) triglycerides (D) nucleotides (E) all of these

11. What is a nephron?

(A) a kidney cell (B) a kidney tubule (C) a capillary that is specific to the kidney.

(D) a kidney tubule and the associated capillaries. (E) none of these.

12. Which one is NOT a steroid hormone?

(A) melatonin (B) cortisol (C) estrogen (D) progesterone (E) testosterone

13. Which one of the following statements about "type 2 diabetes" is Not true?

(A) It usually occurs in middle-aged people. (B) It is the more common form of diabetes.

(C) Target cells do not respond to insulin. (D) Insulin levels are near normal.

(E) It is thought to be an autoimmune disease.

14. The endosperm is _____ because of being produced by double fertilization.

(A) haploid (B) diploid (C) triploid (D) tetraploid (E) none of these

15. Fruit is produced from the development of the _____

(A) ovule (B) ovary (C) flowers (D) zygote (E) cotyledon

16. The telomere is a region in which

(A) new spindle microtubules are formed.

(B) metaphase chromosomes become aligned at the metaphase plate.

(C) chromosomes are grouped during telophase. (D) the chromosomal DNA ends.

(E) chromatids attached to one another before anaphase.

17. α-helix and the β-pleated sheet are usually used to refer

(A) primary structure of DNA. (B) secondary structure of proteins. (C) tertiary structure of RNA.

(D) quaternary structure of lipids. (E) random structure of polysaccharides.

18. Taxonomy is a branch of biology concerned with

(A) the naming and classifying of organisms. (B) the investigation of cellular physiology.

(C) the diseases caused by parasites. (D) the characterization of proteins.

(E) the interactions between organisms and the environments.

19. What are archaea?

(A) Eukaryotic organisms possessing multiple chromosomes per cell.

(B) Organisms that are sensitive to high temperature environments.

(C) Multi-celled organisms.

(D) Organisms that are capable of carrying out photosynthesis.

(E) Prokaryotes characterized as extremophiles that share some bacterial and some eukaryotic traits.

20. Based on Darwin's theory, which of the following is most likely to exhibit the greatest fitness?

(A) the individuals within a population that produce the greatest number of offspring.

(B) the species with the longest life. (C) the species that live in very hot and dry environments.

(D) the community of organisms that live in water (E) the organisms that carry out internal fertilization

21. Which of these molecules is most likely to contain sulfur?

(A) phospholipids (B) DNA (C) proteins (D) polysaccharides (E) fatty acids

22. Which of the following statements about protists is correct?

(A) Amoeba, *Drosophila*, and *E. coli* are protists. (B) Protists are not made of cells.

(C) Protists have a membrane-bounded nucleus. (D) Protists do not cause human diseases.

(E) Protists cannot perform photosynthesis.

23. A bacterium engulfed by a white blood cell through phagocytosis will typically go into

(A) peroxisomes (B) endoplasmic reticulum (C) Golgi vesicles (D) nucleus (E) lysosomes.

24. What is the voltage across a neuron cell membrane called?

(A) turgor pressure (B) membrane potential (C) proton gradient

(D) osmotic potential (E) water potential

25. Where in eukaryotic cells is the primary site of ATP synthesis?

(A) mitochondria (B) secretary vesicles (C) lysosomes (D) Golgi apparatus (E) ribosomes

26. One of the primary functions of RNA molecules is to

(A) transmit genetic information to offspring in animals. (B) be used as a nutrient in cells.

(C) serve as a structural component in cell membrane (D) function in the synthesis of proteins

(E) function as cytoskeletons

27. Polymerase chain reaction is a technique primarily used to

(A) increase the copy number of specific DNA fragments. (B) modify a human genome.

(C) speed up evolution process of eukaryotes. (D) determine the enzyme kinetics.

(E) characterize metabolism in cells.

28. The K-T boundary is a geological layer rich in

(A) Platinum (B) Iridium (C) Cadmium (D) Mercury (E) Plutonium

29. Neutral mutations are the mutations that do not affect

(A) amino acid sequence (B) DNA sequence (C) RNA sequence (D) body morphology

(E) the chances of survival

30. Which of the following statements about a DNA molecule is NOT correct?

(A) It contains two polynucleotide chains run in opposite directions.

(B) It typically contains four hydrophobic nitrogenous bases: A, T, G, and C.

(C) The 5' end has a phosphate group.

(D) Its backbone contains deoxyribose joined by phosphodiester bonds.

(E) Its diameter is approximately 4 μm.

II. 簡答題 (40% 每題 5 分).

1. Please draw the following chemical structures

(A) amino group; (B) carboxyl group; (C) hydroxyl group; (D) peptide bond

2. What is a cladogram? Please draw one example cladogram.

3. What are trans fats? Why should we concern about trans fats?

4. What is apoptosis? What are the characteristics of apoptosis?

5. Please describe the differences between pseudostratified columnar epithelia and transitional epithelia.

6. Please describe the major steps of a cell-mediated immune response.

7. Double fertilization is a complex fertilization mechanism that has evolved in flowering plants. Please describe the major steps during double fertilization.

8. Which of the following hormones is (are) produced by the pituitary gland?

(A) antidiuretic hormone (ADH); (B) oxytocin; (C) thyroid-stimulating hormone (TSH);

(D) thyrotropin-releasing hormone (TRH); (E) corticotropin-releasing hormone (CRH);

(F) adrenocorticotropin (ACTH); (G) follicle-stimulating hormone (FSH);

(H) luteinizing hormone (LH); (I) gonadotropin-releasing hormone (GnRH); (J) growth hormone (GH)