

一、選擇題（每題 2 分，共 50 分）

1. Which of the following is NOT true concerning mitosis?
 - (A) Plant cells lack centrioles while animal cells do not.
 - (B) Both plant and animal cells undergo cytokinesis.
 - (C) Mitosis allows growth and increase in size in both plants and animals.
 - (D) Animal cells form a cell plate during cytokinesis while plant cells do not.
2. Which of the following steps would NOT lead to variation of genetic material?
 - (A) crossing over of homologous chromosomes
 - (B) crossing over of sister chromatids
 - (C) the random alignment of the chromosomes during metaphase I
 - (D) the combination of sperm and egg genes.
3. The location on a chromosome where a particular gene is located is known as the:
 - (A) allele
 - (B) dihybrid
 - (C) locus
 - (D) diploid
4. Which of the following could be used to grow viruses in the laboratory?
 - (A) chicken eggs
 - (B) cell culture
 - (C) bacteria
 - (D) All of the choices could be used.
5. One of Chargaff's rules states that
 - (A) $A + G = T + C$.
 - (B) $A = C, T = G$.
 - (C) $A = G, T = C$.
 - (D) $A + T = G + C$.
6. Which of the following spores is the result of asexual reproduction?
 - (A) sporangiospores
 - (B) zygospores
 - (C) ascospores
 - (D) basidiospores

7. All of the following characteristics are among the adaptations of plants to life on land EXCEPT
- (A) protection of the embryo from drying out.
 - (B) waxy cuticle on leaves to prevent drying out.
 - (C) waxy cuticle on roots to prevent drying out.
 - (D) vascular system (in most plants) to move water internally.
8. The cortex found in the center of a dicot stem or a monocot root is made of what type of tissue?
- (A) ground tissue
 - (B) epithelial tissue
 - (C) vascular tissue
 - (D) dermal tissue
9. Which of the following is NOT involved in mineral uptake by plant roots?
- (A) root nodules that fix atmospheric nitrogen
 - (B) cuticles that protect surfaces
 - (C) root hairs that increase surface area
 - (D) expending energy in uptake/active transport
10. Which plant hormone produced in apical meristems inhibits the growth of axillary buds?
- (A) abscisic acid
 - (B) auxin
 - (C) cytokinin
 - (D) ethylene
11. If there is only one egg in the ovule, why are two sperm needed for fertilization?
- (A) One sperm fertilizes the egg and the other sperm unites with the central cell nuclei to form endosperm.
 - (B) Only one is needed; after one fertilizes the egg, the other disintegrates.
 - (C) Both unite the central cell to form triploid endosperm.
 - (D) Both unite with the egg, forming both a zygote and endosperm.
12. Animals are classified according to all of the following features EXCEPT
- (A) presence of absence of segmentation.
 - (B) mode of reproduction.
 - (C) type of body symmetry.
 - (D) number of germ layers.

13. All of the following are characteristics of vertebrates EXCEPT
- (A) internal organs. (B) vertebral columns.
(C) postanal tails. (D) exoskeletons.
14. What type of tissue lines body cavities and covers body surfaces?
- (A) muscle tissue (B) nervous tissue
(C) epithelial tissue (D) connective tissue
15. Which would you find in the heart of a fish?
- (A) one atrium and one ventricle (B) two atria and one ventricle
(C) one atrium and two ventricles (D) two atria and two ventricles
16. Which of the following is NOT involved in specific immunity?
- (A) B cells (B) antibodies
(C) memory cells (D) complement
17. Which is NOT true of human salivary glands?
- (A) They produce an enzyme to begin the digestion of starch.
(B) They can become inflamed and cause tonsillitis.
(C) There are three pairs that open by ducts into the mouth.
(D) The production of saliva aids in the mechanical digestion process.
18. Which of these organisms is able to use several body surfaces, such as gills, skin, and lungs, for respiration?
- (A) humans (B) birds
(C) amphibians (D) reptiles
19. Which of the following organisms is mismatched with their organs of excretion?
- (A) Planarians – flame cells (B) Earthworms – nephridia
(C) Malpighian tubules – reptiles (D) Kidneys – humans
20. In humans, the central nervous system consists of the _____, which is housed in the _____ and the _____, which is housed in the _____.
- (A) peripheral nervous system; limbs; brain; skull
(B) brain; skull; spinal cord; vertebral column
(C) spinal cord; vertebral column; sensory neurons; limbs
(D) brain; vertebral column; spinal cord; skull

21. The sense of smell is directly connected with what nervous system structure that associates smells with memory or emotion?
- (A) cerebellum (B) brain stem
(C) hypothalamus (D) limbic system
22. Which of the following statements about the insect exoskeleton is NOT true?
- (A) The exoskeleton protects insects against predators and drying out.
(B) The insect exoskeleton is jointed and movable.
(C) The insect exoskeleton is made of a complex form of carbohydrate called chitin.
(D) The insect exoskeleton grows with the organism.
23. The hormone that stimulates the production and maturation of red blood cells is
- (A) thyroxin. (B) erythropoietin.
(C) calcitonin. (D) norepinephrine.
24. Which of the following statements about reproduction is NOT true?
- (A) Gametes are produced by meiosis and may be specialized as eggs or sperm.
(B) Hydras may reproduce asexually by budding new individuals from the parent.
(C) Asexual reproduction is most advantageous when the environment is continually changing.
(D) A hermaphrodite produces both male and female gametes in different specialized gonads.
25. Which of the following stages of embryonic development consists of only two layers of cells?
- (A) morula (B) blastula
(C) early gastrula (D) late gastrula

二、名詞解釋

(請勿只將英文翻成中文，可以中文或英文作答。每題2分，共50分)

1. cDNA (complementary DNA)
2. Restriction enzyme
3. Transfection
4. PCR (Polymerase chain reaction)
5. SNP (Single nucleotide polymorphism)
6. Monoclonal antibody
7. Post-translational modification
8. Recombinant protein
9. Western blotting
10. Reporter gene
11. Microarray
12. Proteome
13. Epigenome
14. ChIP-on-chip (Chromatin immunoprecipitation-on-chip)
15. Primer
16. Plasmid
17. Competent cell
18. Reverse transcription
19. Quantitative PCR
20. Bioinformatics
21. iPS (induced pluripotent stem cells)
22. Conditional gene knockout
23. Nanotechnology
24. siRNA (small interfering RNA)
25. Biocatalysis