

選擇題 (共 40 題,每題 2.5 分,單選) 請於試卷上「選擇題作答區」依序作答。

1. Which of the following natural phenomena are not a direct result of the properties of water?
  - A. insects that walk on water
  - B. sugar dissolving in water
  - C. floating icebergs
  - D. the thermometer
2. Macromolecules that are used by organisms to store hereditary information are called
  - A. transfer RNA molecules
  - B. messenger RNA molecules
  - C. DNA molecules
  - D. amino acids molecules
3. In cells, which of the following molecules is not usually associated with providing energy?
  - A. DNA
  - B. neutral fat
  - C. starch
  - D. egg albumin
4. Humans are unable to get metabolic energy from cellulose because
  - A. cellulose contains very little chemical energy
  - B. cellulose is not part of a normal diet
  - C. cellulose digesting enzymes are absent
  - D. cellulose is present in large quantities in the gut
5. Early cyanobacteria evolved a form of photosynthesis that permanently changed the Earth's atmosphere by releasing which of the following gases?
  - A. carbon dioxide
  - B. oxygen
  - C. nitrogen
  - D. methane
6. The proteins of the plasma membrane are in large part responsible for the cell's ability to interact with its environment. They act as or are involved in all of the following except
  - A. packaging
  - B. recognition
  - C. reception
  - D. transport

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7. The movement of substances from high to low concentration is called
- diffusion
  - active transport
  - osmosis
  - taxis
8. As energy is being reconverted through many forms, it is continuously lost as
- electricity
  - light
  - sound
  - heat
9. In green plant photosynthesis, the electron donor for the light dependent reaction is
- carbon dioxide
  - oxygen
  - water
  - chlorophyll II
10. A cell biologist is conducting a karyotype procedure on red blood cells. What does this mean?
- red blood cells will be examined with a microscope and the nuclei will be counted
  - red blood cells will be examined using restriction enzymes to count the number of centromeres
  - chromosomes from the red blood cells will be examined with a microscope, photographed, counted, lined up with their respective homologous partner, and displayed
  - chromosomes from the red blood cells will be examined with a microscope to determine the amount of hemoglobin
11. In animals such as *Hydra* and corals, new individuals arise as buds on the body of an existing animal. This is called budding, which is a form of
- gamete formation
  - syngamy
  - meiosis
  - asexual reproduction
12. Mendel referred to the trait that was expressed in the F<sub>1</sub> hybrid as
- recessive
  - dominant
  - codominant
  - epistatic

13. If a human female has two Barr bodies, it is almost certain that
- A. her father had at least one Barr body
  - B. her mother also had two Barr bodies
  - C. she developed from a fertilized egg with 3 X chromosomes
  - D. *she is actually a male with female characteristics*
14. Totipotency in plants was demonstrated with carrot tissue. A nucleus of a cell is referred to as totipotent if
- A. it contains a full set of hereditary instructions and can generate an entire adult individual
  - B. it contains one-half of a set of hereditary instructions and can generate an entire adult individual
  - C. it contains a full set of hereditary instructions and can generate gametes without going through any additional mitotic divisions
  - D. it contains a full set of hereditary instructions but can not grow into an entirely new organism
15. Similar to the complementary purine-pyrimidine relationship observed in DNA, which of the following choices pairs with adenine in RNA?
- A. thymine
  - B. cytosine
  - C. guanine
  - D. uracil
16. It has recently been discovered that enzyme-like catalysis can be carried out not only by proteins but also by
- A. steroids
  - B. DNA
  - C. phospholipids
  - D. RNA
17. A restriction in genetic variability caused by a drastic reduction in population size is called a
- A. founder effect
  - B. Hardy-Weinberg effect
  - C. bottleneck effect
  - D. polymorphic effect
18. For a gene with two alternative alleles, A (frequency  $p$ ) and a (frequency  $q$ ), the term in the algebraic form of the Hardy-Weinberg equilibrium for the heterozygote genotype frequency is
- A.  $p^2$
  - B.  $q^2$
  - C.  $2pq$
  - D.  $p+q$

19. Evidence for evolution includes all of the following except
- A. the fossil record
  - B. homologous structures
  - C. the molecular record
  - D. point mutation
20. One of the reasons why the model systems of *Arabidopsis*, *elegans*, fruit flies and mice are so often used for study is because
- A. they all have only a few chromosomes
  - B. they are easy to cross with each other and observe polyploidy effects
  - C. they are easy to culture and have short life cycles
  - D. they mutate easily leading to new genomic variations
21. Eukaryotic cells acquired mitochondria and chloroplasts by
- A. endosymbiosis
  - B. exocytosis
  - C. natural selection
  - D. mutation
22. Recently a class of infectious proteins with no associated nucleic acid, have been identified. They are referred to as
- A. bacteriophages
  - B. prions
  - C. icosahedral viruses
  - D. protease
23. Which plants are characterized by a conducting system, the possession of cuticles, specialized stems, roots, stomata, and seeds?
- A. liverworts
  - B. mosses
  - C. vascular
  - D. horsetails
24. Fungi are important because of all of the following except
- A. they break down organic material and return them to the ecosystem
  - B. all can exist in symbiotic relationships
  - C. some can ferment and produce bread, beer, wine, cheese, and soy sauce
  - D. they can break down lignin

25. In animals which display indeterminate development
- A. embryonic cells have a predetermined fate
  - B. bilateral symmetry cannot develop
  - C. early embryonic cells, if separated from the embryo, can develop into complete organisms
  - D. embryonic cells show spiral cleavage
26. Of the following choices, water is conducted through a plant mostly by
- A. parenchyma cells
  - B. sclerenchyma cells
  - C. sieve tubes
  - D. vessel members
27. The importance of a fruit to the plant is that
- A. fruits keep the seeds from escaping
  - B. fruits enhance the dispersal of seeds
  - C. fruits induce dormancy in plant embryos
  - D. fruits help gymnosperm seeds survive longer
28. Which of the following statements does not apply to aquaporins?
- A. They are water transport channels.
  - B. They are unique to plant cells.
  - C. They occur on the plasma membrane.
  - D. They speed up osmosis.
29. Carnivorous plants evolved in order to obtain which of the following nutrients from seemingly unfavorable environments?
- A. carbon
  - B.  $\text{CO}_2$
  - C.  $\text{O}_2$
  - D. nitrogen
30. Plants' first line of defense against attack by pathogens is
- A. the thick walls of cells within the xylem tissue
  - B. the dermal tissue system
  - C. the plasma membrane of the cells
  - D. various secondary metabolites, such as quinine

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31. Rumen of the first stomach of ruminants serves as a fermentation chamber in which bacteria and protozoa degrade
- A. protein
  - B. fats
  - C. cellulose
  - D. glucose
32. All of the following are functions of the circulatory system except
- A. oxygen, nutrient, and waste transport
  - B. synthesis of red and white blood cells
  - C. blood clotting and immune defense
  - D. temperature regulation
33. The most efficient lungs are found in which of the terrestrial vertebrates listed below?
- A. birds
  - B. reptiles
  - C. mammals
  - D. amphibians
34. The triglycerides are combined with proteins in the small intestine to make them into water soluble particles which are called
- A. chyme
  - B. zymogens
  - C. pepsin
  - D. chylomicrons
35. Which of the following animals is active and efficient in the dark with sonar?
- A. bats
  - B. snakes
  - C. cats
  - D. sharks
36. The movement toward or away from some stimulus is referred to as
- A. instinctive
  - B. classical conditioning
  - C. associative learning
  - D. taxis



37. An animal learns to associate its behavioral response with a reward or punishment in
- A. imprinting
  - B. classical conditioning
  - C. deviant behavior
  - D. operant conditioning
38. Lakes become eutrophic by
- A. accumulation of organic matter
  - B. loss of organic matter
  - C. circulation of water in the lake
  - D. free exchange of water with outside sources
39. In global terms, the production of  $\text{CO}_2$  by respiration and its fixation by photosynthesis are balanced, but the balance has been shifted towards accumulation of  $\text{CO}_2$  by the increase in consumption of
- A. meat products
  - B. vegetable products
  - C. fossil fuels
  - D. ozone
40. An insect feeds on a leaf. If a day's feeding activities gains a total of 1000 calories and 50% is lost in its feces and 33% of the energy is used to provide energy through cellular respiration, how many calories of the original intake are available for its biomass?
- A. 1000 calories
  - B. 500 calories
  - C. 330 calories
  - D. 170 calories