

八 十 五 學 年 度 轉 學 生 入 學 考 試

科目 普通生物學 共 6 頁第 1 頁 *請在試卷【答案卷】內作答

First Part (40%, 10% for each question)

1. Explain why islands are "living laboratories for speciation," and describe an example.
2. What is the greenhouse effect? How is it important to life on Earth?
3. What general function do the chloroplast and mitochondrion have in common? How are their functions different?
4. List four different kinds of lipids and briefly describe their functions.

Second Part (60%) Choose the best answer to each question.

請以2B鉛筆在選擇題答案卡上作答

1. Which of the following is true of geometric isomers
 - A) They have variations in arrangement around a double bond
 - B) They have an asymmetric carbon that makes them mirror images
 - C) They have the same chemical properties
 - D) They have different molecular formulas
 - E) Their atoms and bonds are arranged in different sequences
2. Which of the following statements best summarizes structural differences between DNA and RNA
 - A) RNA is a protein while DNA is a nucleic acid
 - B) DNA is not a polymer, but RNA is
 - C) DNA contains a different sugar than RNA
 - D) Both DNA and RNA are found as double helices in nature
 - E) DNA has different purine bases than RNA
3. Why is ATP an important molecule in metabolism
 - A) It has high energy phosphate bonds
 - B) Its phosphate bonds are easily made and broken
 - C) Its hydrolysis is endergonic
 - D) It is readily obtained from an organism's environment
 - E) It is extremely stable
4. A cell has the following molecules and structures: enzymes, DNA, ribosomes, plasma membrane, and mitochondria. It could be a cell from
 - A) a bacterium
 - B) an animal, but not a plant
 - C) a plant, but not an animal
 - D) a plant or an animal
 - E) any kind of organism

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5. What are the membrane structures that function in active transport
- peripheral protein
 - carbohydrate
 - cholesterol
 - hydrophobic molecule
 - integral protein
6. Pyruvate is the last product of glycolysis. Which statement below is TRUE
- There is more energy in 6 molecules of carbon dioxide than in 2 molecules of pyruvate
 - There is more energy in pyruvate than in lactate
 - There is less energy in two molecules of pyruvate than in one molecule of glucose
 - Pyruvate is in a more oxidized state than carbon dioxide
 - Pyruvate is in a more reduced state than glucose
7. Which of the following statements about the light reactions of photosynthesis is FALSE
- The splitting of water molecules provides a source of electrons
 - Chlorophyll (and other pigments) absorb light energy which excites electrons
 - An electron transport chain is used to create a proton gradient
 - A proton gradient is used to reduce NADP and assemble ATP
 - Some electrons are recycled and some are not
8. DNA replication takes place
- telophase
 - anaphase
 - interphase
 - metaphase
 - prophase
9. Centromeres of sister chromatids uncouple and chromatids separate. This occurs during
- Metaphase
 - Anaphase
 - Prophase I
 - Metaphase I
 - Anaphase I
10. The ability of a single gene to have multiple phenotype effects
- incomplete dominance
 - multiple allele
 - pleiotropy
 - epistasis
 - penetrance

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11. A woman and her husband both show the normal phenotype for pigmentation, but both had one parent who was an albino. Albinism is an autosomal recessive trait. What is the probability that their first child will be an albino

- A) 0
- B) 25
- C) 50
- D) 75
- E) 100

12. The frequency of crossing over between any two linked genes is

- A) more likely if they are recessive
- B) difficult to predict
- C) determined by their relative dominance
- D) the same as if they were not linked
- E) proportional to the distance between them

13. What is the primer that is required to initiate the synthesis of a new DNA strand

- A) RNA
- B) DNA
- C) protein
- D) ligase
- E) primase

14. Accuracy in the translation of mRNA into the primary structure of a protein depends on specificity in the

- A) binding of ribosomes to mRNA
- B) the shape of the A and P sites of ribosomes
- C) bonding of the anticodon to the codon
- D) attachment of amino acids to tRNAs
- E) Both c and d are correct

15. Amino acids are assembled according to DNA instructions

- A) transduction
- B) transposition
- C) translation
- D) transformation
- E) conjugation

16. A cell that remains flexible in its developmental possibilities is said to be

- A) differentiate
- B) determine
- C) totipotency
- D) genomically equivalence
- E) epigenesis

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17. Separates molecules by movement due to size and electrical charge

- A) restriction enzyme
- B) gene cloning
- C) DNA ligase
- D) gel electrophoresis
- E) reverse transcriptase

18. Current arguments by evolutionists about evolution are mainly concerned with the

- A) mechanism of evolutionary change
- B) existence of vestigial organs
- C) importance of homologous structures
- D) effects of ontogeny versus phylogeny
- E) significance of natural versus artificial selection

19. Recessive alleles in a genetic equilibrium

- A) are not significant
- B) remain stable indefinitely
- C) are constantly selected against
- D) are on a steady increase
- E) are on a steady decrease

20. The origin of a new plant species by hybridization coupled with nondisjunction is an example of

- A) allopatric speciation
- B) sympatric speciation
- C) autopolyploidy
- D) introgression
- E) a peak shift

21. All of the following statements about macroevolution are correct EXCEPT

- A) Long stable periods have been interrupted by brief intervals of extensive species extinction
- B) Most evolutionary trends appear to be the result of gradual phyletic change in an unbranched lineage
- C) Major adaptive radiations have often followed the evolution of novel features
- D) Continental drift has had a significant impact on macroevolution
- E) Differential speciation is a driving force behind macroevolution

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22. Which of the following statements about the origin of genetic material is correct
- A) The first genes were DNA produced by reverse transcriptase from abiotically produced RNA
 - B) The first genes were DNA whose information was transcribed to RNA and later translated in polypeptides
 - C) The first genes were RNA confined to membrane-bound compartments that enhanced molecular cooperation
 - D) The first genes were RNA produced by autocatalytic, proteinaceous enzymes called ribozymes
 - E) The first genes were protobionts produced by dehydration syntheses of nucleic acids
23. The antibiotics known as penicillins inhibit the ability of bacteria to
- A) form spores
 - B) perform respiration
 - C) replicate DNA
 - D) synthesize proteins
 - E) synthesize cell walls
24. According to the endosymbiotic theory, the ancestors of mitochondria were probably
- A) aerobic eukaryotes
 - B) aerobic bacteria
 - C) anaerobic bacteria
 - D) cyanobacteria
 - E) chloroplasts
25. Protozoan protists are generally classified according to
- A) nutrition
 - B) cell shape
 - C) size
 - D) locomotion
 - E) type of reproduction
26. Plant spores directly give rise to
- A) sporophytes
 - B) gametes
 - C) gametophytes
 - D) zygotes
 - E) seeds

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27. The sporangia of bread molds are
- A) asexual structures that produce haploid spores
 - B) asexual structures that produce diploid spores
 - C) sexual structures that produce haploid spores
 - D) sexual structures that produce diploid spores
 - E) vegetative structures with no role in reproduction
28. Which of the following characteristics correctly applies to protosome development
- A) radial cleavage
 - B) determinate cleavage
 - C) enterocoelous
 - D) blastopore becomes the anus
 - E) archenteron absent
29. Which of the following structures are characteristic of vertebrates
- A) open circulatory system
 - B) pharyngeal slits
 - C) dorsal hollow nerve core
 - D) Only b and c are correct
 - E) a, b and c are correct
30. In a root, the ground meristem differentiates to form the
- A) epidermis only
 - B) cork cambium only
 - C) cortex only
 - D) procambium only
 - E) epidermis and procambium