

請清楚標示題號並依序作答於試卷上

1. 單選題：(每題 2 分，40%) ※請作答於試卷內之「選擇題作答區」

1. Excessive heat or extremes of pH often cause denaturation of proteins. The first and major effect of protein denaturation is that
  - A) peptide bonds break.
  - B)  $\alpha$  helices unwind.
  - C)  $\beta$  sheet structures unfold.
  - D) tertiary structure is changed.
2. RNA differs from DNA because
  - A) RNA is always single-stranded when functioning, and DNA is always double-stranded.
  - B) RNA may contain the pyrimidine uracil, and DNA does not.
  - C) RNA is more stable than DNA and is broken down less easily.
  - D) the pentose sugar in RNA has one less oxygen atom than the pentose sugar in DNA.
3. Which type of microscopy passes light directly through a stained and killed specimen?
  - A) fluorescence microscopy
  - B) phase-contrast microscopy
  - C) bright field microscopy
  - D) scanning electron microscopy
4. Trace the correct path in the endomembrane system followed by a protein, beginning with its site of synthesis in the rough ER
  - A) rough ER, smooth ER, Golgi complex, plasma membrane
  - B) rough ER, Golgi complex, vesicle, plasma membrane
  - C) rough ER, vesicle, lysosome, plasma membrane
  - D) rough ER, vesicle, smooth ER, plasma membrane
5. The coordinated contraction of the mammalian heart is accomplished in part by the presence of \_\_\_\_ in heart muscle tissue that allows for communication between the cells.
  - A) tight junctions
  - B) desmosomes
  - C) synapses
  - D) gap junctions
6. Membrane sterols, such as cholesterol, function in animal cell membranes to \_\_\_\_\_.
  - A) increase the rate of diffusion
  - B) store cellular energy
  - C) maintain membrane fluidity
  - D) receive chemical signals
7. A biologist wanted to study the cellular respiration. In one experiment, she allowed a mouse to breathe air containing isotope-labeled  $O_2$ . In this mouse, the labeled oxygen first showed up in
  - A) ATP
  - B) NADH
  - C)  $CO_2$
  - D)  $H_2O$
8. Where does photosynthesis take place in cyanobacteria?
  - A) plasma membrane
  - B) Golgi apparatus
  - C) cytosol
  - D) chloroplast
9. Many signal transduction pathways utilize second messengers to \_\_\_\_\_.
  - A) transport a signal through the lipid bilayer of the plasma membrane
  - B) relay a signal from the outside of the cell to the inside
  - C) decrease the message once the signaling molecules have left the receptor
  - D) relay the message from the inner surface of the plasma membrane throughout the cytoplasm
10. Contact inhibition is an important mechanism for maintaining cell growth in developed organs and tissues. As long as the cells maintain contact with each other, they remain in \_\_\_\_\_ and are prevented from dividing.
  - A) prophase
  - B)  $G_1$
  - C)  $G_2$
  - D)  $G_0$

見背面

- 11. How do cells distinguish between estrogen and testosterone?**  
A) Only male cells respond to testosterone and female cells respond to estrogen.  
B) Estrogen is hydrophilic and binds to surface receptors, while testosterone is hydrophobic and binds to internal receptors.  
C) Estrogen and testosterone have the same basic structures, but different side chains that are easily distinguished by their individual receptors.  
D) Estrogen and testosterone have similar functional groups but different basic structures that are easily distinguished by their individual receptors.
- 12. Your father is heterozygous for a recessive disorder. You know your mother has two "good" alleles. What is the probability that you will have the disorder?**  
A) 0%      B) 25%      C) 50%      D) 75%
- 13. Suppose a DNA replication error is not corrected. After two cell divisions, how many of the four daughter cells contain this mutation (assuming that the mistake was never corrected)?**  
A) one      B) two      C) three      D) four
- 14. Which event occurs after the first heart sound and before the second heart sound?**  
A) ventricular relaxation      B) P wave of the ECG      C) AV valves open  
D) aortic systolic pressure      E) blood volume in ventricle increases
- 15. Which of the following is closest to the center of a woody stem?**  
A) vascular cambium      B) primary phloem      C) secondary phloem  
D) primary xylem      E) secondary xylem
- 16. Which sequence of structures through which water passes into a root is correct?**  
A) guard cell, endodermis, cortex, xylem  
B) root hair, cortex, xylem, endodermis  
C) epidermis, cortex, endodermis, xylem  
D) root hair, xylem, endodermis, phloem
- 17. The relationship between a plant and mycorrhizal fungi is best described as**  
A) parasitic      B) competitive      C) mutualistic      D) commensal
- 18. Consider a stable frog population living at carrying capacity in a pond. If an average female produces 5,000 eggs during her lifetime and an average of 250 tadpoles hatch from these eggs, how many of these tadpoles will, on average, survive to reproduce?**  
A) 0      B) 2      C) 10 to 20      D) More than 100
- 19. Keystone predators can maintain species diversity in a community if they \_\_\_\_\_.**  
A) competitively exclude other predators  
B) prey on the community's dominant species  
C) allow immigration of other predators  
D) prey only on the least abundant species in the community
- 20. A human who has no access to fresh water but is forced to drink seawater instead will \_\_\_\_\_.**  
A) produce excessive antidiuretic hormone (ADH) to excrete more water but hold back salts  
B) passively excrete excess water in order to remove the high concentration of ingested salt  
C) release atrial natriuretic peptide (ANP) to decrease blood pressure  
D) risk becoming overhydrated within ten hours

題號：35

題號：35

科目：普通生物學(A)

共 3 頁之第 3 頁

※ 注意：請於試卷上「非選擇題作答區」標明大題及小題題號，並依序作答。

**II. 解釋名詞: (每題 3 分，15%)**

1. triple response in plants (to mechanical stress)
2. postsynaptic potential
3. dendritic cell
4. sensory transduction (explain with an example)
5. epigenetic inheritance

**III. 簡答題 (每題 5 分，45%)**

1. Design an experiment to identify of proteins that regulate the secretory pathway in human cells.
2. The reaction of the Calvin cycle are not directly dependent on light, but they usually do not occur at night. Why?
3. Brief describe how three different processes that occur during a sexual reproduction increase the genetic diversity of offspring.
4. If a nerve cell and a skin cell in your body have the same genes, how can the cells be so different?
5. If a gene has the sequence AATTGCGC, what would be the sequence of an miRNA that turns off the gene?
6. Describe the roles of the following enzymes during DNA replication: ligase, single-stranded binding proteins (SSBs), DNA polymerase III, primase, DNA helicase.
7. List three characteristics that arthropods have in common.
8. Garden 1 has 100 individuals distributed among four species: 25A, 20B, 25C, and 30 D. Garden 2 has 100 individuals distributed among three species: 80A, 5B, and 15C. Fertilizers were applied on garden 1, but not on garden 2. Does the application of fertilizers increase diversity? (Explain your answer.)
9. How does the Bohr shift affect deliver oxygen to very active tissue in humans?

試題隨卷繳回