

請清楚標示題號並依序作答於試卷上

I. 單選題: (每題 2 分, 共 40 分) ※請作答於試卷內之「選擇題作答區」

1. Which of the following statements is not consistent with Darwin's theory of natural selection?
 - A) Individuals in a population exhibit variations, some of which are passed from parents to offspring.
 - B) Individual organisms experience genetic change during their life spans to better fit their environment.
 - C) Factors in the environment result in some organisms having better reproductive success than others.
 - D) Natural selection can lead to the appearance of new species.
2. Over time, cancerous cells typically lose the cell adhesion molecules embedded in their plasma membrane. Loss of these molecules is best associated with which of the following traits of cancer cells?
 - A) increased rate of cell division
 - B) production of new proteins
 - C) angiogenesis
 - D) migration to new locations in the body
3. Plant cells grow primarily by increasing _____.
 - A) cell number through cell division
 - B) pressure and volume of the central vacuole
 - C) cell size through cell differentiation
 - D) the concentration of lignin
4. In an ecosystem, energy
 - A) cycles along with chemical nutrients.
 - B) typically flows from consumers to producers to decomposers.
 - C) typically flows from producers through a series of consumers.
 - D) comes ultimately from bacteria.
5. Which of the following is most important in guiding transport vesicles from the Golgi apparatus to the plasma membrane?
 - A) microtubules
 - B) microfilaments
 - C) plasmodesma
 - D) intermediate filaments
6. The alleles of a gene are found at _____ chromosomes.
 - A) the same locus on nonhomologous
 - B) different loci on homologous
 - C) different loci on nonhomologous
 - D) the same locus on homologous
7. In some cats, black coat color (B) is dominant over brown (b) and a striped fur pattern (S) is dominant over a marbled fur pattern (s). You rescued a black striped cat from an animal shelter but could not determine its exact genotype. To do so, you mated the cat with a brown marbled cat. The mating produced 3 brown marbled, 2 brown striped, 2 black marbled, and 3 black striped. Immediately, you concluded the genotype of your rescued cat was
 - A) BBSS.
 - B) BBSs.
 - C) BbSS.
 - D) BbSs.
8. The ribosomes reads a messenger RNA and makes a protein containing 120 amino acids. The mRNA consisted of at least how many codons?
 - A) 40
 - B) 120
 - C) 360
 - D) 480
9. Why does a DNA strand grow only in the 5' to 3' direction?
 - A) because DNA polymerases can only add nucleotides to the 3' end of the growing molecule
 - B) because DNA polymerases can only add nucleotides to the 5' end of the growing molecule
 - C) because the DNA molecule only unwinds in the 5' to 3' direction
 - D) because DNA polymerase requires the addition of a starter nucleotide at the 5' end
10. Which of the following statements regarding viral diseases is false?
 - A) RNA viruses tend to have an unusually high rate of mutation because their RNA genomes cannot be corrected by proofreading.
 - B) New viral diseases often emerge when a virus infects a new host species.
 - C) Very few new human diseases have originated in other animals because the genetic differences are too great.
 - D) Herpesviruses may remain dormant for long periods of time while inside the host cell nucleus.
11. Which of the following permits a single gene to code for more than one polypeptide?
 - A) retention of different introns in the final version of the different mRNA strands
 - B) alternative RNA splicing
 - C) genetic differentiation
 - D) addition of different types of caps and tails to the final version of the mRNA strands

見背面

12. If Hershey and Chase had used radioactive oxygen in their experiments instead of phosphorus and sulfur, what results would they have likely obtained?
- A) They would have observed a radioactive signal in the pellet only.
B) They would have observed a radioactive signal in the liquid only.
C) They would have observed a radioactive signal in both the pellet and the liquid.
D) They would have not observed radioactivity anywhere.
13. The lac operon of *E. coli* is _____ when the repressor is bound to lactose.
A) active B) inactive C) cloned D) unregulated
14. A single cell, the zygote, can develop into an entirely new organism with many different specialized cells. Which of the following statements about this process is false?
- A) Additional genetic information for the formation of specialized cells is passed on to the developing embryo via the mother.
B) The descendant cells specialize by a process known as differentiation.
C) The zygote contains all of the genetic information required for the development of many different cell types.
D) Differentiation of the zygote into a multicellular organism results from selective gene expression.
15. Which of the following is the correct order of floral organs from the outside to the inside of a complete flower?
- A) petals → sepals → stamens → carpels B) sepals → stamens → petals → carpels
C) sepals → petals → stamens → carpels D) spores → gametes → zygote → embryo
16. When mature long-day plants grow in winter, a _____ treatment can make them flower.
A) red light B) far-red light C) lower temperature D) high temperature
17. Which of the following traits is not shared by all mammals?
- A) amnion B) production of milk C) placenta D) three bones of the middle ear
18. What is the role of the fungus in a mycorrhizal association?
- A) contributes to photosynthesis B) absorption of water, phosphate, and other minerals
C) secretion of growth factors D) release of water
19. Which of the following statements is false?
- A) The ground tissue system of a leaf is called the mesophyll.
B) Each vein in a leaf is composed of either xylem or phloem, but not both.
C) The pith of a stem is often important in food storage.
D) Tissues that are neither dermal nor vascular are known as the ground tissue system.
20. Which of the following statements is not true?
- A) The elastic walls allow the arteries to reduce the pressure fluctuation during a cardiac cycle.
B) The risk of stroke can be reduced by avoiding the damage to endothelium of vessels.
C) The primary function of erythrocytes is to participate in immune reactions.
D) Epinephrine raises blood pressure by increasing the strength and rate of the heartbeat.

II. 解釋名詞 (每題 4 分，共 20 分)

1. inhibitory postsynaptic potential
2. gastrin
3. atrioventricular node
4. endosperm
5. niche differentiation

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III. 簡答題 (共 40 分)

1. Explain the advantages eukaryotic cells derive from being compartmentalized by many internal membranes. (5 分)
2. Give two examples (one in plants, another in animals) to explain the connection of biological structure and function. (5 分)
3. Answer whether you would use a light microscope (LM), a transmission electron microscope (TEM), or a scanning electron microscope (SEM) to perform each of the following tasks, and explain why: (8 分)
 - A) examining fine structural details within cell organelles
 - B) observing how a cell changes shape as it moves
 - C) studying tiny projection on cell surface
 - D) filming changes in the shape of the nucleus as a cell prepares to divide
4. What is sensory transduction? Explain with an example. (5 分)
5. Which of the types of nucleic acids you've learned about does not participate directly in translation? (4 分)
6. If an anemic patient had moderately lower hemoglobin concentration (10 g/ 100 ml blood) but his lungs were functioning normally, _____. (Select the best answer from the choices given, and explain your answer.) (8 分)
 - A) the arterial oxygen content would be normal.
 - B) the arterial PO₂ would be normal.
 - C) stimulation of peripheral arterial chemoreceptors would be expected to increase.
 - D) arterial hemoglobin saturation (%) would be expected to decrease.
 - E) the venous reserve of oxygen would be normal.
7. Why does vaccination work? Why do people need to get a new flu shot every year? (5 分)

試題隨卷繳回