

一、單選題 (每題 2 分) ※注意：請於試卷「選擇題作答區」依題號作答。※

1. The hydrogenation of vegetable oil results in which of the following?
(A) saturated fats and unsaturated fats with trans double bonds
(B) an increased contribution to arteriosclerosis
(C) the oil (fat) being a solid at room temperature
(D) A and C only
(E) A, B, and C
2. Which of the following contains its own DNA and ribosomes?
(A) lysosome (B) vacuole (C) mitochondrion (D) Golgi apparatus (E) peroxisome
3. The reaction-center chlorophyll of photosystem I is known as P700 because _____.
(A) there are 700 chlorophyll molecules in the center.
(B) this pigment is best at absorbing light with a wavelength of 700 nm.
(C) there are 700 photosystem I components to each chloroplast.
(D) it absorbs 700 photons per microsecond.
(E) the plastoquinone reflects light with a wavelength of 700 nm.
4. Cytokinesis usually, but not always, follows mitosis. If a cell completed mitosis but not cytokinesis, the result would be a cell with _____.
(A) a single large nucleus (B) high concentrations of actin and myosin
(C) two abnormally small nuclei (D) two nuclei
(E) two nuclei but with half the amount of DNA
5. When does the synaptonemal complex disappear in meiosis?
(A) Late prophase of meiosis I
(B) During fertilization or fusion of gametes
(C) Early anaphase of meiosis I
(D) Mid-prophase of meiosis II
(E) Late metaphase of meiosis II
6. Which enzyme catalyzes the elongation of a DNA strand in the 5' → 3' direction?
(A) primase (B) DNA ligase (C) DNA polymerase III (D) topoisomerase (E) helicase
7. For a repressible operon to be transcribed, which of the following must occur?
(A) A corepressor must be present.
(B) RNA polymerase must bind to the promoter, and the repressor must be inactive.
(C) RNA polymerase and the active repressor must be present.
(D) RNA polymerase cannot be present, and the repressor must be inactive.
(E) RNA polymerase must not occupy the promoter, and the repressor must be inactive.

見背面

8. Most molecular biologists think that viruses originated from fragments of cellular nucleic acid. Which of the following observations supports this theory?
- (A) Viruses contain either DNA or RNA.
 - (B) Viruses are enclosed in protein capsids rather than plasma membranes.
 - (C) Viruses can reproduce only inside host cells.
 - (D) Viruses can infect both prokaryotic and eukaryotic cells.
 - (E) Viral genomes are usually more similar to the genome of the host cell than to the genomes of viruses that infect other cell types.
9. A researcher needs to clone a sequence of part of a eukaryotic genome in order to express the sequence and to modify the polypeptide product. She would be able to satisfy these requirements by using which of the following vectors?
- (A) a bacterial plasmid
 - (B) BAC to accommodate the size of the sequence
 - (C) a modified bacteriophage
 - (D) a YAC with appropriate cellular enzymes
 - (E) a human chromosome
10. In a Hardy-Weinberg population with two alleles, A and a, that are in equilibrium, the frequency of allele a is 0.2. What is the frequency of individuals with Aa genotype?
- (A) 0.20
 - (B) 0.32
 - (C) 0.42
 - (D) 0.80
 - (E) Genotype frequency cannot be determined from the information provided.
11. Which taxon is essentially equivalent to the "embryophytes"?
- (A) Plantae
 - (B) Viridiplantae
 - (C) Pterophyta
 - (D) Bryophyta
 - (E) Charophyceae
12. What do fungi and arthropods have in common?
- (A) Both groups are commonly coenocytic.
 - (B) The haploid state is dominant in both groups.
 - (C) Both groups are predominantly heterotrophs that ingest their food.
 - (D) The protective coats of both groups are made of chitin.
 - (E) Both groups have cell walls.
13. Plant hormones can have different effects at different concentrations. This explains how _____.
- (A) some plants are long-day plants and others are short-day plants.
 - (B) signal transduction pathways in plants are different from those in animals.
 - (C) auxin can stimulate cell elongation in apical meristems, yet will inhibit the growth of axillary buds.
 - (D) plant genes recognize pathogen genes.
 - (E) they really don't fit the definition of "hormone."
14. The pH of the stomach is low enough and the protease activity high enough that the cells of the stomach itself are at risk of self-digestion. Which of the following does prevent it?
- (A) a sufficient colony of H. pylori
 - (B) secretions entering the stomach from the pancreas
 - (C) high level of secretion by chief cells
 - (D) high level of secretion from parietal cells
 - (E) mucus secretion and active mitosis of epithelial cells

15. An embryo with meroblastic cleavage, extra-embryonic membranes, and a primitive streak must be that of _____.
- (A) a bird (B) a fish (C) an amphibian (D) an insect (E) a sea urchin
16. Which of the following is controlled by the magnitude of a receptor potential?
- (A) the rate of production of an action potential (B) the rate of reaction of the brain
(C) the rate of response to a sensory neuron (D) perception
(E) adaptation
17. Which of the following levels of organization is arranged in the correct sequence from most to least inclusive?
- (A) community, ecosystem, individual, population
(B) ecosystem, community, population, individual
(C) population, ecosystem, individual, community
(D) individual, population, community, ecosystem
(E) individual, community, population, ecosystem
18. The Allee effect is used to describe a population that _____.
- (A) exceeds carrying capacity
(B) has become so large it will have difficulty surviving and reproducing
(C) approaches carrying capacity
(D) has become so small that it will have difficulty surviving and reproducing
(E) is in crash decline
19. Subtraction of which of the following will convert gross primary productivity into net primary productivity?
- (A) the energy contained in the standing crop
(B) the energy used by heterotrophs in respiration
(C) the energy used by autotrophs in respiration
(D) the energy fixed by photosynthesis
(E) all solar energy
20. If the sex ratio in a population is significantly different from 50:50, then which of the following will always be true?
- (A) The population will enter the extinction vortex.
(B) The genetic variation in the population will increase over time.
(C) The genetic variation in the population will decrease over time.
(D) The effective population size will be greater than the actual population size.
(E) The effective population size will be less than the actual population size.

見背面

※下列題目請標明題號，依序作答於試卷內「非選擇題作答區」。※

二、名詞解釋 (每題 4 分)

1. Allosteric regulation
2. Biomass
3. Chemoautotroph
4. Protein domain
5. Epigenetic inheritance
6. Founder effect
7. Homeostasis
8. Inductive reasoning
9. Prion

三、簡答題 (每題 8 分)

1. 請說明真核細胞的內膜系統 (endomembrane system) 之組成以及物質如何在其中傳遞。
2. 請簡述二種在相鄰神經細胞間傳導動作電位的機制。
3. 請說明系統生物學的發展如何影響未來的醫藥科技。

試題隨卷繳回