科目 普通生物學 類組別 A1 共 8 頁 第 1 頁

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共50題選擇題(單選)，每題2分

1. Darwin's finches, collected from the Galápagos Islands, illustrate which of the following?
   A) mutation frequency
   B) ancestors from different regions
   C) adaptive radiation
   D) the accuracy of the fossil record

2. Oxygen has an atomic number of 8 and most commonly, a mass number of 16. Thus, what is the atomic mass of an oxygen atom?
   A) approximately 8 grams
   B) approximately 8 daltons
   C) approximately 16 grams
   D) approximately 16 daltons

3. Which of the following statements is true about buffer solutions?
   A) They maintain a constant pH when bases are added to them but not when acids are added to them.
   B) They maintain a constant pH when acids are added to them but not when bases are added to them.
   C) They fluctuate in pH when either acids or bases are added to them.
   D) They maintain a relatively constant pH when either acids or bases are added to them.

4. Which two functional groups are always found in amino acids?
   A) carbonyl and amino groups
   B) carboxyl and amino groups
   C) amino and sulfhydryl groups
   D) hydroxyl and carboxyl groups

5. Lactose, a sugar in milk, is composed of one glucose molecule joined by a glycosidic linkage to one galactose molecule. How is lactose classified?
   A) as a hexose
   B) as a monosaccharide
   C) as a disaccharide
   D) as a polysaccharide

6. Which of the following produces and modifies polysaccharides that will be secreted?
   A) lysosome
   B) mitochondrion
   C) Golgi apparatus
   D) peroxisome

7. Which of the following is true of osmosis?
   A) Osmosis only takes place in red blood cells.
   B) Osmosis is an energy-demanding or "active" process.
   C) In osmosis, water moves across a membrane from areas of lower solute concentration to areas of higher solute concentration.
   D) In osmosis, solutes move across a membrane from areas of lower water concentration to areas of higher water concentration.

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8. A noncompetitive inhibitor decreases the rate of an enzyme reaction by _____.
   A) binding at the active site of the enzyme
   B) changing the shape of the enzyme's active site
   C) changing the free energy change of the reaction
   D) acting as a coenzyme for the reaction

9. You have a friend who lost 7 kg of fat on a regimen of strict diet and exercise. How did the fat leave his body?
   A) It was released as CO_2 and H_2O.
   B) It was converted to heat and then released.
   C) It was converted to ATP, which weighs much less than fat.
   D) It was converted to urine and eliminated from the body.

10. In the process of carbon fixation, RuBP attaches a CO_2 to produce a six-carbon molecule, which is then split to produce two molecules of 3-phosphoglycerate. After phosphorylation and reduction produces glyceraldehyde 3-phosphate (G3P), what more needs to happen to complete the Calvin cycle?
   A) addition of a pair of electrons from NADPH
   B) regeneration of ATP from ADP
   C) regeneration of RuBP
   D) regeneration of $NADP^+$

11. A drug designed to inhibit the response of cells to testosterone would most likely result in _____.
   A) lower cytoplasmic levels of cAMP
   B) a decrease in transcriptional activity of certain genes
   C) an increase in cytosolic calcium concentration
   D) a decrease in G protein activity

12. Motor proteins require which of the following to function in the movement of chromosomes toward the poles of the mitotic spindle?
   A) intact centromeres
   B) a microtubule-organizing center
   C) ATP as an energy source
   D) synthesis of cohesin

13. A female with a paternal set of one orange and one long gene chromosome and a maternal set comprised of one blue and one short gene chromosome is expected to produce which of the following types of eggs after meiosis?
   A) All eggs will have maternal types of gene combinations.
   B) All eggs will have paternal types of gene combinations.
   C) Half the eggs will have maternal and half will have paternal combinations.
   D) Each egg has a one-fourth chance of having either blue long, blue short, orange long, or orange short combinations.

14. Mendel's observation of the segregation of alleles in gamete formation has its basis in which of the following phases of cell division?
   A) prophase I of meiosis
   B) anaphase II of meiosis
   C) metaphase II of meiosis
   D) anaphase I of meiosis

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15. Cinnabar eyes is a sex-linked, recessive characteristic in fruit flies. If a female having cinnabar eyes is crossed with a wild-type male, what percentage of the F_1 males will have cinnabar eyes?
A) 0%
B) 25%
C) 50%
D) 100%

16. What is the role of DNA ligase in the elongation of the lagging strand during DNA replication?
A) It synthesizes RNA nucleotides to make a primer.
B) It joins Okazaki fragments together.
C) It unwinds the parental double helix.
D) It stabilizes the unwound parental DNA.

17. An original section of DNA has the base sequence AGCGTTACCGT. A mutation in this DNA strand results in the base sequence AGGCGTTACCGT. This change represents _____.
A) a missense mutation
B) a point mutation
C) a silent mutation
D) frameshift mutation

18. Imagine that you've isolated a yeast mutant that contains histones resistant to acetylation. What phenotype do you predict for this mutant?
A) The mutant will grow rapidly.
B) The mutant will require galactose for growth.
C) The mutant will show low levels of gene expression.
D) The mutant will show high levels of gene expression.

19. Which of the following human diseases is caused by a virus that requires reverse transcriptase to transcribe its genome inside the host cell?
A) herpes
B) AIDS
C) smallpox
D) influenza

20. A laboratory might use dideoxyribonucleotides to _____.
A) separate DNA fragments
B) produce cDNA from mRNA
C) sequence a DNA fragment
D) visualize DNA expression

21. When gene duplication occurs to its ultimate extent by doubling all genes in a genome, what has occurred?
A) pseudogene creation
B) creation of a gene cluster
C) creation of a polyploid
D) creation of a diploid

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22. A farmer uses triazine herbicide to control pigweed in his field. For the first few years, the triazine works well and almost all the pigweed dies; but after several years, the farmer sees more and more pigweed. Which of these explanations best explains what happened?
A) The herbicide company lost its triazine formula and started selling poor-quality triazine.
B) Natural selection caused the pigweed to mutate, creating a new triazine-resistant species.
C) Triazine-resistant pigweed has less-efficient photosynthesis metabolism.
D) Triazine-resistant weeds were more likely to survive and reproduce.

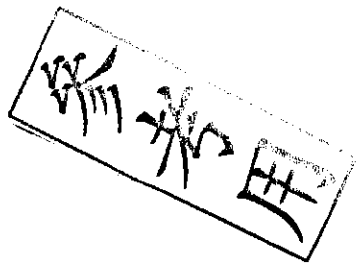
23. Mutation is the only evolutionary mechanism that _____.
A) does little to change allele frequencies
B) is more important in eukaryotes than in prokaryotes
C) happens in all populations
D) has no effect on genetic variation

24. Plant species A has a diploid number of 12. Plant species B has a diploid number of 16. A new species, C, arises as an allopolyploid from A and B. The diploid number for species C would probably be _____.
A) 14
B) 16
C) 28
D) 56

25. If one organ is an exaptation of another organ, then these two organs _____.
A) are homologous
B) are undergoing convergent evolution
C) are found in the same species
D) have the same function

26. Phylogenetic trees constructed from evidence from molecular systematics are based on similarities in _____.
A) morphology
B) the pattern of embryological development
C) biochemical pathways
D) mutations to homologous genes

27. If a bacterium regenerates from an endospore that did not possess any of the plasmids that were contained in its original parent cell, the regenerated bacterium will probably also _____.
A) lack antibiotic-resistant genes
B) lack a cell wall
C) lack a chromosome
D) lack water in its cytoplasm



28. Dinoflagellates _____.
A) possess two flagella
B) are all autotrophic
C) lack mitochondria
D) include species that cause malaria

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29. Most moss gametophytes do not have a cuticle and are 1-2 cells thick. What does this imply about moss gametophytes and their structure?
A) They use stomata for gas exchange regulation.
B) They can easily lose water to, and absorb water from, the atmosphere.
C) Photosynthesis occurs throughout the entire gametophyte surface.
D) They have branching veins in their leaves.

30. In examining an unknown animal species during its embryonic development, how can you be sure what you are looking at is a protostome and not a deuterostome?
A) There is evidence of cephalization.
B) The animal is triploblastic.
C) The animal is clearly bilaterally symmetrical.
D) You see a mouth, but not an anus.

31. Which of the following is most likely to be aquatic?
A) suspension feeder
B) mass feeder
C) deposit feeder
D) fluid feeder

32. Unlike eutherians, *both* monotremes and marsupials _____.
A) lack nipples
B) have some embryonic development outside the uterus
C) lay eggs
D) are found in Australia and Africa

33. Compared to most animals, the growth of most plant structure is best described as _____.
A) perennial
B) weedy
C) indeterminate
D) primary

34. If isolated plant cells with a water potential averaging -0.5 MPa are placed into a solution with a water potential of -0.3 MPa, which of the following would be the most likely outcome?
A) The pressure potential of the cells would increase.
B) Water would move out of the cells.
C) The cell walls would rupture, killing the cells.
D) Solutes would move out of the cells.

35. Most of the dry mass of a plant is the result of uptake of _____.
A) water and minerals through root hairs
B) water and minerals through mycorrhizae
C) carbon dioxide through stoma
D) carbon dioxide and oxygen through stomata in leaves

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36. Which of the following could be considered an evolutionary advantage of asexual reproduction in plants?
A) increased success of progeny in a stable environment.
B) increased agricultural productivity in a rapidly changing environment.
C) maintenance and expansion of a large genome.
D) increased ability to adapt to a change in the environment.

37. Suppose a plant had a photosynthetic pigment that absorbed far-red wavelengths of light. In which of the following environments could that plant thrive?
A) on the surface of a lake
B) on the forest floor, beneath a canopy of taller plants
C) on the ocean floor, in very deep waters
D) on mountaintops, closer to the Sun

38. The body tissue that consists largely of material located outside of cells is _____.
A) epithelial tissue
B) connective tissue
C) skeletal muscle
D) nervous tissue

39. If you found a vertebrate skull in the woods and the teeth were sharp and scissor-like, what type of food would you expect this animal to eat?
A) grass
B) flesh of another animal
C) nectar
D) blood

40. The hormone that stimulates the production of red blood cells, and the organ where this hormone is synthesized, are _____.
A) growth hormone and pancreas, respectively
B) erythropoietin and kidney, respectively
C) cortisol and adrenal gland, respectively
D) acetylcholine and bone marrow, respectively

41. What type of immunity is associated with breast feeding?
A) innate immunity
B) active immunity
C) passive immunity
D) cell-mediated immunity

42. If you are hiking through the desert for several days, one would pack which of the following to ensure proper hydration?
A) a drink with a combination of water and electrolytes
B) caffeinated beverages
C) bottled water kept at room temperature
D) bottled water that had been frozen to ensure that it would be as cold as possible

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43. If a portion of the pancreas is surgically removed from a rat and the rat subsequently loses its appetite, one explanation is that the removed portion contains cells that secrete a chemical signal that somehow stimulates appetite. Given this scenario, what type of chemical signaling is occurring?
A) autocrine
B) paracrine
C) endocrine
D) neuroendocrine

44. The primary function of the corpus luteum is to _____.
A) nourish and protect the egg cell
B) maintain progesterone and estrogen synthesis after ovulation has occurred
C) stimulate the development of the mammary glands
D) support pregnancy in the second and third trimesters

45. The embryonic precursor to the human spinal cord is the _____.
A) notochord
B) neural tube
C) mesoderm
D) archenteron

46. Which of the following statements about action potentials is correct?
A) Action potentials for a given neuron vary in magnitude.
B) Action potentials for a given neuron vary in duration.
C) Action potentials are propagated down the length of the axon.
D) Movement of ions during the action potential occurs mostly through the sodium pump.

47. Artificial electrical stimulation of a human's capsaicin-sensitive neurons would likely produce the sensation of _____.
A) cold temperature
B) hot temperature
C) tactile stimulus
D) deep pressure

48. A stickleback fish will attack a fish model as long as the model has red coloring. What animal behavior idea is manifested by this observation?
A) sign stimulus
B) cognition
C) imprinting
D) classical conditioning

49. Uniform spacing patterns in plants such as the creosote bush are most often associated with _____.
A) patterns of high humidity
B) the random distribution of seeds
C) competitive interaction between individuals of the same population
D) the concentration of nutrients within the population's range

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50. Which of the following has the greatest effect on the rate of chemical cycling in an ecosystem?
A) the ecosystem's rate of primary production
B) the production efficiency of the ecosystem's consumers
C) the rate of decomposition in the ecosystem
D) the trophic efficiency of the ecosystem

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