

編號: 70

系所: 地球科學系乙組

科目: 生物學

本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

(每題 2 分):

1. In self-splicing RNA is acting like
 - A. a replisome.
 - B. a ribosome.
 - C. a ribozyme.
 - D. an enhancer.
 - E. a rho protein.

2. Human males are much more likely to be have hemophilia (a failure of blood to clot properly) than human females. This is the case because
 - A. hemophilia is a contagious disease to which males are more susceptible.
 - B. the gene for hemophilia is carried on the Y chromosome.
 - C. hemophilia is carried on the autosomes.
 - D. hemophilia is the wild type.
 - E. the gene for hemophilia is sex-linked.

3. Which of the following best describes the complete sequences of steps occurring during *every cycle* of PCR?
 - (1) The primers hybridized to the target DNA.
 - (2). The mixture is heated to a high temperature to denature the double-stranded target DNA.
 - (3) Fresh DNA polymerase is added.
 - (4) DNA polymerase extends the primers to make a copy of the target DNA.
 - A. (2), (1), (4).
 - B. (1), (3), (2), (4).
 - C. (3), (4), (1), (2).
 - D. (3), (4), (2).
 - E. (2), (3), (4).

4. The mouse autosomal genes *B* and *S* are linked and 38 map units apart. Genotypes *BS/BS* and *bs/bs* are intercrossed and the F_1 is testcrossed to *bs/bs*. The proportion of *B-S-* progeny will be
 - A. 0.38.
 - B. 0.76.
 - C. 0.50.
 - D. 0.31.
 - E. 0.18.

(背面仍有題目,請繼續作答)

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5. Genes contain the instructions for building proteins. Where are those instructions located?
- A. in the bonds between complementary bases.
 - B. in the sugar and phosphate groups that are part of each nucleotide.
 - C. in the tRNA.
 - D. in the nuclear membrane.
 - E. in the order of the DNA bases.
6. Which of the following terms best characterizes catabolite repression associated with the lactose operon in *E. coli*?
- A. inducible system.
 - B. repressible system.
 - C. negative control.
 - D. positive control.
 - E. constitutive
7. Which of the following statements concerning natural killer cells is wrong?
- A. They are derived from stem cells.
 - B. They can destroy virus-infected cells.
 - C. They destroy virus-infected cells by inducing necrosis.
 - D. They can destroy cancer cells.
 - E. They contain interferon receptors.
8. Which item is not a secondary lymphoid organ?
- A. Bone marrow.
 - B. Spleen.
 - C. Peyer's patch.
 - D. Tonsil.
 - E. Lymph node.
9. When the tryptophan is present, the *trp* operon
- A. is on by using the tryptophan itself as co-inducer.
 - B. is on by using the tryptophan itself as co-repressor.
 - C. is off by using the tryptophan itself as co-inducer.
 - D. is off by using the tryptophan itself as co-repressor.

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- E. is not controlled by tryptophan, but by repressor only.
10. What roles are usually played by *lacZ* and *amp^R* (ampicillin resistance) genes on the bacterial cloning vector?
- A. *lacZ* as gene insertion site and selection marker; *amp^R* as selection marker only.
B. *lacZ* as gene insertion site only; *amp^R* as selection marker only.
C. *lacZ* as gene insertion site and selection marker; *amp^R* as gene integration site too.
D. Both *lacZ* and *amp^R* as gene insertion sites and selection markers.
E. Both *lacZ* and *amp^R* as selection markers only.
11. Which of the following is not a trace element in the human body?
- A. Fluorine
B. Nitrogen
C. Zinc
D. Manganese
E. Iodine
12. Table salt is formed when
- A. Chlorine gives an electron to sodium
B. A hydrogen bond forms between sodium and chlorine
C. Sodium and chlorine share electrons to form a bond
D. Sodium crystals combine with chlorine crystals
E. None of the above
13. Lipids are important in animal cells as
- A. Energy-containing molecules
B. Components of cell membranes
C. Steroids and hormones
D. Enzymes
E. A, b and c
14. The maximum amount of air that a human can inhale and exhale is called the
- A. Tital volume
B. Vital capacity
C. Maximum capacity
D. Physiological volume

(背面仍有題目,請繼續作)

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E. Inhalation capacity

15. What is the most common cause of anemia?
- A. Vital deficient
 - B. Low blood pressure
 - C. Iron deficient
 - D. Inefficient hemoglobin production
 - E. Bone marrow cancer
16. Why are cattle able to survive on a diet consisting almost entirely of plant material?
- A. They are autotrophic.
 - B. Cattle, like the rabbit, reingests its feces.
 - C. They manufacture all 15 amino acids out of sugars in the liver.
 - D. Cattle saliva has enzymes capable of digesting cellulose.
 - E. They have cellulose-digesting, symbiotic microorganisms in chambers of their stomachs.
17. If the release of LH were inhibited in a human female, which of the following events would not occur?
- A. release of FSH from the pituitary
 - B. maturation of a primary follicle and oocyte
 - C. ovulation of a secondary oocyte
 - D. release of GnRH from the hypothalamus
 - E. production of estrogen by follicle cells
18. Which developmental sequence is correct?
- A. cleavage, blastula, gastrula, morula
 - B. cleavage, gastrula, morula, blastula
 - C. cleavage, morula, blastula, gastrula
 - D. gastrula, morula, blastula, cleavage
 - E. morula, cleavage, gastrula, blastula
19. What role does the cornea play in the vertebrate eye?
- A. controls the amount of light entering the eye
 - B. focuses light on the retina
 - C. contains light-sensitive cells that send signals to the brain to process the visual image
 - D. the opening through which light passes into the eye
20. The action potential is produced by a combination of an influx of sodium ions and an efflux of potassium

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- ions. Since these ions carry similar charge and are moving in opposite directions, why don't their movements simply cancel each other out so that there is no change in the membrane potential?
- A. Voltage-gated potassium channels open at the same time as voltage-gated sodium channels.
 - B. Voltage-gated sodium channels open at the same time as voltage-gated potassium channels.
 - C. The opening of voltage-gated sodium channels is delayed.
 - D. The opening of voltage-gated potassium channels is delayed.
21. Which of the following best illustrates the concept of feedback inhibition within the endocrine system?
- A. An increase in CRH release by the hypothalamus causes a decrease in ACTH release by the anterior pituitary gland.
 - B. An increase in CRH release by the hypothalamus causes an increase in ACTH release by the anterior pituitary gland.
 - C. An increase in cortisol release by the adrenal glands causes a decrease in CRH release by the hypothalamus.
 - D. An increase in cortisol release by the adrenal glands causes a decrease in CRH release by the anterior pituitary gland.
22. Of the evolutionary forces, which causes stochastic changes of gene frequencies between generations?
- A. gene flow.
 - B. genetic drift.
 - C. natural selection.
 - D. random mating.
 - E. mutation.
23. A phylogenetic tree of plant families constructed by cladistic analysis would most clearly show which of the following?
- A. characteristics shared by all plant families.
 - B. evolutionary relationships among families.
 - C. families that look most alike.
 - D. analogous structures shared by various species.
 - E. relative ages of living species of plants.
24. Of the followings, which one is Carolus Linnaeus' contributions?
- A. particulate genetics.
 - B. descent with modification.
 - C. genetic drift.
 - D. natural selection.

(背面仍有題目,請繼續作答)

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E. hierarchy of life.

25. Most of the time, species are identified by their appearance. Why?

- A. This is the criterion used to define a biological species.
- B. If two organisms look different, they must be different species.
- C. If two organisms look alike, they must be the same species.
- D. This is the most convenient way of identifying species.
- E. Most organisms reproduce asexually

26. Which of the following statements about survivorship curves are correct?

- I. Organisms with type I curve experience very high mortality when young.
 - II. Organisms with type II curve have a constant death rate over the life span.
 - III. Type III curve is usually associated with organisms provide good parental care.
 - IV. Some organisms can show more complex pattern in different life stages.
- A. I, III, and IV
 - B. III only
 - C. I and II
 - D. I, II, III, and IV
 - E. II and IV

27. Fixed action pattern in animals is a major characteristic of

- A. Playing behavior.
- B. Imprinting behavior.
- C. Learning behavior.
- D. Instinct behavior.
- E. Habituation behavior.

28. Which of the following relationships are different in the evolutionary history of animals between the phylogenies based on form-and-body-plan and based on molecular evidence:

- I. between Nematoda and Arthropoda, II. between Chordata and Echinodermata,
 - III. between Rotifera and Nematoda, IV. between Mollusca and Arthropoda,
 - V. between Annelida and Arthropoda.
- A. I, III, IV
 - B. III, V
 - C. I, II, V
 - D. III, IV

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E. I, II, IV, V

29. In which seasons a lake most likely to have a homogeneous and balanced distribution of nutrients and O_2 along the entire lake? I. winter; II. Autumn; III. Summer; IV. spring, IV. both spring and summer
- A. IV
 - B. I, III
 - C. I, IV
 - D. II, III
 - E. II, IV
30. Which of the following is a problem faced by animals as they increase in size?
- A. decreasing surface-to-volume ratio
 - B. reproducing in aqueous environments
 - C. the tendency for larger bodies to be more variable in metabolic rate
 - D. A and B only
 - E. A, B, and C
31. Which of the following interactions can correctly be labeled coevolution?
- A. the tendency of coyotes to respond to human habitat encroachment by including pet dogs and cats in their diets
 - B. a genetic change in a virus that allows it to exploit a new host, which responds to virus-imposed selection by changing its genetically controlled habitat preferences
 - C. a genetic change in foxes that allows them to tolerate human presence (and food)
 - D. the adaptation of cockroaches to human habitation
 - E. the ability of rats to survive in a variety of novel environments
32. Some cyanobacteria produce potent neurotoxins that, if ingested, will kill humans. These cyanobacteria are most likely to contaminate:
- A. Waters rich in organic carbon wastes but poor in phosphate.
 - B. Waters that are anoxic.
 - C. Waters rich in phosphate wastes but poor in organic carbon.
 - D. Shellfish living in polluted waters.
 - E. C and D only.

(背面仍有題目,請繼續作答)

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33. We would be most likely to find an organism that is psychrophilic, anaerobic and obligately barophilic:
- A. In refrigerated vacuum-packed foods.
 - B. Near thermal vents in the deep sea.
 - C. In the deep sea but not near thermal vents.
 - D. In the thermocline layer of a stratified lake.
 - E. In a particle of surface soil.
34. The coliform test:
- A. Identifies water-borne pathogens.
 - B. Is sufficient to prove that water is safe to drink.
 - C. Reliably estimates the risk of pathogens in drinking water based on its content of coliform bacteria.
 - D. Reliably estimates the risk of pathogens in meat products based on their content of coliform bacteria.
 - E. All of the above.
35. The level of nitrate in drinking water has been rising over time. Which of the following contributes to this increase?
- A. Denitrifying bacteria.
 - B. Dumping of wastewater that has received secondary but not tertiary treatment.
 - C. The inhibitor of the nitrosifiers, nitrapyrin.
 - D. Nitrifying bacteria.
 - E. B and D only.
36. Cyanide binds with at least one of the molecules involved in the production of ATP. Following exposure of a cell to cyanide, most of the cyanide could be expected to be found within the
- A. mitochondria.
 - B. ribosomes.
 - C. Peroxisomes.
 - D. Lysosomes.
 - E. endoplasmic reticulum.
37. Which of the following factors would tend to increase membrane fluidity?
- A. a greater proportion of unsaturated phospholipids
 - B. a greater proportion of saturated phospholipids
 - C. a lower temperature
 - D. a relatively high protein content in the membrane
 - E. a greater proportion of relatively large glycolipids compared to lipids having smaller molecular masses

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38. Cell do not catabolize carbon dioxide because
- A. its double bonds are too stable to be broken.
 - B. CO_2 has fewer bonding electrons than other organic compounds.
 - C. CO_2 is already completely reduced.
 - D. CO_2 is already completely oxidized.
 - E. The molecule has too few atoms.
39. Consider this pathway: epinephrine \rightarrow G-protein-linked receptor \rightarrow G protein \rightarrow adenylyl cyclase \rightarrow cAMP. Identify the second messenger.
- A. cAMP
 - B. G protein
 - C. GTP
 - D. adenylyl cyclase
 - E. G-protein-linked receptor
40. In some organisms, mitosis occurs without cytokinesis occurring. This will result in
- A. cells with more than one nucleus.
 - B. cells that are unusually small.
 - C. cells lacking nuclei.
 - D. destruction of chromosomes.
 - E. cell cycles lacking an S phase.
41. The fact that plants can be cloned from somatic cells demonstrates that
- A. differentiated cells retain all the genes of zygote.
 - B. genes are lost during differentiation.
 - C. the differentiated state is normally very unstable.
 - D. differentiated cells contain masked mRNA.
 - E. differentiation does not occur in plants.
42. Which of the following statements is correct about protoplast fusion?
- A. It is used to develop gene banks to maintain genetic variability.
 - B. It is the method of test-tube cloning thousands of copies.
 - C. It can be used to form new plant species.
 - D. It occurs within a callus.
 - E. It requires that the cell wall remain intact during the fusion process.

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43. The transduction pathway that activates systemic acquired resistance in plants is initially signaled by
- A. antisense RNA
 - B. phytochrome
 - C. salicylic acid.
 - D. abscisic acid.
 - E. red light.
44. Which of the following is *not* true of micronutrients in plants?
- A. They are the essential elements of small size and molecular weight.
 - B. They are the elements required in relatively small amounts.
 - C. Overdoses of them can be toxic.
 - D. They are required for a plant to grow from a seed and complete its life cycle.
 - E. They generally help in catalytic functions in the plant.
45. Which of the following is *true* concerning the water potential of a plant cell?
- A. It is higher than that of air.
 - B. It becomes lower after the uptake of water by osmosis.
 - C. It becomes higher when K^+ is actively moved into the cell.
 - D. It is equal to 0.23 MPa.
 - E. It is equal to zero when the cell is in pure water and is turgid.
46. Which of the following conclusions does *not* follow from studying the absorption spectrum for chlorophyll *a* and the action spectrum for photosynthesis?
- A. There must be accessory pigments that broaden the spectrum of light that contributes to photosynthesis.
 - B. Chlorophyll *a* has two absorption peaks.
 - C. Chlorophyll owes its color to the absorption of green light.
 - D. Not all wavelengths are equally effective for photosynthesis.
 - E. The red and blue areas of the spectrum are most effective in driving photosynthesis.
47. With respect to angiosperms, which of the following is incorrectly paired with its chromosome count?
- A. egg cell- n
 - B. megaspore- $2n$
 - C. microspore- n
 - D. zygote- $2n$
 - E. sperm- n
48. Gymnosperms and angiosperms have the following in common except

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- A. seeds.
- B. pollen.
- C. vascular tissue.
- D. ovules.
- E. ovaries.

49. Which of the following is not common to all phyla of vascular plants?

- A. the development of seeds
- B. alternation of generations
- C. dominance of the diploid generation
- D. xylem and phloem
- E. the addition of lignin to cell walls

50. Which of the following is diploid?

- A. the archegonia of a liverwort
- B. a nonreproductive cell in the gametangia of a moss
- C. a cell that is part of the stalk (seta) of a moss sporophyte
- D. a spore produced by a fern sporophyte
- E. a subterranean gametophyte of a lycophyte