

系所組別：生命科學系甲乙丙組，生物多樣性研究所考試科目：普通生物學

考試日期：0307，節次：3

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答對一題得一分，答錯一題倒扣 0.25 分

- Research indicates that Ibuprofen, a drug used to relieve inflammation and pain, is a mixture of two enantiomers; that is, molecules that:
  - have identical three-dimensional shapes.
  - are mirror images of one another.
  - differ in the location of their double bonds.
  - differ in their electrical charge.
- A compound contains hydroxyl groups as its predominant functional group. Which of the following statements is *true* concerning this compound?
  - It lacks an asymmetric carbon, and it is probably a fat or lipid.
  - It should dissolve in a nonpolar solvent.
  - It should dissolve in water.
  - It is hydrophobic.
- Which of the following is *true* of both starch and cellulose?
  - They are both structural components of the plant cell wall.
  - They can both be digested by humans.
  - They are both used for energy storage in plants.
  - They are both polymers of glucose.
- What method did Frederick Sanger use to elucidate the structure of insulin?
  - analysis of amino acid sequence of small fragments
  - high-speed centrifugation
  - bioinformatics
  - X-ray crystallography
- Competitive inhibitors block the entry of substrate into the active site of an enzyme. On which of the following properties of an active site does this primarily depend?
  - the enzyme's ability to stretch reactants and move them toward a transition state
  - the enzyme providing an appropriate microenvironment conducive to a reaction's occurrence
  - the ability of an enzyme to form a template for holding and joining molecules
  - the enzyme becoming too saturated because of the concentration of substrate
- According to the induced fit hypothesis of enzyme catalysis, which of the following is *correct*?
  - The active site creates a microenvironment ideal for the reaction.
  - A competitive inhibitor can outcompete the substrate for the active site.
  - The binding of the substrate depends on the shape of the active site.
  - The binding of the substrate changes the shape of the enzyme's active site
- Mycoplasmas are bacteria that lack cell walls. On the basis of this structural feature, which statement concerning mycoplasmas should be true?
  - They lack a cell membrane as well.
  - They are subject to lysis in hypotonic conditions.
  - They undergo ready fossilization in sedimentary rock
  - They possess typical prokaryotic flagella.
- In a hypothetical situation, the genes for sex pilus construction and for tetracycline resistance are located together on the same plasmid within a particular bacterium. If this bacterium readily performs conjugation involving a copy of this plasmid, then the result should be
  - a transformed bacterium.

(背面仍有題目,請繼續作答)

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- B. the rapid spread of tetracycline resistance to other bacteria in that habitat.  
C. the subsequent loss of tetracycline resistance from this bacterium.  
D. the temporary possession by this bacterium of a completely diploid genome.
9. Plastids that are surrounded by more than two membranes are evidence of  
A. budding of the plastids from the nuclear envelope.  
B. origin of the plastids from archaea  
C. evolution from mitochondria.  
D. secondary endosymbiosis.
10. Which process results in genetic recombination, but is separate from the process wherein the population size of *Paramecium* increases?  
A. conjugation  
B. binary fission  
C. mitotic division  
D. budding
11. Which of the following is a major cause of the size limits for certain types of cells?  
A. the evolution of larger cells after the evolution of smaller cells  
B. the difference in plasma membranes between prokaryotes and eukaryotes  
C. the evolution of eukaryotes after the evolution of prokaryotes  
D. the need for a surface area of sufficient area to allow the cell's function
12. Recent evidence shows that individual chromosomes occupy fairly defined territories within the nucleus. Given the structure and location of the following parts of the nucleus, which would be more probably involved in chromosome location?  
A. nuclear pores  
B. the nucleolus  
C. the nuclear matrix  
D. the nuclear lamina
13. Which of the following is true of integral membrane proteins?  
A. They lack tertiary structure.  
B. They are loosely bound to the surface of the bilayer.  
C. They are usually transmembrane proteins.  
D. They are not mobile within the bilayer.
14. The sodium-potassium pump is called an electrogenic pump because it  
A. contributes to the membrane potential.  
B. pumps hydrogen ions out of the cell.  
C. pumps equal quantities of  $\text{Na}^+$  and  $\text{K}^+$  across the membrane.  
D. is used to drive the transport of other molecules against a concentration gradient.
15. Cellular respiration harvests the most chemical energy from which of the following?  
A. substrate-level phosphorylation  
B. chemiosmotic phosphorylation  
C. converting oxygen to ATP  
D. transferring electrons from organic molecules to pyruvate
16. Which of the following describes ubiquinone?  
A. a protein in the electron transport chain  
B. a small hydrophobic coenzyme  
C. a substrate for synthesis of FADH

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- D. a vitamin needed for efficient glycolysis
17. In the yeast signal transduction pathway, after both types of mating cells have released the mating factors and the factors have bound to specific receptors on the correct cells,
- binding induces changes in the cells that lead to cell fusion.
  - the cells then produce the  $\alpha$  factor and the  $a$  factor.
  - one cell nucleus binds the mating factors and produces a new nucleus in the opposite cell.
  - the cell membranes fall apart, releasing the mating factors that lead to new yeast cells.
18. Which is true of transcription factors?
- They regulate the synthesis of DNA in response to a signal.
  - Some transcribe ATP into cAMP.
  - They initiate the epinephrine response in animal cells.
  - They control which genes are expressed.
19. Regarding mitosis and cytokinesis, one difference between higher plants and animals is that in plants
- the spindles contain microfibrils in addition to microtubules, whereas animal spindles do not contain microfibrils.
  - sister chromatids are identical, but they differ from one another in animals.
  - a cell plate begins to form at telophase, whereas in animals a cleavage furrow is initiated at that stage.
  - chromosomes become attached to the spindle at prophase, whereas in animals chromosomes do not become attached until anaphase.
20. Density-dependent inhibition is explained by which of the following?
- As cells become more numerous, they begin to squeeze against each other, restricting their size and ability to produce control factors.
  - As cells become more numerous, the cell surface proteins of one cell contact the adjoining cells and they stop dividing.
  - As cells become more numerous, the protein kinases they produce begin to compete with each other, such that the proteins produced by one cell essentially cancel those produced by its neighbor.
  - As cells become more numerous, more and more of them enter the S phase of the cell cycle.
21. During interphase of the cell cycle, mitosis or meiosis,
- the nuclear membrane disappears
  - sister chromatids move to opposite poles
  - DNA recombines
  - DNA content essentially doubles
22. How many different kinds of gametes will be expected by an individual with the following genotype *PpCcTTRr*?
- 4
  - 6
  - 8
  - 10
23. Genes contain the instructions for building proteins. Where are those instructions located?
- in the bonds between complementary bases.
  - in the sugar and phosphate groups that are part of each nucleotide.
  - in the order of the DNA bases.

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D. in the nuclear membrane.

24. Which of the following properly pair the organic subset with the element that could be radioactively labelled to trace it?
- A. nucleotide; Nitrogen
  - B. nucleotide; Phosphorous
  - C. proteins; Hydrogen
  - D. proteins; Sulfur
25. In what cellular compartment are introns removed from pre-mRNA to make mature mRNA?
- A. cytoplasm
  - B. endoplasmic Reticulum
  - C. nucleus
  - D. golgi apparatus
26. In most prokaryotes and all eukaryotes, the first amino acid in any newly synthesized polypeptide is:
- A. tyrosine
  - B. phenylalanine
  - C. methionine
  - D. leucine
27. Which of the following is not involved in with the initiation of transcription of human genes?
- A. TATA binding proteins
  - B. DNA polymerase
  - C. RNA polymerase
  - D. activators
28. Which of the following mutations is more likely to produce a severe rather than mild phenotypic consequence(s)?
- A. nonsense mutations
  - B. synonymous mutations
  - C. missense mutations
  - D. neutral mutations
29. In a cross of two yeast strains of genotypes  $c^+ a^+ \times c a$  the progeny were 40  $c^+ a^+$ , 36  $c a$ , 11  $c^+ a$ , and 13  $c a^+$ . The frequency of recombination is
- A. 76%
  - B. 12%
  - C. 18%
  - D. 24%
30. 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. 0.24
  - B. 0.31
  - C. 0.50
  - D. 0.76
31. Suppose an experimenter becomes proficient with a technique that allows her to move DNA sequences within a prokaryotic genome. If she moves the operator to the far end of the operon (past the transacetylase gene), which of the following would likely occur when the cell is exposed to lactose?
- A. The structural genes will be transcribed continuously.
  - B. The repressor will no longer bind to the operator.

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- C. The operon will never be transcribed.  
D. The inducer will no longer bind to the repressor.
32. During DNA replication,  
A. methylation of the DNA is maintained because methylation enzymes act at DNA sites where one strand is already methylated and thus correctly methylates daughter strands after replication.  
B. all methylation of the DNA is lost at the first round of replication.  
C. DNA polymerase is blocked by methyl groups, and methylated regions of the genome are therefore left uncopied.  
D. methylation of the DNA is maintained because DNA polymerase directly incorporates methylated nucleotides into the new strand opposite any methylated nucleotides in the template.
33. Which of the following accounts for someone who has had a herpesvirus-mediated cold sore or genital sore getting flare-ups for the rest of life?  
A. copies of the herpesvirus genome permanently maintained in host cell cytoplasm  
B. co-infection with an unrelated virus that causes the same symptoms  
C. re-infection by the same herpesvirus strain  
D. copies of the herpesvirus genome permanently maintained in host nuclei
34. You isolate an infectious substance that is capable of causing disease in plants, but you do not know whether the infectious agent is a bacterium, virus, viroid, or prion. You have four methods at your disposal that you can use to analyze the substance in order to determine the nature of the infectious agent. If you already knew that the infectious agent was either bacterial or viral, which treatment would allow you to distinguish between these two possibilities?  
A. treating the substance with nucleases that destroy all nucleic acids and then determining whether it is still infectious  
B. filtering the substance to remove all elements smaller than what can be easily seen under a light microscope  
C. culturing the substance by itself on nutritive medium, away from any plant cells  
D. treating the sample with proteases that digest all proteins and then determining whether it is still infectious
35. What is the most logical sequence of steps for splicing foreign DNA into a plasmid and inserting the plasmid into a bacterium?  
I. Transform bacteria with recombinant DNA molecule.  
II. Cut the plasmid DNA using restriction enzymes.  
III. Extract plasmid DNA from bacterial cells.  
IV. Hydrogen-bond the plasmid DNA to nonplasmid DNA fragments.  
V. Use ligase to seal plasmid DNA to nonplasmid DNA.  
A. I, II, IV, III, V  
B. III, IV, V, I, II  
C. III, II, IV, V, I  
D. II, III, V, IV, I
36. Which of the following best describes the complete sequence of steps occurring during every cycle of PCR?  
1. The primers hybridize 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.

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- A. 1, 3, 2, 4  
 B. 2, 3, 4  
 C. 2, 1, 4  
 D. 3, 4, 1, 2
37. A person exposed to a new cold virus would not feel better for one to two weeks because
- A. specific B cells and T cells must be selected prior to a protective response.  
 B. it takes up to two weeks to stimulate immunologic memory cells.  
 C. no memory cells can be called upon, so adequate response is slow.  
 D. V-J gene rearrangement must occur prior to a response.
38. An otherwise healthy student in your class is infected with EBV, the virus that causes infectious mononucleosis. The same student had already been infected when she was a child, and she had merely experienced a mild sore throat and swollen lymph nodes in her neck. This time, though infected, she does not get sick. The EBV antigen fragments will be presented by the virus-infected cells along with which of the following?
- A. class I MHC molecules  
 B. Dendritic cells  
 C. complement  
 D. class II MHC molecules
39. Which of the following is NOT a paradigm of Darwinism?
- A. Gradualism  
 B. Use and disuse  
 C. Natural selection  
 D. Descent with modification
40. Which of the following is Lamarck's theory?
- A. Inheritance of acquired characteristics  
 B. Natural selection  
 C. Genetic drift  
 D. Great chain of being
41. In a population of 1,000 individuals, at a locus with two alleles of A and a, the numbers of genotypes AA, Aa, and aa are 360, 240, and 400, respectively. What is frequency of A?
- A. 0.52  
 B. 0.60  
 C. 0.48  
 D. 0.18
42. Which evolutionary force would maintain the allele for sickle-cell anemia in a tropical area with malaria infection?
- A. Genetic drift  
 B. Survival of the fittest  
 C. Migration  
 D. Balancing selection
43. Which of the following will reduce the genetic variation within a population?
- A. Bottleneck effect  
 B. Migration  
 C. Dissortative mating

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- D. Mutation
44. A group of all offspring from a common ancestor is called
- Paraphyletic group
  - Polyphyletic group
  - Monophyletic group
  - Hybrid
45. Which speciation mode does not allow gene flow between populations isolated by geographical barriers?
- Sympatric speciation
  - Parapatric speciation
  - Reticulation
  - Allopatric speciation
46. Which of the following will favor variants at both ends of the distribution of a character?
- Stabalizing selection
  - Disruptive selection
  - Directional selection
  - Balancing selection
47. Which of the following statements best describes the relationship between photosynthesis and respiration?
- Photosynthesis stores energy in complex organic molecules, while respiration releases it.
  - ATP molecules are produced in photosynthesis and used up in respiration.
  - Respiration is the reversal of the biochemical pathways of photosynthesis.
  - Photosynthesis occurs only in plants and respiration occurs only in animals.
48. Carotenoids are often found in foods that are considered to have antioxidant properties in human nutrition. What related function do they have in plants?
- They dissipate excessive light energy.
  - They serve as accessory pigments.
  - They take up toxins from the water.
  - They reflect orange light.
49. What is the role of proton pumps in root hair cells?
- eliminate excess electrons
  - pressurize xylem transport
  - acquire minerals from the soil
  - establish ATP gradients
50. In which plant cell or tissue would the pressure component of water potential most often be negative?
- root epidermis
  - root cortex cell
  - leaf mesophyll cell
  - stem xylem
51. Among important crop plants, nitrogen-fixing root nodules are most commonly an attribute of
- members of the potato family.
  - legumes.
  - cabbage and other members of the brassica family.
  - wheat.
52. What is the function of a root nodule's leghemoglobin?
- regulate the supply of oxygen to Rhizobium.

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- B. supply the legume with fixed nitrogen.  
C. promote ion exchange in the soil.  
D. form a mutualistic relationship with insects.
53. In plants, which of the following could be an advantage of sexual reproduction as opposed to asexual reproduction?  
A. rapid population increase  
B. mitosis  
C. genetic variation  
D. stable populations
54. Which of the following statements is true of protoplast fusion?  
A. It can be used to form new plant varieties by combining genomes from two plants.  
B. It is the method of test-tube cloning that produces whole plants from explants.  
C. It occurs when the second sperm nucleus fuses with the polar nuclei in the embryo sac.  
D. It occurs within a callus that is developing in tissue culture.
55. Ethylene, as an example of a plant hormone, may have multiple effects on a plant, depending on all of the following except the  
A. concentration of ethylene.  
B. altered chemical structure of ethylene from a gas to a liquid.  
C. developmental stage of the plant.  
D. site of action within the plant.
56. Biological clocks cause organisms to perform daily activities on a regular basis. Which of the following is a false statement about this kind of "circadian rhythm"?  
A. Once set, it is independent of external signals.  
B. It may have the same signal transduction pathway in all organisms.  
C. The exact mechanism of biological clocks remains unknown.  
D. It must be reset on a daily basis.
57. In which of the following taxa does the mature sporophyte depend completely on the gametophyte for nutrition?  
A. angiosperm plant  
B. gymnosperm plant  
C. fern  
D. bryophyte
58. Which event during the evolution of land plants probably made the synthesis of secondary compounds most beneficial?  
A. the association of the roots of land plants with fungi  
B. the rise of herbivory  
C. the greenhouse effect present throughout the Devonian period  
D. the reverse-greenhouse effect during the Carboniferous period
59. In addition to seeds, which of the following characteristics are unique to the seed-producing plants?  
A. lignin present in cell walls  
B. sporopollenin  
C. pollen  
D. use of air currents as a dispersal agent
60. Angiosperm double fertilization is so-called because it features the formation of  
A. one embryo from one egg fertilized by two sperm cells.



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- B. one embryo from two eggs fertilized by a single sperm cell.  
C. one embryo involving one sperm cell and of endosperm involving a second sperm cell.  
D. two embryos from two sperm cells and two eggs.
61. The intimate, mutually beneficial association formed between a fungus and the root of a plant is called a(n)  
A. ingrowth.  
B. parasitic infection.  
C. root nodule.  
D. mycorrhiza.
62. Both fungus-derived antibiotics and hallucinogens used by humans probably evolved in fungi as a means to  
A. reduce competition for nutrients.  
B. promote their ingestion of foodstuffs.  
C. eliminate other fungi.  
D. discourage animal predators.
63. "Totipotency" is a term used to describe the ability of a cell to give rise to a complete new organism. In plants, this means that  
A. the cells of shoots and the cells of roots have different genes.  
B. cell differentiation depends largely on the control of gene expression.  
C. a cell's environment has no effect on its differentiation.  
D. sexual reproduction is not necessary in plants.
64. What would be a plant adaptation that increases exposure of a plant to light in a dense forest?  
A. apical dominance  
B. closing of the stomata  
C. intercalary meristems  
D. lateral buds
65. Which of the following is considered an essential nutrient in the human diet?  
A. Pepsin  
B. fat  
C. vitamin A  
D. glucose
66. Which are the relation between food and breathing passage during swallowing reflex  
A. Larynx down epiglottis down  
B. Larynx down epiglottis up  
C. Larynx up epiglottis up  
D. Larynx up epiglottis down
67. Which of the following sea creatures might be described as a pelagic animal of the aphotic zone?  
A. Coral reef fish  
B. giant clam near a deep-sea  
C. intertidal snail  
D. harbor seal
68. The most complex and diverse biome  
A. Savanna  
B. temperate forest  
C. tundra

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- D. tropical rain forest
69. Which of the following represents a demographic transition?
- A population switches from high birth and death rates to low birth and death rate
  - a population switches from exponential to logistic growth
  - a population reaches zero population growth when the birth rate drops to zero
  - there are equal number of individuals in all age-groups
70. What is not the parameter of life table?
- Number living at the stage of age
  - mortality during interval
  - birth rate during interval
  - evolution rate of history
71. A bat locates insect prey in the dark by bouncing high-pitched sounds off them. One species of moth escapes predation by diving to the ground when it hears "sonar" of a particular bat species. This illustrates-----between the bat and moth.
- Commensalism
  - Coevolution
  - ecological succession
  - competitive exclusion
72. which is not the nutrition cycle
- nitrogen-fixation
  - eutrophication
  - photosynthesis
  - nitrifying
73. After a sperm penetrates an egg, the fertilization membrane
- secretes important hormones
  - enables the fertilized egg to implant in the wall of the uterus
  - prevents more than one sperm from entering egg
  - attracts additional sperm to the egg
74. How does a zygote differ from an ovum?
- A zygote has more chromosomes.
  - A zygote is smaller.
  - A zygote consists of more than one cell.
  - A zygote divides by meiosis.
75. A woman had several miscarriages. Her doctor suspected that a hormonal insufficiency was causing the lining of the uterus to break down, as it does during menstruation, terminating her pregnancies. Treatment with which of the following might help her remain pregnant?
- oxytocin
  - follicle-stimulating hormone
  - testosterone
  - luteinizing hormone
76. Which of the following controls the activity of all the others?
- thyroid
  - pituitary gland
  - adrenal cortex
  - Ovaries

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77. Countercurrent exchange in the gills of a fish
- speeds up the flow of water through the gills
  - maintains a gradient that enhances diffusion
  - enables the fish to obtain oxygen while swimming backward
  - means that blood and water flow in the same direction
78. Which of the following sequences correctly traces the passage of food through the human digestive tract?
- pharynx, esophagus, stomach, small intestine, large intestine
  - esophagus, stomach, small intestine, large intestine, pharynx
  - pharynx, stomach, small intestine, large intestine, esophagus
  - esophagus, pharynx, stomach, small intestine, large intestine
79. Which of the following enzymes has the lowest pH optimum?
- salivary amylase
  - trypsin
  - pepsin
  - pancreatic lipase
80. Trypsinogen, a pancreatic zymogen secreted into the duodenum, can be activated by
- chymotrypsin
  - secretin
  - Pepsin
  - Enterokinase
81. The maximum volume of air you can forcefully exhale after taking the deepest possible breath is called
- tidal volume
  - residual volume
  - alveolar volume
  - vital volume
82. Which of the following reactions prevails in red blood cells traveling through pulmonary capillaries?
- $\text{Hb} + 4\text{O}_2 \rightarrow \text{Hb}(\text{O}_2)_4$
  - $\text{Hb}(\text{O}_2)_4 \rightarrow \text{Hb} + 4\text{O}_2$
  - $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$
  - $\text{H}_2\text{CO}_3 \rightarrow \text{H}^+ + \text{HCO}_3^-$
83. The direct function of GnRH is to
- stimulate production of estrogen and progesterone
  - Initiate ovulation
  - Inhibit secretion of pituitary hormones
  - stimulate secretion of LH and FSH
84. African lungfish, which are often found in small stagnant pools of fresh water, produce urea as a nitrogenous waste. What is the advantage of this adaptation?
- Urea takes less energy to synthesize than ammonia.
  - Small stagnant pools do not provide enough water to dilute the toxic ammonia.
  - Urea forms an insoluble precipitate.
  - Urea makes lungfish tissue hypoosmotic to the pool.
85. The "threshold" potential of a membrane
- is the point of separation from a living from a dead neuron.
  - is the lowest frequency of action potentials a neuron can produce.

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- C. is the minimum hyperpolarization needed to prevent the occurrence of action potentials.  
D. is the minimum depolarization needed to operate the voltage-gated sodium and potassium channels.
86. Saltatory conduction is a term applied to conduction of impulses
- across electrical synapses.
  - an action potential that skips the axon hillock in moving from the dendritic region to the axon terminal.
  - jumping from one neuron to an adjacent neuron.
  - jumping from one node of Ranvier to the next in a myelinated neuron.
87. Which of the following is correct about the telencephalon region of the brain?
- It develops as the neural tube differentiates.
  - It develops from the midbrain.
  - It is the brain region most like that of ancestral vertebrates.
  - It gives rise to the cerebrum.
88. When Phineas Gage had a metal rod driven into his frontal lobe or when someone had a frontal lobotomy, which of the following occurred?
- They could no longer reason.
  - They lost short-term memory.
  - They had different emotional responses.
  - They lost long-term memory.
89. Which of the following terms is correctly described?
- Benthic zone: in a lake, the well-lit, open surface water farther from shore.
  - Littoral zone: in a lake, the shallow, well-lit water close to shore.
  - Intertidal zone: open water at the edge of the continental shelf.
  - None of above.
90. Which statement about dispersal is correct?
- Dispersal occurs only on an evolutionary time scale
  - No plants depend on animals for their seed dispersal
  - The ability to disperse can not limit the geographic distribution of a species
  - Dispersal is a common component of the life cycles of plants and animals.
91. A mother bird is gathering food for her chicks, constrained by the fact that she can not leave her chicks for more than 15 minutes. There are five plots with different conditions listed in the table below for her to choose. If everything else being equal, according to Optimal foraging theory, which plot will you predict this mother bird will go for foraging?

| Plot | Time for travelling(min) | # of prey / m <sup>2</sup> | chance of being eaten |
|------|--------------------------|----------------------------|-----------------------|
| 1    | 5                        | 10                         | 0.1                   |
| 2    | 5                        | 15                         | 0.1                   |
| 3    | 10                       | 20                         | 0.2                   |
| 4    | 10                       | 25                         | 0.2                   |

- Plot 1.
- Plot 2.
- Plot 3.
- Plot 4.

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92. The diversity and complexity of bird songs may be associated with
- where a bird is distributed,
  - how old a bird is,
  - its reproductive success,
  - All of above
93. Which of the following population-limiting factors is independent of population density?
- Disease.
  - Predation.
  - Catastrophe.
  - Aggressive interaction.
94. In the logistic model of population growth, how carrying capacity ( $K$ ) and population size ( $N$ ) can influence growth rate ( $dN/dt$ ) of a population?
- as  $N$  approaches  $K$ ,  $dN/dt$  approaches zero.
  - as  $N$  approaches  $K$ , the birth rate approaches zero.
  - as  $N$  approaches  $K$ , the death rate approaches zero.
  - as  $N$  approaches  $K$ , the intrinsic rate of increase approaches zero.
95. Which of the following characterizes relatively  $K$ -selected populations?
- offspring with good chances of survival
  - many offspring per reproductive episode
  - a high intrinsic rate of increase
  - early parental reproduction
96. Which of the following aspects of an organism's life is *least* relevant to its life history?
- frequency of dispersal
  - age at which it first reproduces
  - frequency of reproduction
  - number of offspring per reproductive bout
97. With a few exceptions, most of the food chains studied by ecologists have a maximum of how many links?
- 2
  - 3
  - 5
  - 10
98. According to the nonequilibrium model,
- communities will remain in a state of equilibrium in the absence of human activities.
  - communities are assemblages of closely linked species that function as tightly integrated units.
  - interspecific interactions induce changes in community composition over time.
  - communities are constantly changing because of disturbances.
99. For most terrestrial ecosystems, pyramids of numbers, biomass, and energy are essentially the same—they have a broad base and a narrow top. The primary reason for this pattern is that
- secondary consumers and top carnivores require less energy than producers.
  - at each step, energy is lost from the system as a result of keeping the organisms alive.
  - as matter passes through ecosystems, some of it is lost to the environment.
  - biomagnification of toxic materials limits the secondary consumers and top carnivores.

(背面仍有題目,請繼續作答)

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考試日期：0307，節次：3

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100. How does phosphorus normally enter the atmosphere?

- A. photosynthesis
- B. rock weathering
- C. geological uplifting (subduction and vulcanism)
- D. It does not enter the atmosphere in biologically significant amounts.