

亞洲大學

107 學年度學士後獸醫學系招生考試試題紙

學系別	考試科目	考試日期	時 間
學士後獸醫學系	生物學(含動物學、植物學)	107.04.21	15:30-17:00

- Which of the following sequences represents the hierarchy of biological organization from the least to the most complex level?
 - organelle, tissue, biosphere, ecosystem, population, organism
 - cell, community, population, organ system, molecule, organelle
 - organism, community, biosphere, molecule, tissue, organ
 - molecule, cell, organ system, population, ecosystem, biosphere
- The main source of energy for producers in an ecosystem is
 - light energy
 - kinetic energy
 - chemical energy
 - ATP
- Which of the following ionizes completely in solution and is considered to be a strong acid?
 - NaOH
 - HCl
 - NH₃
 - H₂CO₃
- Which of the following polymers contain nitrogen?
 - starch
 - glycogen
 - cellulose
 - chitin
- Which structure is the site of the synthesis of proteins that may be exported from the cell?
 - rough ER
 - lysosomes
 - plasmodesmata
 - Golgi vesicles
- Which of the following is true of integral membrane proteins?
 - They lack tertiary structure
 - They are loosely bound to the surface of the bilayer
 - They are usually transmembrane proteins
 - They are not mobile within the bilayer
- An animal cell lacking oligosaccharides on the external surface of its plasma membrane would likely be impaired in which function?
 - transporting ions against an electrochemical gradient
 - cell-cell recognition
 - maintaining fluidity of the phospholipid bilayer
 - attaching to the cytoskeleton
- Which of the following is most similar in structure to ATP?
 - an anabolic steroid
 - a DNA helix
 - an RNA nucleotide
 - an amino acid with three phosphate groups attached

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9. What are the end products of glycolysis?
 - A. CO₂ and H₂O
 - B. CO₂ and pyruvate
 - C. NADH and pyruvate
 - D. CO₂ and NADH

10. How does pyruvate enter the mitochondrion?
 - A. active transport
 - B. diffusion
 - C. facilitated diffusion
 - D. through a channel

11. Muscle cells, when an individual is exercising heavily and when the muscle becomes oxygen deprived, convert pyruvate to lactate. What happens to the lactate in skeletal muscle cells?
 - A. It is converted to NAD⁺
 - B. It produces CO₂ and water
 - C. It is taken to the liver and converted back to pyruvate
 - D. It is converted to alcohol

12. Synaptic signaling between adjacent neurons is like hormone signaling in which of the following ways?
 - A. It sends its signal molecules through the blood
 - B. It sends its signal molecules quite a distance
 - C. It requires calcium ions
 - D. It requires binding of a signaling molecule to a receptor

13. If a pharmaceutical company wished to design a drug to maintain low blood sugar levels, one approach might be to
 - A. design a compound that mimics epinephrine and can bind to the epinephrine receptor
 - B. design a compound that stimulates cAMP production in liver cells
 - C. design a compound to stimulate G protein activity in liver cells
 - D. design a compound that increases phosphodiesterase activity

14. Caffeine is an inhibitor of phosphodiesterase. Therefore, the cells of a person who has recently consumed coffee would have increased levels of
 - A. phosphorylated proteins
 - B. GTP
 - C. cAMP
 - D. adenylyl cyclase

15. What is a chromatid?
 - A. a chromosome in G₁ of the cell cycle
 - B. a replicate chromosome
 - C. a chromosome found outside the nucleus
 - D. a special region that holds two centromeres together

16. Starting with a fertilized egg (zygote), a series of five cell divisions would produce an early embryo with how many cells?
 - A. 4
 - B. 8
 - C. 16
 - D. 32

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17. If there are 20 chromatids in a cell at metaphase, how many chromosomes are there in each daughter cell following cytokinesis?

A. 10
B. 20
C. 30
D. 40

18. Which of the following occurs in meiosis but not in mitosis?

A. Chromosome replication
B. Synapsis of chromosomes
C. Production of daughter cells
D. Alignment of chromosomes at the equator

19. Homologous chromosomes synapse and crossing over occurs

A. The statement is true for mitosis only
B. The statement is true for meiosis I only
C. The statement is true for meiosis II only
D. The statement is true for mitosis and meiosis I

20. Which of the following happens at the conclusion of meiosis I?

A. Homologous chromosomes are separated
B. The chromosome number per cell is conserved
C. Sister chromatids are separated
D. Four daughter cells are formed

21. In certain plants, tall is dominant to short. If a heterozygous plant is crossed with a homozygous tall plant, what is the probability that the offspring will be short?

A. 1
B. 1/2
C. 1/4
D. 1/6

22. In a cross $AaBbCc \times AaBbCc$, what is the probability of producing the genotype $AABBCC$?

A. 1/8
B. 1/16
C. 1/32
D. 1/64

23. Mendel was able to draw his ideas of segregation and independent assortment because of the influence of which of the following?

A. The understanding of particulate inheritance he learned from renowned scientists of his time
B. His discussions of heredity with his colleagues at major universities
C. His reading of the scientific literature current in the field
D. His experiments with the breeding of plants such as peas

24. Skin color in a certain species of fish is inherited via a single gene with four different alleles. How many different types of gametes would be possible in this system?

A. 1
B. 2
C. 4
D. 8

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25. Calico cats are female because

- A. a male inherits only one of the two X-linked genes controlling hair color
- B. the males die during embryonic development
- C. the Y chromosome has a gene blocking orange coloration
- D. only females can have Barr bodies

26. If a human interphase nucleus contains three Barr bodies, it can be assumed that the person

- A. has hemophilia
- B. is a male
- C. has four X chromosomes
- D. has Turner syndrome

27. A cell that has $2n + 1$ chromosomes is

- A. trisomic
- B. monosomic
- C. euploid
- D. polyploid

28. In trying to determine whether DNA or protein is the genetic material, Hershey and Chase made use of which of the following facts?

- A. DNA contains sulfur, whereas protein does not
- B. DNA contains phosphorus, but protein does not
- C. DNA contains nitrogen, whereas protein does not
- D. DNA contains purines, whereas protein includes pyrimidines

29. Which enzyme catalyzes the elongation of a DNA strand in the $5' \rightarrow 3'$ direction?

- A. primase
- B. DNA ligase
- C. DNA polymerase III
- D. topoisomerase

30. Which component is *not* directly involved in translation?

- A. mRNA
- B. DNA
- C. tRNA
- D. ribosomes

31. Which of the following is *not* true of RNA processing?

- A. Exons are cut out before mRNA leaves the nucleus
- B. Nucleotides may be added at both ends of the RNA
- C. Ribozymes may function in RNA splicing.
- D. RNA splicing can be catalyzed by spliceosomes

32. Sickle-cell disease is probably the result of which kind of mutation?

- A. point
- B. frameshift
- C. nonsense
- D. nondisjunction

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33. What are polyribosomes?

- A. groups of ribosomes reading a single mRNA simultaneously
- B. ribosomes containing more than two subunits
- C. multiple copies of ribosomes associated with giant chromosomes
- D. aggregations of vesicles containing ribosomal RNA

34. The role of a metabolite that controls a repressible operon is to

- A. bind to the promoter region and decrease the affinity of RNA polymerase for the promoter
- B. bind to the promoter region and decrease the affinity of RNA polymerase for the promoter
- C. increase the production of inactive repressor proteins
- D. bind to the repressor protein and activate it

35. Genomic imprinting, DNA methylation, and histone acetylation are all examples of

- A. genetic mutation
- B. chromosomal rearrangements
- C. karyotypes
- D. epigenetic phenomena

36. In both eukaryotes and prokaryotes, gene expression is primarily regulated at the level of

- A. transcription
- B. translation
- C. mRNA stability
- D. mRNA splicing

37. The host range of a virus is determined by

- A. the proteins on its surface and that of the host
- B. whether its nucleic acid is DNA or RNA
- C. the proteins in the host's cytoplasm
- D. the enzymes produced by the virus before it infects the cell

38. What is the function of reverse transcriptase in retroviruses?

- A. It hydrolyzes the host cell's DNA
- B. It uses viral RNA as a template for DNA synthesis
- C. It converts host cell RNA into viral DNA
- D. It translates viral RNA into proteins

39. What are prions?

- A. misfolded versions of normal brain protein
- B. tiny molecules of RNA that infect plants
- C. viral DNA that has had to attach itself to the host genome
- D. viruses that invade bacteria

40. What is the name given to viruses that are single-stranded RNA that acts as a template for DNA synthesis?

- A. retroviruses
- B. proviruses
- C. viroids
- D. bacteriophages

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<p>41. What is the enzymatic function of restriction enzymes?</p> <p>A. to add new nucleotides to the growing strand of DNA</p> <p>B. to join nucleotides during replication</p> <p>C. to join nucleotides during transcription</p> <p>D. to cleave nucleic acids at specific sites</p> <p>42. Bacteria containing recombinant plasmids are often identified by which process?</p> <p>A. examining the cells with an electron microscope</p> <p>B. using radioactive tracers to locate the plasmids</p> <p>C. exposing the bacteria to an antibiotic that kills cells lacking the resistant plasmid</p> <p>D. removing the DNA of all cells in a culture to see which cells have plasmids</p> <p>43. A gene that contains introns can be made shorter (but remain functional) for genetic engineering purposes by using</p> <p>A. RNA polymerase to transcribe the gene</p> <p>B. a restriction enzyme to cut the gene into shorter pieces</p> <p>C. reverse transcriptase to reconstruct the gene from its mRNA</p> <p>D. DNA polymerase to reconstruct the gene from its polypeptide product</p> <p>44. The first cell whose entire genome was sequenced was which of the following?</p> <p>A. <i>H. influenzae</i> in 1995</p> <p>B. <i>H. sapiens</i> in 2001</p> <p>C. rice in 1955</p> <p>D. tobacco mosaic virus</p> <p>45. Which of the following is a representation of gene density?</p> <p>A. Humans have 2,900 Mb per genome</p> <p>B. <i>C. elegans</i> has ~20,000 genes</p> <p>C. Humans have ~25,000 genes in 2,900 Mb</p> <p>D. Humans have 27,000 bp in introns</p> <p>46. Why might the cricket genome have 11 times as many base pairs than that of <i>Drosophila melanogaster</i>?</p> <p>A. The two insect species evolved at very different geologic eras</p> <p>B. Crickets have higher gene density</p> <p>C. <i>Drosophila</i> are more complex organisms</p> <p>D. Crickets must have more non-coding DNA</p> <p>47. Several of the different globin genes are expressed in humans, but at different times in development. What mechanism could allow for this?</p> <p>A. exon shuffling</p> <p>B. intron activation</p> <p>C. pseudogene activation</p> <p>D. differential gene regulation over time</p> <p>48. In Darwin's thinking, the more closely related two different organisms are, the</p> <p>A. more similar their habitats are</p> <p>B. less similar their DNA sequences are</p> <p>C. more recently they shared a common ancestor</p> <p>D. less likely they are to have the same genes in common</p>			

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49. Of the following anatomical structures, which is homologous to the wing of a bird?

- Dorsal fin of a shark
- Wing of a butterfly
- Tail fin of a flying fish
- Flipper of a cetacean

50. Each of the following has a better chance of influencing gene frequencies in small populations than in large populations, but which one most consistently requires a small population as a precondition for its occurrence?

- Mutation
- Non-random mating
- Genetic drift
- Natural selection

51. Which free-living cells were the earliest contributors to the formation of Earth's oxidizing atmosphere?

- cyanobacteria
- chloroplasts
- mitochondria
- seaweeds

52. The scientific *discipline* concerned with naming organisms is called

- taxonomy
- cladistics
- binomial nomenclature
- systematics

53. Which of the following are responsible for high levels of O₂ in Earth's atmosphere?

- photoautotrophs
- photoheterotrophs
- chemoautotrophs
- chemoheterotrophs that perform decomposition

54. What is the primary ecological role of prokaryotes?

- parasitizing eukaryotes, thus causing diseases
- breaking down organic matter
- metabolizing materials in extreme environments
- adding methane to the atmosphere

55. Which group includes members that are important primary producers in ocean food webs, causes red tides that kill many fish, and may even be carnivorous?

- apicomplexans
- dinoflagellates
- brown algae
- golden algae

56. Which of the following is a secondary compound of embryophytes?

- adenosine triphosphate
- alkaloids
- GDP
- Bryophyta

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57. What is the correct sequence of the following four events during an animal's development?

- A. 4 → 3 → 2 → 1
- B. 4 → 3 → 1 → 2
- C. 3 → 4 → 1 → 2
- D. heterotrophy

58. A terrestrial mollusc without a shell belongs to which class?

- A. chitons
- B. bivalves
- C. gastropods
- D. cephalopods

59. The ray-finned fishes are characterized by

- A. a bony endoskeleton, operculum, and usually a swim bladder
- B. a cartilaginous endoskeleton
- C. an amniotic egg
- D. teeth that are replaced regularly

60. The opening of stomata is thought to involve

- A. an increase in the osmotic concentration of the guard cells
- B. a decrease in the osmotic concentration of the stoma
- C. active transport of water out of the guard cells
- D. decreased turgor pressure in guard cells

61. What should be added to soil to prevent minerals from leaching away?

- A. humus
- B. sand
- C. mycorrhizae
- D. nitrogen

62. Which of the following essential nutrients plays an essential role in the opening and closing of the stomatal aperture?

- A. Fe
- B. Bo
- C. Mg
- D. K

63. All of the following are primary functions of flowers *except*

- A. pollen production
- B. photosynthesis
- C. meiosis
- D. sexual reproduction

64. The plant hormone involved in aging and ripening of fruit is

- A. auxin
- B. ethylene
- C. florigen
- D. abscisic acid

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65. Interstitial fluid

- A. is the fluid inside the gastrovascular cavity of *Hydra*
- B. is the internal environment found inside an animal's cells
- C. is composed of blood
- D. provides for the exchange of materials between blood and body cells

66. An example of a connective tissue is the

- A. skin
- B. nerves
- C. blood
- D. smooth muscles

67. The mammalian trachea and esophagus both connect to the

- A. large intestine.
- B. stomach
- C. pharynx
- D. epiglottis

68. In which of the following would you expect to find an enlarged cecum?

- A. rabbits, horses, and herbivorous bears
- B. carnivorous animals
- C. tubeworms that digest via symbionts
- D. humans and other primates

69. Which of the following would be described as a portal system?

- A. an area connecting arterioles to venules
- B. a space within or between organs where blood is allowed to pool
- C. a slightly muscular vessel that has minimal pumping action in an organism with no heart
- D. a vessel or vessels connecting two capillary beds

70. Which of the following are the only vertebrates in which blood flows directly from respiratory organs to body tissues without first returning to the heart?

- A. amphibians
- B. birds
- C. fishes
- D. mammals

71. How do antibodies of the different classes IgM, IgG, IgA, IgD, and IgE differ from each other ?

- A. in the way they are produced
- B. in their heavy chain structure
- C. in the type of cell that produces them
- D. by the antigenic determinants that they recognize

72. Which of the following are T cells of the immune system?

- A. CD4, CD8, and plasma cells
- B. cytotoxic and helper cells
- C. plasma, antigen-presenting, and memory cells
- D. lymphocytes, macrophages, and dendritic cells

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<p>73. The advantage of excreting wastes as urea rather than as ammonia is that</p> <p>A. urea can be exchanged for Na⁺</p> <p>B. urea is less toxic than ammonia</p> <p>C. urea requires more water for excretion than ammonia</p> <p>D. urea does not affect the osmolar gradient</p> <p>74. What is the main nitrogenous waste excreted by birds?</p> <p>A. ammonia</p> <p>B. nitrate</p> <p>C. nitrite</p> <p>D. uric acid</p> <p>75. Which of the following does not represent a chemical signal?</p> <p>A. movement of a signal from one end of a nerve to the other end of the nerve</p> <p>B. movement of a signal from one nerve to the next</p> <p>C. an immune cell releasing a cytokine</p> <p>D. a chemical released that affects the cell that releases it</p> <p>76. The hypothalamus controls the anterior pituitary by means of</p> <p>A. releasing hormones</p> <p>B. second messengers</p> <p>C. third messengers</p> <p>D. antibodies</p> <p>77. Internal and external fertilization both</p> <p>A. produce zygotes</p> <p>B. occur only among invertebrates</p> <p>C. occur only among terrestrial animals</p> <p>D. depend on the use of intromittent copulatory organs</p> <p>78. Females of many insect species, including honeybee queens, can store gametes shed by their mating partners in</p> <p>A. their nests</p> <p>B. the abdominal tract</p> <p>C. the cloaca</p> <p>D. the spermatheca</p> <p>79. Contact of a sperm with signal molecules in the coat of an egg causes the sperm to undergo</p> <p>A. mitosis</p> <p>B. depolarization</p> <p>C. apoptosis</p> <p>D. the acrosomal reaction</p> <p>80. Meroblastic cleavage occurs in</p> <p>A. sea urchins</p> <p>B. humans</p> <p>C. birds</p> <p>D. fish</p>			

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