

亞洲大學

108 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)	108.04.27	15:30-17:00

- Genetic engineering is being used by the pharmaceutical industry. Which of the following is not currently one of the uses?
 - production of human insulin.
 - production of human growth hormone.
 - production of tissue plasminogen activator.
 - creation of products that will remove poisons from the human body.
- Genetically engineered plants
 - are more difficult to engineer than animals.
 - include a transgenic rice plant that can help prevent are more difficult to engineer than animals t vitamin A deficiency.
 - are being rapidly developed, but traditional plant breeding programs are still the only method used to develop new plants.
 - are able to fix nitrogen themselves
- Expression of a cloned eukaryotic gene in a bacterial cell involves many challenges. The use of mRNA and reverse transcriptase is part of a strategy to solve the problem of
 - post-transcriptional processing.
 - electroporation.
 - post-translational processing.
 - nucleic acid hybridization
- Bioinformatics can be used to scan sequences for probable genes looking for start and stop sites for transcription and for translation, for probable splice sites, and for sequences known to be found in other known genes. Such sequences containing these elements are called
 - expressed sequence tag.
 - cDNA.
 - multigene families.
 - proteomes
- What does the field often called "evo-devo" study?
 - whether or not development is an evolutionary process.
 - how developmental processes have evolved.
 - whether or not all animals have developmental regulation.
 - whether the pattern of human development evolved early or late
- Which of the following has the largest genome and the fewest genes per million base pairs?
 - Haemophilus influenzae (bacterium).
 - Saccharomyces cerevisiae (yeast).
 - Drosophila melanogaster (fruit fly).
 - Homo sapiens (human)
- Natural selection is based on all of the following *except*
 - genetic variation exists within populations.
 - the best-adapted individuals tend to leave the most offspring.
 - populations tend to produce more individuals than the environment can support.
 - individuals adapt to their environments and, thereby, evolve

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8. Evolutionary trees such as this are properly understood by scientists to be
- A. theories.
 - B. hypotheses.
 - C. laws
 - D. facts
9. Which of the following pairs of structures is *least* likely to represent homology?
- A. The wings of a bat and the arms of a human.
 - B. The hemoglobin of a baboon and that of a gorilla.
 - C. The wings of a bird and those of an insect
 - D. The brain of a cat and that of a dog
10. Fossil evidence indicates that horses have gradually increased in size over geologic time. Which of the following terms best describes this?
- A. artificial selection.
 - B. directional selection.
 - C. stabilizing selection
 - D. disruptive selection
11. A rapid method of speciation that has been important in the history of flowering plants is
- A. genetic drift.
 - B. a mutation in the gene controlling the timing of flowering.
 - C. behavioral isolation
 - D. polyploidy
12. A taxon, all of whose members have the same common ancestor, is
- A. paraphyletic..
 - B. polyphyletic.
 - C. monophyletic
 - D. none of all
13. Which of the following is an important source of endotoxin in gram-negative species?
- A. endospore.
 - B. sex pilus.
 - C. flagellum
 - D. cell wall
14. Which of the following use light energy to synthesize organic compounds from CO₂?
- A. photoautotrophs.
 - B. photoheterotrophs.
 - C. chemoautotrophs
 - D. parasitic chemoheterotrophs

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15. Which of these statements about dinoflagellates is *false*?
- They possess two flagella.
 - Some cause red tides.
 - Their walls are composed of cellulose plates
 - Their dead cells accumulate on the seafloor, and are mined to serve as a filtering material
16. Plant spores are produced directly by
- sporophytes.
 - gametes.
 - gametophytes
 - gametangia
17. Which of the following most closely represents the male gametophyte of seed-bearing plants?
- ovule.
 - microspore mother cell.
 - pollen grain interior
 - embryo sac
18. What is the primary role of a mushroom's underground mycelium?
- absorbing nutrients.
 - anchoring.
 - sexual reproduction
 - asexual reproduction
19. Cephalization is most closely associated with which of the following?
- sedentary lifestyle.
 - concentration of sensory structures at the anterior end.
 - predators, but not prey
 - a backbone
20. Generally, members of which flatworm class(es) are nonparasitic?
- Turbellaria.
 - Trematoda.
 - Cestoda
 - Monogenea
21. What is a distinctive feature of the chondrichthyans?
- an amniotic egg.
 - unpaired fins.
 - an acute sense of vision that includes the ability to distinguish colors
 - a mostly cartilaginous endoskeleton
22. Land plants are composed of all the following tissue types *except*
- mesodermal.
 - epidermal.
 - meristematic
 - vascular

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23. A plant developed a mineral deficiency after being treated with a fungicide. What is the most probable cause of the deficiency?

- A. Mineral receptor proteins in the plant membrane were not functioning.
- B. Mycorrhizal fungi were killed.
- C. Active transport of minerals was inhibited
- D. The genes for the synthesis of transport proteins were destroyed

24. What soil(s) is(are) the most fertile?

- A. humus only.
- B. loam only.
- C. silt only
- D. both humus and loam

25. In flowering plants, pollen is released from the

- A. anther.
- B. stigma.
- C. carpel
- D. filament

26. According to modern ideas about phototropism in plants

- A. light causes auxin to accumulate on the shaded side of a plant stem.
- B. auxin stimulates elongation of plant stem cells.
- C. auxin is produced by the tip of the coleoptile and moves downward
- D. A, B and C

27. According to modern ideas about phototropism in plants

- A. many densely-packed cells without an extracellular matrix.
- B. an epithelial origin.
- C. relatively few cells and a large amount of extracellular matrix
- D. a supporting material such as chondroitin sulfate

28. Foods eaten by animals are most often composed largely of macromolecules. This requires the animals to have methods for which of the following?

- A. elimination.
- B. dehydration synthesis.
- C. enzymatic hydrolysis
- D. regurgitation

29. Which sequence of blood flow can be observed in either a reptile or a mammal?

- A. left ventricle → aorta → lungs → systemic circulation.
- B. right ventricle → pulmonary vein → pulmocutaneous circulation.
- C. pulmonary vein → ventricle → left atrium → pulmonary circuit
- D. pulmonary vein → left atrium → ventricle → pulmonary circuit

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30. Where are semilunar valves to be found in the mammalian heart?

- A. where blood goes from atria to ventricles.
- B. on the right side of the heart only.
- C. where the pulmonary veins attach to the heart
- D. at the places where blood leaves via the aorta and pulmonary arteries

31. Histamines trigger dilation of nearby blood vessels, and increase in their permeability. Which of the signs of inflammation are therefore associated with histamine release?

- A. redness and heat only.
- B. swelling only
- C. pain
- D. redness, heat, and swelling

32. Which of the following cell types are responsible for initiating a secondary immune response?

- A. memory cells.
- B. macrophages
- C. stem cells
- D. B cells

33. Which of the following nitrogenous wastes requires hardly any water for its excretion?

- A. amino acid.
- B. urea
- C. uric acid
- D. ammonia

34. Materials are returned to the blood from the filtrate by which of the following processes?

- A. filtration.
- B. ultrafiltration
- C. selective reabsorption
- D. secretion

35. What do nitric oxide and epinephrine have in common?

- A. They both function as neurotransmitters.
- B. They are both involved in the "fight-or-flight" response
- C. They bind the same receptors
- D. They both function as growth factor

36. Prostaglandins are local regulators whose basic structure is derived from

- A. oligosaccharides.
- B. fatty acids
- C. steroids
- D. amino acids

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37. Environmental cues that influence the timing of reproduction generally do so by

- A. increasing the body temperature.
- B. providing access to water for external fertilization
- C. direct effects on gonadal structures
- D. direct effects on hormonal control mechanisms

38. Internal and external fertilization both

- A. produce zygotes.
- B. occur only among invertebrates
- C. occur only among terrestrial animals
- D. depend on the use of intromittent copulatory organs

39. Contact of an egg with signal molecules on sperm causes the egg to undergo a brief

- A. mitosis.
- B. membrane depolarization
- C. apoptosis
- D. vitellogenesis

40. In an egg cell treated with EDTA, a chemical that binds calcium and magnesium ions, the

- A. acrosomal reaction would be blocked.
- B. fusion of sperm and egg nuclei would be blocked
- C. fast block to polyspermy would not occur
- D. fertilization envelope would not be formed

41. Which of the following properties or processes do we associate with living things?

- A. evolutionary adaptations
- B. energy processing
- C. responding to the environment
- D. all of the above

42. Organisms interact with their environments, exchanging matter and energy. For example, plant chloroplasts convert the energy of sunlight into

- A. the energy of motion.
- B. carbon dioxide and water.
- C. the potential energy of chemical bonds.
- D. oxygen.

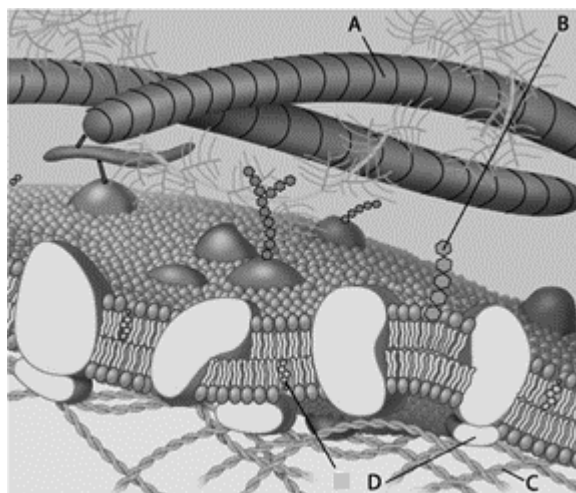
43. Testosterone and estradiol are

- A. nucleic acids.
- B. carbohydrates.
- C. proteins.
- D. steroids.

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44. Which of the following is *true* of cellulose?
- It is a polymer composed of sucrose monomers.
 - It is a storage polysaccharide for energy in plant cells.
 - It is a storage polysaccharide for energy in animal cells.
 - It is a major structural component of plant cell walls.
45. Which type of organelle is primarily involved in the synthesis of oils, phospholipids, and steroids?
- ribosome
 - lysosome
 - smooth endoplasmic reticulum
 - mitochondrion
46. Which of the following contains hydrolytic enzymes?
- lysosome
 - vacuole
 - mitochondrion
 - Golgi apparatus

For the following questions 47 to 49, match the labeled component of the cell membrane (Figure) with its description.



47. peripheral protein
 A.(A) B.(B) C.(C) D.(D)
48. fiber of the extracellular matrix
 A.(A) B.(B) C.(C) D.(D)
49. glycolipid
 A.(A) B.(B) C.(C) D.(D)

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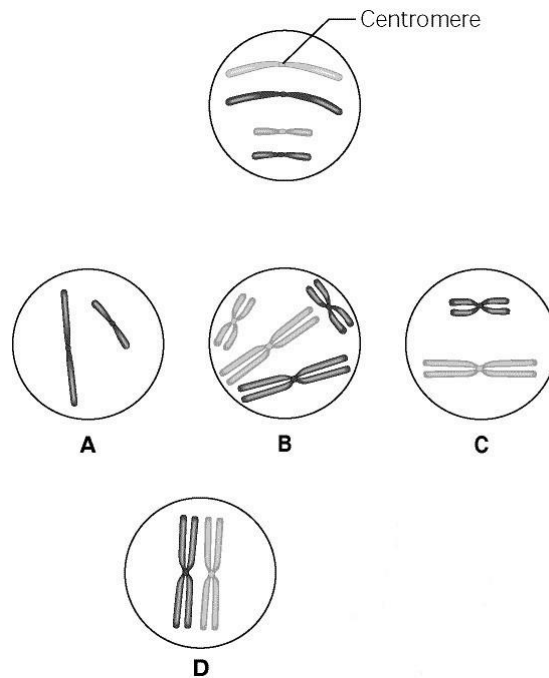
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50. Why is ATP an important molecule in metabolism?
- A. Its hydrolysis provides an input of free energy for exergonic reactions.
 - B. It provides energy coupling between exergonic and endergonic reactions.
 - C. Its terminal phosphate group contains a strong covalent bond that when hydrolyzed releases free energy.
 - D. Its terminal phosphate bond has higher energy than the other two.
51. Why are carbohydrates and fats considered high energy foods?
- A. They have a lot of oxygen atoms.
 - B. They have no nitrogen in their makeup.
 - C. They can have very long carbon skeletons.
 - D. They have a lot of electrons associated with hydrogen.
52. In a plant cell, where are the ATP synthase complexes located?
- A. thylakoid membrane
 - B. plasma membrane
 - C. inner mitochondrial membrane
 - D. A and C
53. The general name for an enzyme that transfers phosphate groups from ATP to a protein is
- A. phosphorylase.
 - B. phosphatase.
 - C. protein kinase.
 - D. ATPase.
54. The main proteases involved in apoptosis
- A. ced-3 and ced-4
 - B. inactive.
 - C. cytochromes.
 - D. caspases.

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The lettered circle in Figure shows a diploid nucleus with four chromosomes. There are two pairs of homologous chromosomes, one long and the other short. One haploid set is symbolized as black and the other haploid set is gray. The chromosomes in the unlettered circle have not yet replicated. Choose the correct chromosomal conditions for the following stages in questions 55 to 57.



55. at prometaphase of mitosis

- A.(A) B.(B) C.(C) D.(D)

56. Which term describes centromeres uncoupling, sister chromatids separating, and the two new chromosomes moving to opposite poles of the cell?

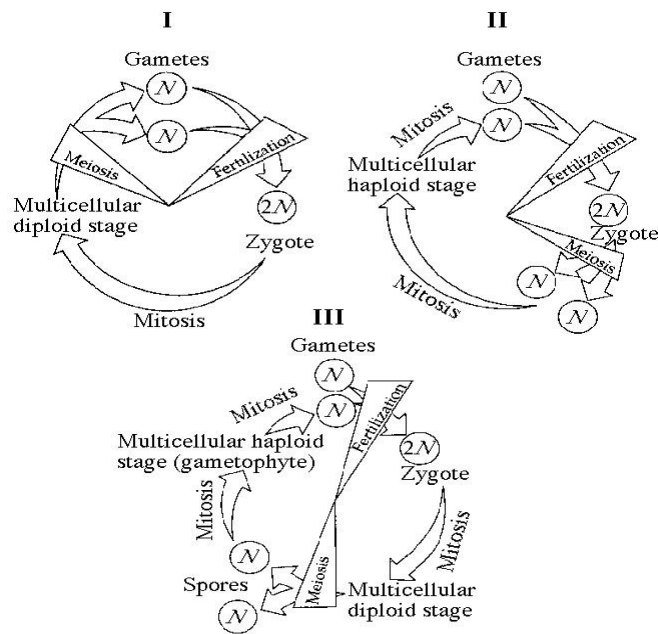
- A.(A) B.(B) C.(C) D.(D)

57. If cells in the process of dividing are subjected to colchicine, a drug that interferes with the functioning of the spindle apparatus, at which stage will mitosis be arrested?

- A.(A) B.(B) C.(C) D.(D)

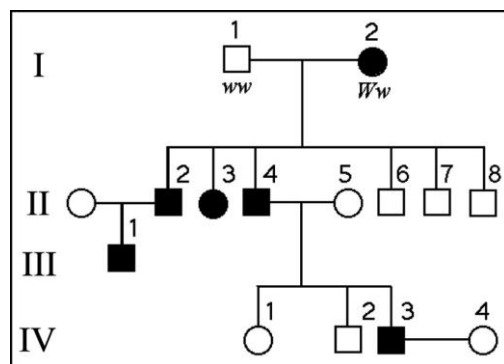
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Refer to the life cycles illustrated in Figure to answer the following questions 58 to 59.



58. Which of the life cycles is typical for animals?
- A. I only
 - B. II only
 - C. III only
 - D. I and II
59. Which of the life cycles is typical for plants and some algae?
- A. I only
 - B. II only
 - C. III only
 - D. I and II

The following questions 60 to 63 refer to the pedigree chart in Figure for a family, some of whose members exhibit the dominant trait, wooly hair. Affected individuals are indicated by an open square or circle.



60. Which of the life cycles is typical for most fungi and some protists?
- A. I only
 - B. II only
 - C. III only
 - D. I and III

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61. What is the genotype of individual II-5?
- A. WW
 - B. Ww
 - C. ww
 - D. WW or ww
62. What is the likelihood that the progeny of IV-3 and IV-4 will have wooly hair?
- A. 0%
 - B. 25%
 - C. 50%
 - D. 75%
63. What is the probability that individual III-1 is Ww ?
- A. $3/4$
 - B. $2/4$
 - C. $2/3$
 - D. 1

Refer to the following information to answer the questions 64 to 69.

A man who is an achondroplastic dwarf with normal vision marries a color-blind woman of normal height. The man's father was six feet tall, and both the woman's parents were of average height. Achondroplastic dwarfism is autosomal dominant, and red-green color blindness is X-linked recessive.

64. How many of their daughters might be expected to be color-blind dwarfs
- A. All
 - B. None
 - C. Half
 - D. One out of four
65. What proportion of their sons would be color-blind and of normal height?
- A. All
 - B. None
 - C. Half
 - D. One out of four
66. They have a daughter who is a dwarf with normal color vision. What is the probability that she is heterozygous for both genes?
- A. 0
 - B. 0.25
 - C. 0.50
 - D. 0.75

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67. In an analysis of the nucleotide composition of DNA, which of the following will be found?
- A = C
 - A = G and C = T
 - A + C = G + T
 - G + C = T + A
68. An Okazaki fragment has which of the following arrangements?
- primase, polymerase, ligase
 - 3' RNA nucleotides, DNA nucleotides 5'
 - 5' RNA nucleotides, DNA nucleotides 3'
 - DNA polymerase I, DNA polymerase III
69. The enzyme telomerase solves the problem of replication at the ends of linear chromosomes by which method?
- adding a single 5' cap structure that resists degradation by nucleases
 - causing specific double strand DNA breaks that result in blunt ends on both strands
 - causing linear ends of the newly replicated DNA to circularize
 - adding numerous short DNA sequences such as TTAGGG, which form a hairpin turn

The following questions 70 to 73 refer to Figure, a table of codons.

		Second Base					
		U	C	A	G		
First Base	U	UUU } Phe	UCU } Ser	UAU } Tyr	UGU } Cys	Third Base	
		UUC } Phe	UCC } Ser	UAC } Tyr	UGC } Cys		
		UUA } Leu	UCA } Ser	UAA } Stop	UGA } Stop		
		UUG } Leu	UCG } Ser	UAG } Stop	UGG } Trp		
	C	CUU } Leu	CCU } Pro	CAU } His	CGU } Arg		
		CUC } Leu	CCC } Pro	CAC } His	CGC } Arg		
		CUA } Leu	CCA } Pro	CAA } Gln	CGA } Arg		
		CUG } Leu	CCG } Pro	CAG } Gln	CGG } Arg		
	A	AUU } Ile	ACU } Thr	AAU } Asn	AGU } Ser		
		AUC } Ile	ACC } Thr	AAC } Asn	AGC } Ser		
		AUA } Ile	ACA } Thr	AAA } Lys	AGA } Arg		
		AUG } Met or Start	ACG } Thr	AAG } Lys	AGG } Arg		
	G	GUU } Val	GCU } Ala	GAU } Asp	GGU } Gly		
		GUC } Val	GCC } Ala	GAC } Asp	GGC } Gly		
		GUA } Val	GCA } Ala	GAA } Glu	GGA } Gly		
		GUG } Val	GCG } Ala	GAG } Glu	GGG } Gly		

70. A possible sequence of nucleotides in the template strand of DNA that would code for the polypeptide sequence phe-leu-ile-val would be
- 5' TTG-CTA-CAG-TAG 3'.
 - 3' AAC-GAC-GUC-AUA 5'.
 - 5' AUG-CTG-CAG-TAT 3'.
 - 3' AAA-GAA-TAA-CAA 5'.

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71. What amino acid sequence will be generated, based on the following mRNA codon sequence?
5' AUG-UCU-UCG-UUA-UCC-UUG 3'

A. met-arg-glu-arg-glu-arg.
B. met-glu-arg-arg-gln-leu
C. met-ser-leu-ser-leu-ser
D. met-ser-ser-leu-ser-leu

72. A peptide has the sequence NH₂-phe-pro-lys-gly-phe-pro-COOH. Which of the following sequences in the coding strand of the DNA could code for this peptide?
A. 3' UUU-CCC-AAA-GGG-UUU-CCC.
B. 3' AUG-AAA-GGG-TTT-CCC-AAA-GGG
C. 5' TTT-CCC-AAA-GGG-TTT-CCC
D. 5' GGG-AAA-TTT-AAA-CCC-ACT-GGG

73. What is the sequence of a peptide based on the following mRNA sequence?
A. leu-cys-tyr-ser-phe.
B. cyc-phe-tyr-cys-leu
C. phe-leu-ile-met-val
D. phe-ser-tyr-cys-leu

74. In most cases, differentiation is controlled at which level?
A. replication of the DNA.
B. nucleosome formation
C. transcription
D. translation

75. The MyoD protein
A. can promote muscle development in all cell types.
B. is a transcription factor that binds to and activates the transcription of muscle-related genes.
C. was used by researchers to convert differentiated muscle cells into liver cells.
D. magnifies the effects of other muscle proteins.

76. The product of the *bicoid* gene in *Drosophila* provides essential information about
A. the anterior-posterior axis.
B. the dorsal-ventral axis.
C. the left-right axis.
D. segmentation.

77. These genes form gradients and help establish the axes and other features of an embryo:
A. homeotic genes.
B. segmentation genes.
C. egg-polarity genes.
D. morphogens.

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78. Why are viruses referred to as obligate parasites?
- A. They cannot reproduce outside of a host cell.
 - B. Viral DNA always inserts itself into host DNA.
 - C. They invariably kill any cell they infect.
 - D. They can incorporate nucleic acids from other viruses.
79. 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.
80. Gene therapy
- A. has proven to be beneficial to HIV patients.
 - B. involves replacement of a defective allele in sex cells.
 - C. cannot be used to correct genetic disorders.
 - D. had apparent success in treating disorders involving bone marrow cells.