

國立清華大學 命題紙

九十一學年度 生命科學系 轉學生招生考試

科目 普通生物學 科號 151 共 5 頁第 1 頁 *請在試卷【答案卷】內作答

Choose ONE most appropriate answer. (2 points each 不倒扣)

1. Cartilage is considered as a _____ tissue. A) nervous, B) connective, C) muscle, D) epithelial. E) cardiac.
2. Which of the following descriptions about osteoporosis is correct? A) It is a disorder that affects bones. B) It is commonly found in menopause women. C) Estrogen supplement is a standard treatment. D) Osteoblast activity is decreasing in the patients. E) All of above are correct.
3. Glucose and most amino acids are absorbed across the gut lining A) by active transport, B) by diffusion, C) by macrophages, D) at lymph vessels, E) as fat droplets.
4. Immunoglobulin designated _____ increases antimicrobial activity in mucus A) IgA, B) IgG, C) IgZ, D) IgE, E) IgM.
5. Gas exchanges in human body occurs primarily at the A) two bronchi, B) nasal epithelium, C) alveolar sacs, D) colon, E) oral cavity.
6. Of the following statements of the neurotransmitter, which is not correct? A) Acetylcholine acts as an excitatory neurotransmitter to cause contraction of both skeletal muscle and heart muscle. B) NO is the gaseous neurotransmitter to signal the dilation of the blood vessels by diffusion. C) Parkinson's disease is associated with a lack of GABA in the brain. D) Opium, morphine, and heroin are the pain killers which mimic function of the endogenous opiates such as endorphins. E) Neurotransmitter can be found in synapses.
7. _____ lowers blood sugar levels; _____ raises it. A) glucagon; insulin. B) gastrin; insulin. C) insulin; glucagon. D) pepsin; glucagon. E) pepsin; insulin.
8. Which one of the following statements about heat shock proteins is not correct? A) they are stress-induced proteins, B) they are commonly called chaperones, C) they help other proteins fold into their functional conformations, D) they are synthesized only in animals above a certain temperature, E) these proteins associate with thermo-tolerance in cells.
9. The probable role of salicylic acid in systemic acquired resistance (SAR) of plants is to A) destroy the pathogens directly B) activate plant defenses throughout the plants before infection spreads C) close stomata, thus preventing the entry of pathogens D) activate cold-shock proteins E) sacrifice infected tissue by hydrolyzing cells
10. Archaeobacteria A) commonly cause food poisoning, B) commonly found in extreme environments, C) are a group of bacteria contain chlorophyll A, D) are in fact eukaryotic organisms, E) appeared on earth recently.
11. During human gestation, organogenesis occurs A) in the first trimester B) in the second trimester C) in the third trimester D) while the embryo is in the oviduct E) none of above.
12. Patch-clamp recording is used to A) study ion movement through a patch of membrane B) identify essential nutrients of a plant C) measure the water potential of leaves D) study the control of stomatal opening and closing E) measure the strength of muscle.

13. Viruses are A) capable of producing own ATP, B) infectious particles, C) Procaryotes, D) capable of synthesizing most of amino acids, E) propagated by binary fission.
14. Which structure is **incorrectly** paired with its tissue system? A) guard cell - ground tissue; B) xylem - vascular tissue; C) companion cell - vascular tissue; D) root hair - dermal tissue; E) palisade parenchyma - ground tissue.
15. Which of the following conditions is needed by almost all seeds to break dormancy? A) Exposure to light. B) Abrasion of the seed coat. C) Imbibition. D) Exposure to cold temperatures. E) Covering of fertile soil
16. Which of the following digestive enzymes has the lowest pH optimum? A) trypsin B) chymotrypsin C) pepsin D) amylase E) nuclease.
17. Animals are A) autotrophs B) heterotrophs C) homotrophs D) saprobes E) chemotrophs.
18. A human diverged from other primates, which of the following appeared first? A) the family system, B) language, C) an erect stance D) the disappearance of tails E) an enlarged brain
19. Which of the following is **not** an accurate statement about hormones? A) Hormones are often regulated through feedback loops. B) The steroid hormones bind with specific receptor proteins only on target cell membranes. C) The tropic hormones have other endocrine glands as their targets. D) Hormones are secreted by specialized cells usually located in endocrine glands. E) Secretion of some hormones involves the control of both nervous and endocrine systems
20. Which of the following statements about nervous system is **not** true? A) Glia cells are essential for the structural integrity of the nervous system. B) Compared to its surroundings, an undisturbed neuron carries a slight negative charge inside the plasma membrane. C) Inhibitory period is the period when the neuron is in the hyperpolarized state. D) Summation is an additive action effect of several synaptic terminals onto a postsynaptic cell. E) Resting potential is the potential at which there will be no net movement of Na^+ across the membrane.
21. Which of the following human diseases is **incorrectly** paired? A) diabetes mellitus - insulin, B) Acquired immunodeficiency syndrome - HIV, C) dwarfism - growth hormone, D) Alzheimer's diseases - serotonin E) hypothyroidism - thyroxine
22. Blood returning to our heart in a vena cava will drain first into the A) aorta B) left ventricle C) left atrium D) right ventricle E) right atrium
23. Which process in the nephron is *least* selective? A) Reabsorption. B) Secretion. C) Filtration. D) Salt pumping by loop of Henle. E) Transport across the epithelium of a collecting duct.
24. Which of the following factors does not affect sustainable population size? A) Predation. B) Competition. C) Resources. D) Pollution. E) All of above can affect population size.
25. A bottleneck is A) a new population established by individuals who left an old one. B) a chance event that wipes out nearly all members of a population. C) a process that works against adaptive traits. D) a process whereby species originate. E) all of above are correct.

26. A scientist wants to magnify a flower seed 8000 times and examine the ridges of its surface. Which of the following instruments would be the best? A) a transmission electron microscope. B) an inverted light microscope. C) a scanning electron microscope. D) a scanning light microscope. E) a transmission light microscope.
27. Unlike animal cells, plant cells have ____ and _____. Unlike plant cells, animal cells have _____. A) large central vacuoles.... cell walls....peroxisomes. B) large central vacuoles....cell walls....centrioles. C) chloroplasts....cell walls....lysosomes D) centrioles....cell walls....large central vacuoles. E). large central vacuoles....cell walls....endosomes.
28. The function of mitochondria is: A) cellular respiration. B) intracellular transport of proteins. C) lipid synthesis. D) photosynthesis. E). intracellular degradation.
29. A woman is having trouble becoming pregnant. Examination of her partner's sperm indicates that dynein arms are missing from the flagella in his sperm cells. A physician explains that this could interfere with fertility by: A) preventing the sperm from producing enough energy to power swimming. B) preventing the sperm from swimming to the egg cell. C) preventing the sperm from attaching to the egg cell. D) interfering with the attachment of the flagella to the sperm. E). interfering with the ability of the sperm to tolerate the acid conditions in the vaginal canal.
30. All cells on Earth: A) have DNA as the genetic material. B) are enclosed in a membrane that maintains internal conditions different from the surroundings. C) can interconvert forms of energy. D) can interconvert chemical materials. E) all of the above.
31. Plasma membranes are selectively permeable. This means that: A) anything can pass into or out of a cell. B) the plasma membrane regulates the passage of material into and out of the cell. C) glucose cannot enter the cell. D) cholesterol cannot enter the cell. E). plasma membranes must be very thin.
32. The fluid mosaic model describes the plasma membrane as consisting of A) a phospholipid bilayer with embedded proteins. B) two layers of phospholipids with protein sandwiched between them. C) a protein bilayer with embedded phospholipids. D) individual proteins and phospholipids that can drift in the membrane. E). both a and d.
33. Which of the following pieces of evidence would prove that a substance enters a cell by active rather than passive transport? A) The substance is moved across the cell membrane by a carrier. B) The breakdown of ATP is needed for transport to occur. C) The substance enters the cell when its concentration is higher outside the cell than inside. D) All of the above. E) Both A and C.
34. Bacteria that are unable to survive in the presence of oxygen are called A) facultative anaerobes. B) aerobes. C) microaerophiles. D) strict anaerobes. E) chemosynthetic bacteria.

35. When proteins are used as a source of energy for the body, the proteins
- A) are hydrolyzed to fatty acids and converted to acetyl CoA, which enters the Krebs cycle.
 - B) are converted mainly into pyruvic acid, acetyl CoA, or a Krebs cycle intermediate and then processed by the Krebs cycle and chemiosmosis.
 - C) are converted into glucose molecules, which are fed into glycolysis.
 - D) are hydrolyzed to glycerols and then converted to glyceraldehydes 3-phosphate, which is fed into glycolysis.
 - E) are hydrolyzed to their constituent amino acids; electrons are stripped from the amino acids and passed to the electron transport chain.
36. The Calvin cycle of photosynthesis involves all of the following *except*
- A) formation of steroid products.
 - B) carbon fixation.
 - C) reduction of carbon.
 - D) addition of electrons and protons to carbon.
 - E) regeneration of NADP^+ .
37. Which of the following is a difference between sexual and asexual reproduction?
- A) Regeneration is exclusive to sexual reproduction.
 - B) Asexual reproduction occurs only in diploid organisms.
 - C) Sexual reproduction is more likely to increase genetic variation than is asexual reproduction.
 - D) Asexual reproduction always increases the number of sets of chromosomes in the offspring; sexual reproduction decreases the number of sets of chromosomes in the offspring.
 - E) All of the above are incorrect.
38. Where in the tertiary structure of a water-soluble globular protein would you be most likely to find a hydrophobic amino acid R group?
- A) On the outside, in the water.
 - B) On the inside core, away from water.
 - C) At both ends of the polypeptide chain.
 - D) Covalently bonded to another R group.
 - E) Covalently bonded to the amino group of the next amino group.
39. Which of the following is *least* related to the others?
- A) pattern formation.
 - B) apoptosis.
 - C) maternal effect genes.
 - D) positional information.
 - E) egg-polarity genes.
40. In humans, the 22 pairs of chromosomes that don't include the sex chromosomes are called
- A) autosomes.
 - B) polysomes.
 - C) somatic chromosomes.
 - D) loci.
 - E) both b and d.
41. Varieties of plants in which self-fertilization produces offspring that are identical to the parent are referred to as
- A) hybrids.
 - B) monohybrid crosses.
 - C) independent crosses.
 - D) the F₂ generation.
 - E) true-breeding.
42. The express or physical traits of an organism are referred to as its _____. The genetic makeup of an organism is referred to as its _____. A) expressed form....karyotype. B) archetype....genetic heritage. C) phenotype....genotype. D) karyotype....genotype. E) none of the above.
43. Dr. Smith's parents have normal hearing. However, Dr. Smith has an inherited form of deafness. Deafness is a recessive trait that is associated with the abnormal allele *d*. The normal allele at this locus, associated with normal hearing, is *D*. Dr Smith's parents could have which of the following genotypes?
- A) *DD* and *dd*.
 - B) *dd* and *dd*.
 - C) *DD* and *DD*.
 - D) *Dd* and *Dd*.
 - E) either C or D.
44. The monomer units of DNA and RNA are
- A) nucleosides.
 - B) nucleotides.
 - C) nucleic acids.
 - D) amino acids.
 - E) monosaccharides.

45. Why does a DNA strand grow only in the 5' to 3' direction? A) Because DNA polymerase can only add nucleotides to the 5' end of the growing molecule. B) Because DNA polymerase can only add nucleotides to the 3' end of the growing molecule. C) Because mRNA can only read a DNA molecule in the 5' to 3' direction. D) Because ribosome can only read a DNA molecule in the 5' to 3' direction. E) None of the above is true.
46. The codon AUG means: A) add the amino acid phenylalanine. B) start a polypeptide chain here. C) end a polypeptide chain here. D) add the amino acid methionine. E) both B and D
47. Which of the following sequences is *true* of translation?
- A) codon recognition → translocation → peptide bond formation → termination.
 - B) peptide bond formation → codon recognition → translocation → termination.
 - C) codon recognition → peptide bond formation → translocation → termination.
 - D) codon recognition → peptide bond breakage → translocation → peptide bond formation.
 - E) peptide bond formation → translocation → codon recognition → termination.
48. Which of the following kinds of entities can serve as DNA vectors for genetic recombination? A) operons. B) bacterial plasmids. C) exons. D) phages. E) both B and D
49. The *lac* operon in *E. coli* A) regulates the rate of binary fission. B) allows the bacterium to resist antibiotics in the penicillin family. C) coordinates the production of lactose-utilizing enzymes when that carbohydrate is present. D) promotes the expression of lactose-utilizing enzymes in the absence of lactose. E) both B and C.
50. Which of the following is *least* related to the others? A) cloning vector. B) restriction enzymes. C) electroporation. D) in situ hybridization. E) ligase.