高雄醫學大學 105 學年度學士後醫學系招生考試試題

科目：普通生物學　　考試時間：80 分鐘

說明：一、選擇題用 2B 鉛筆在「答案卡」上作答，修正時應以橡皮擦擦拭，不得使用修正液(帶)，未遵照正確作答方法而致電腦無法判讀者，考生自行負責。
二、試題及答案卡必須繳回，不得攜出試場。

I.【單選題】1-60 題，每題 1 分，共計 60 分。答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

1. Very rapid speciation occurred when cichlid fishes were isolated in Lake Victoria. Widespread extinction was dramatically seen when _____.
(A) hybridization stopped (B) fishing was prohibited (C) predatory fishes were added
(D) artificial selection stopped (E) insect larvae stocks were depleted

2. Which one of the following statements about endosymbiosis and the origin of the eukaryotic cell are **FALSE**?
(A) Mitochondria are the descendents of purple nonsulfur bacteria.
(B) The chloroplasts of red and green alga are the descendents of cyanobacteria.
(C) Not all compartments of the eukaryotic cell are derived from the endomembrane system.
(D) The brown algae acquired their chloroplasts by engulfing a prokaryotic cell with chloroplasts.
(E) None of these choices are correct.

3. Which of the following groups is most threatened by global extinctions?
(A) amphibians (B) birds (C) plants (D) mammals (E) fish

4. Irregular dental hygiene and a high sugar diet may lead to tooth decay. Why?
(A) Bacteria consume calcium.
(B) Glucose forms a weak acid when dissolved in saliva.
(C) High concentrations of sugar soften the tooth enamel.
(D) Plaque degrades the tooth's protective mucosal layers.
(E) Lactic acid fermentation is used to generate ATP under anaerobic conditions.

5. Which of the following regions of the human brain is critically important for controlling heart rate and breathing?
(A) medulla oblongata (B) hippocampus (C) cerebellum (D) cerebral cortex (E) thalamus

6. Which of the following correctly indicates the hierarchy of skeletal muscle organization from "small" to "big"?
(A) muscle fiber, sarcomere, myofibril, motor unit
(B) myofibril, sarcomere, motor unit, muscle fiber
(C) sarcomere, myofibril, muscle fiber, motor unit
(D) myofibril, sarcomere, muscle fiber, motor unit
(E) sarcomere, muscle fiber, myofibril, motor unit

7. The hormones epinephrine and norepinephrine constitute the "alarm" response of the body to stress. What secretes these hormones?
(A) pancreas (B) pineal gland (C) thyroid gland (D) adrenal medulla (E) anterior pituitary gland

8. The bulk of the reabsorption of useful materials by the kidney takes place in the _____.
(A) loop of Henle (B) renal corpuscle (C) collecting ducts
(D) distal convoluted tubule (E) proximal convoluted tubule

9. Increases in leptin levels will _____ appetite and _____ metabolic rate.
(A) decrease, decrease (B) decrease, increase (C) increase, decrease
(D) increase, increase (E) decrease, not change

10. Humans cannot survive at sea by drinking salt water. However, marine vertebrates such as sea turtles and various sea birds can survive by drinking salt water. What do they have that humans do not?
(A) Salt glands.
(B) They use ammonia as their primary nitrogenous waste.
(C) Kidneys are extremely good at producing concentrated urine.
(D) Body fluid concentrations are similar to or greater than those of seawater.
(E) The ability to secrete salts and wastes into their intestinal contents like an insect.

11. Otto Loewi performed an experiment in which he electrically stimulated the vagus nerve connected to one frog heart. Loewi also let the fluid bathing this first heart pass to a second chamber containing a second frog heart not connected to a nerve. What did Loewi observe?
    (A) There was no effect on the beating of either heart.
    (B) The first heart showed a decrease in beat rate and so did the second heart.
    (C) The first heart showed an increase in beat rate and so did the second heart.
    (D) The first heart showed a decrease in beat rate, but there was no change in the second heart.
    (E) The first heart showed an increase in beat rate, but there was no change in the second heart.

12. All of the following are primary functions of flowers **EXCEPT**:
    (A) meiosis (B) photosynthesis (C) egg production (D) pollen production (E) sexual reproduction

13. The series of metabolic events that occurs within tomato plants in response to wounding is _____.
    (A) a waterfall effect (B) the hypersensitive response (C) resistance to coevolution
    (D) a systemic response (E) a pathogen-specific response

14. The last common ancestor of all animals was probably a _____.
    (A) flagellated protest (B) unicellular yeast (C) unicellular chytrid
    (D) multicellular algae (E) multicellular fungus

15. Fire suppression by humans:
    (A) can change the species composition within biological communities.
    (B) will always result in an increase in species diversity in a given biome.
    (C) is necessary for the protection of threatened and endangered forest species.
    (D) will result ultimately in sustainable production of increased amounts of forest products for human use.
    (E) is a management goal of conservation biologists to maintain the healthy condition of forest communities.

16. A person has his/her gall bladder removed and as a result:
    (A) can only eat liquid meals. (B) can only eat very small meals. (C) can only eat small amounts of fat.
    (D) can now eat as much fat as desired and not absorb it. (E) none of these choices are correct.

17. The primary difference between estrous and menstrual cycles is that:
    (A) most estrous cycles are of much longer duration compared to menstrual cycles.
    (B) behavioral changes during estrous cycles are much less apparent than those of menstrual cycles.
    (C) season and climate have less pronounced effects on estrous cycles than they do on menstrual cycles.
    (D) copulation normally occurs across the estrous cycle, whereas in menstrual cycles copulation only occurs during the period surrounding ovulation.
    (E) the endometrium shed by the uterus during the estrous cycle is reabsorbed, whereas the shed endometrium of menstrual cycles is excreted from the body.

18. When light strikes the rod cell, it becomes _____ and glutamate release onto bipolar cells _____.
    (A) excited, increases (B) depolarized, increases (C) depolarized, decreases
    (D) hyperpolarized, increases (E) hyperpolarized, decreases

19. "Accommodation" is the process in the eye of _____.
    (A) regulation of vitreous humor volume
    (B) bending light rays to varying degrees by the lens
    (C) converting light energy into electrical signals by the retina
    (D) adjustment to varying light levels by altering the sensitivity of the eye
    (E) adjustment of the amount of light admitted to the eye by adjusting pupil diameter

20. Biofuels are mainly produced by _____.
    (A) plants that convert hemicellulose into gasoline
    (B) plants that are easy to grow in arid environments
    (C) transgenic crops that have cell walls containing ethylene
    (D) the genetic engineering of ethanol-generating genes into plants
    (E) the breakdown of cell wall biopolymers into sugars that can be fermented

21. Liver cells, mammary cells, and skin cells all contain the same genome; however, their respective proteomes vary drastically. This observation is best explained by what phenomenon?
    (A) cell growth (B) cell division (C) crossing over (D) cell differentiation (E) evolution

22. The first heart sound is produced at _____.
    (A) closing the semilunar valve (B) the beginning of systole (C) the end of systole
    (D) the beginning of diastole (E) the end of diastole

23. Which of the following statements about fluid mosaic model is **FALSE**?
(A) Lipid-anchored proteins are a part of the original fluid mosaic.
(B) The fluid part of the model is the phospholipid bilayer.
(C) The mosaic part of the model is the protein.
(D) The model was proposed by S. Jonathan Singer and Garth Nicolson.
(E) This model can provide explanations for most of the criticisms of the "lipid bilayer plus protein sheets" model.

24. Which of the following statements about the cell cycle is **FALSE**?
(A) Maturation-promoting factor (MPF) stimulates nuclear envelope breakdown by phosphorylating the lamin proteins of nuclear lamina.
(B) Active MPF phosphorylates microfilament-associated proteins to facilitate formation of the mitotic spindle.
(C) Active MPF phosphorylates histones to allow chromosome condensation.
(D) Epidermal growth factor can induce cells to pass through the G1 checkpoint and into S phase through the Ras pathway.
(E) The p21 protein functions to suppress the activity of Cdk-cyclin complex to block passage through the G1 checkpoint.

25. Which of the following statements about the extracellular matrix (ECM) is **FALSE**?
(A) Collagens are the major structure fiber of ECM in animal cells.
(B) Mucoproteins are the components of hydrated matrix of ECM in animal cells.
(C) Cellulose are adhesive molecules of ECM in plant cells.
(D) Fibronectins and laminins are adhesive molecules of ECM in animal cells.
(E) Hemicellulose and extensins are the components of hydrated matrix of ECM in plant cells.

26. Which of these statements about viruses is true?
I. H5N1 virus is an RNA virus.
II. SARS virus is a single positive-stranded RNA virus.
III. Dengue fever virus is a mosquito-borne single negative-stranded RNA virus.
IV. Zika virus is a single negative-stranded RNA virus.
(A) I and II (B) I and III (C) I and IV (D) I, II, and III (E) I, II, III, and IV

27. Which of these statements best describes fruits?
I. A pea pod is formed from an ovary.
II. When you consume tomato, you are eating fruits that are derived from ripen ovary.
III. A peach and a nut are a simple fruit that is derived from a flower.
IV. A strawberry is a fruit that is derived from a single flower.
V. A pineapple is a simple fruit.
(A) I and II (B) II and III (C) III and IV (D) I, II, III, and IV (E) I, II, III, IV, and V

28. _____ triggers the ripening and aging of the banana, while _____ inhibits growth and seed germination during periods of drought.
(A) Auxin; abscisic acid (B) Abscisic acid; ethylene (C) Ethylene; cytokinin
(D) Ethylene; abscisic acid (E) Auxin; gibberellin

29. A Taiwan ecologist monitoring the number of Formosan macaque in a wildlife refuge over a 10-year period is studying ecology at which level?
(A) population (B) ecosystem (C) organism (D) community (E) biosphere

30. Which of the following characteristics best describes specialized cell junction?
(A) Adherens junctions but not desmosomes are the main types of anchoring junctions.
(B) Gap junctions prevent the movement of molecules across cell layers.
(C) Tight junctions allow direct electrical and chemical communication between cells.
(D) Plasmodesmata permit direct cell-cell communication between plant cells.
(E) Tight junctions are the main types of communicating junctions between cardiac muscle cells.

31. Which of the following sources of reducing equivalents is most important for steroid hormone synthesis?
(A) glycolysis (B) tricarboxylic acid (TCA) cycle (C) malate shuttle
(D) fatty acid oxidation (E) pentose phosphate pathway

32. Which of the following statements about gout is true?
(A) It results from the overproduction of orotic acid.
(B) It can result from a deficiency in phosphoribosylpyrophosphate (PRPP) synthetase.
(C) It can be treated with inhibitors of xanthine oxidase.
(D) It occurs more frequently in women than men.
(E) The symptoms appear in early adolescence.

33. Which of the following characteristics best describes the urea cycle?
(A) All of the enzymes are localized in the cytosol of hepatocytes.
(B) The enzymes are present in high concentration in the perivenous hepatocytes.
(C) Arginine is the end product of the urea cycle.
(D) The cleavage of argininosuccinate releases fumarate.
(E) Asparagine is a substrate in the urea cycle.

34. Which of the following vitamins involves primarily in transamination reactions of amino acid metabolism?
(A) Vitamin C (B) Vitamin E (C) Vitamin B6 (D) Vitamin B12 (E) Vitamin A

35. Martin and Mary have free earlobes, but their son Mark does not. If Martin and Mary have two more children, what is the probability that both will have attached earlobes?
(A) 1/4 (B) 3/4 (C) 1/16 (D) 9/16 (E) 3/16

36. Which of these statements best describes stem cells?
(A) Adult stem cells but not embryonic stem cells are immortal in lab culture.
(B) Only embryonic stem cells are found in every tissue of the adult body.
(C) Embryonic stem cells and induced pluripotent stem cells give rise to all the different types of cells in the organism.
(D) Stem cells can be isolated from the inner cell mass of blastocytes, bone marrow, and amniotic fluid, but not from adipose tissues.
(E) Cancer stem cells possess characteristics associated with normal stem cells.

37. Which order is correct according to the number of genes from big to small in the following organisms?
1. *E. coli*
2. Rice
3. Human sperm
4. *D. melanogaster* (Fruit fly)
5. *Saccharomyces cerevisiae* (yeast)
(A) 23451 (B) 24351 (C) 34251 (D) 32415 (E) 34521

38. Phenylketonuria (PKU) is due to a recessive allele. Given 1 PKU occurrence per 25 births, what is the frequency of individuals with the heterozygous phenotype if the population is in Hardy-Weinberg equilibrium?
(A) 0.2 (B) 0.32 (C) 0.64 (D) 0.8 (E) 0.96

39. Which of these statements best describes speciation?
(A) Populations separated by a geographic barrier are known as sympatric populations.
(B) Geographic isolation necessarily leads to new species.
(C) For allopatric speciation to occur, changes in the gene pool must produce reproductive isolation.
(D) In allopatric speciation, reproductive isolation develops and new species arises without geographic separation.
(E) A small population is less likely to have its gene pool changed by genetic drift and natural selection.

40. _____ clinical trial tests on the target human population, and _____ clinical trial maximize the number of test subjects and include human subjects of both sexes, different ethnic groups, and those who have health problems besides the one that the drug is intended to benefit.
(A) Phase I; phase II (B) Phase I; phase III (C) Phase II; phase III
(D) Phase II; phase IV (E) Phase III; phase IV

41. Which of the following normal ranges for measurements of some fasting blood values is **FALSE**?
(A) Glucose: 75-110 mg/dL (B) Arterial blood pH: 7.00-7.45 (C) Protein: 6.5-8 g/dL
(D) Cholesterol: less than 200 mg/dL (E) Sodium: 135-145 mM

42. Which of these statements about a secondary immune response is **FALSE**?
(A) Antibodies of the IgE class are produced.
(B) Antibodies are made quickly and in great amounts.
(C) Antibody production lasts longer than in a primary response.
(D) Lymphocyte clones are believed to develop.
(E) It provides active immunity against the specific pathogens.

43. Which of these statements about muscle contraction is **FALSE**?
(A) Ca^{2+} is required for all muscle contraction.
(B) Troponin is present in skeletal muscles and smooth muscles.
(C) When a skeletal muscle shortens during contraction, the H band and sarcomere shorten.
(D) Skeletal muscles but not cardiac muscles require neural stimulation to contract.
(E) The sarcoplasmic reticulum and transverse tubules are well-developed in skeletal muscles and poorly developed in smooth muscles.

44. What is the correct sequence of events involving cyclic AMP as a second messenger of glucagon hormone?
1. The stimulation of the activity of adenylate cyclase.
2. The activation of G-proteins.
3. The conversion of ATP to cyclic AMP.
4. The activation of of protein kinase A.
5. The stimulation of lipid mobilization.
6. An increase in the activity of hormone-sensitive lipase.
(A) 213645 (B) 213456 (C) 214356 (D) 213465 (E) 214365

45. Which of the following sequence of the steps is regular for Western Blotting Assay that is widely used for detection of the specific protein in a tissue?
1. Tissues are broken down using a homogenizer or by sonication.
2. The protein is probed with an addition of the primary antibody.
3. The protein is transferred to a PVDF membrane.
4. Add secondary antibody conjugated with peroxidase.
5. The proteins of the tissues are separated using gel electrophoresis.
6. The protein is detected with an addition of a peroxidase substrate.
(A) 123456 (B) 153246 (C) 152346 (D) 154623 (E) 124653

46. All are stages in gene transcription **EXCEPT**:
(A) binding of RNA polymerase holoenzyme at the promoter sites.
(B) DNase I activity on RNA polymerase/DNA complex.
(C) chain elongation.
(D) initiation of polymerization.
(E) chain termination.

47. The driving force that pushes the root tip through the soil is primarily _____.
(A) the elongation of root hairs
(B) continuous cell division of root cap cells
(C) elongation of cells behind the root apical meristem
(D) continuous cell division in the root cap at the tip of the root
(E) continuous cell division just behind the root cap in the center of the apical meristem

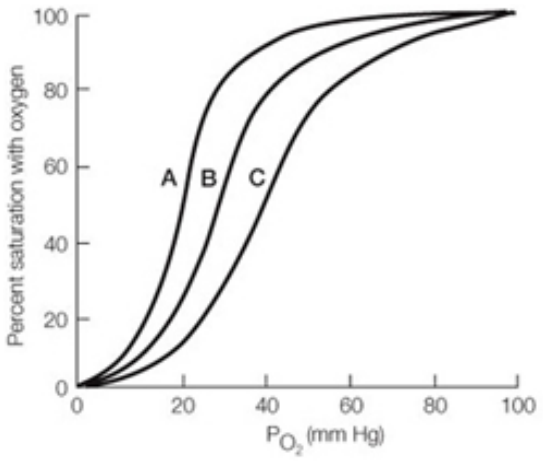
48. Iron deficiency is often indicated by yellowing in newly formed leaves. This suggests that iron _____.
(A) is a relatively immobile nutrient in plants
(B) is concentrated in the xylem of older leaves
(C) is tied up in formed chlorophyll molecules
(D) is concentrated in the phloem of older leaves
(E) is found in leghemoglobin and reduces the amount available to new plant parts

49. You find a new species of mouse that, compared to the house mouse you are familiar with, sprints extraordinarily rapidly but also fatigues quickly. Which type of muscle fiber (compared to an ordinary house mouse) would you expect to see an increase in _____?
(A) slow glycolytic fibers (B) slow oxidative fibers (C) fast glycolytic fibers
(D) fast oxidative fibers (E) fast and slow oxidative fibers

50. Which of the following is true about short-term and long-term memory processes?
(A) Both short-term and long-term memory processes require protein synthesis.
(B) Neither short-term nor long-term memory processes require protein synthesis.
(C) Invertebrate animals like Aplysia and Drosophila do not show long-term memory processes.
(D) Short-term memory processes act through second messenger systems while long-term memory processes require protein synthesis.
(E) Long-term memory processes act through second messenger systems while short-term memory processes require protein synthesis.

51. An open circulatory system differs from a closed one in that:
(A) The open circulatory system has a combination of blood vessels and large thin-walled sinuses whereas a closed circulatory system has only vessels.
(B) An open circulatory system opens into the heart whereas the closed circulatory system does not.
(C) An open circulatory system opens into arteries and is drained by veins whereas in a closed one it is just the reverse.
(D) An open circulatory system drains into the mantle cavity whereas a closed circulatory system drains into the hemolymph.
(E) A closed circulatory system is completely encased in the body cavity whereas the open one is not.

52.



$x = P_{O_2}$ (mm Hg)
y = Percent saturation with oxygen

In the above graph, curve _____ is most likely the oxygen-binding curve for normal adult human hemoglobin. Curve _____ is most likely that of llama hemoglobin (from a llama population that has lived in the mountains of Peru for thousands of years). Curve _____ is most likely that of myoglobin.
(A) A, B, C (B) A, C, B (C) B, C, A (D) B, A, C (E) C, B, A

53. A small island has stable populations of plants and animals, including one species of hawk as the only predator. A ship docks at the island, and the ship's cat has recently had a litter of kittens. One of the young cats accidentally goes ashore in a small boat, jumps to land and runs into the brush. No one notices, and they leave the cat on the island. What do you think is a likely consequence of the cat's presence on the island?
(A) The insect populations will decline.
(B) The fish in the lagoon will decrease due to predation.
(C) It's only one cat and will make no difference to the island.
(D) Some species of ground-nesting birds may go extinct within a few years.
(E) The increase in nitrogenous waste from the cat will increase the size of many plants.

54. Which is **NOT CORRECT**?
(A) Introduced species are sometimes a problem because they usually are better competitors.
(B) For carbon cycle, the CO_2 would be returned to the atmosphere when the trees died and decayed.
(C) Global warming is caused by increased CO_2 and CH_4 levels.
(D) UV-B radiation is increasing due to increased CH_4 concentration in the polar region.
(E) CO_2 level increased due to enhanced human activities.

55. Which statement about hyperpolarization of a neuron is true? When hyperpolarization occurs,
(A) membrane potential is more negative than during resting potential.
(B) membrane potential is closer to Na^+ equilibrium potential (E_{Na}) than it is to E_K.
(C) Na^+ and/or Cl^- channels are open.
(D) if it occurs in a downstream neuron, exciting postsynaptic potentials (EPSPs) are more likely to be generated than are inhibitory PSPs (IPSPs).
(E) generation of action potentials is likely to occur.

56. Which of the statement about digestion system in animals is correct?
(A) Stomach acid activates pepsinogen into pepsin.
(B) Secretin modulates digestion by triggering acid release in the stomach.
(C) The bile salts function in fat digestion by dispersing big droplets of fats to small droplets.
(D) A fatty acid absorbed into an intestinal cell becomes part of a chylomicron.
(E) Glucagon, the pancreatic hormone, functions to stimulate the liver to release glucose.

57. For the reproduction of flowering plants, double fertilization:
(A) is characteristic of all plants.
(B) produces a triploid sporophyte and a diploid endosperm.
(C) results in the fertilization of egg by sperm and polar nuclei by pollen tube nucleus.
(D) results from the fusion of the male and female sporophytes of angiosperms.
(E) prevents the production of fertile pollen grains.

58. A difference between a stem and a root in secondary growth is that the root often lacks _____.
(A) xylem (B) vascular cambium (C) pith (D) parenchyma rays (E) cork

59. For invertebrates, which statement is **NOT CORRECT**?
(A) Molluscs are the most diverse phylum.
(B) Trematodes have very sophisticated defenses against immune system attack.
(C) Tapeworms lack a mouth and a gut.
(D) Echinoderms and vertebrates are more closely related than arthropods.
(E) Barnacles are classified as mollusks because of their trochophore larvae.

60. Which statement is true for seed plants?
(A) In angiosperm life cycles, the female gametophyte is the ovule.
(B) A spore grows into a seed.
(C) A pollen grain contains a male gametophyte.
(D) Double fertilization results in the production of a diploid zygote and a triploid endosperm nucleus.
(E) The life cycle of seed plants does not include a gametophyte generation.

Ⅱ.【單選題】61-80 題，每題 2 分，共計 40 分。答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。

61. Which statement is true?
(A) Plants are defined as multicellular, eukaryotic, photosynthetic autotrophs.
(B) Plants are defined by their chloroplasts, which contain chlorophyll *a* and *b*.
(C) Plant sporophytes grow from haploid spores.
(D) Charophytes and land plants share four derived traits that suggest they share a relatively recent common ancestor.
(E) Charophytes are embryophytes.

62. Endosymbiosis is the event occurring in the algal evolution. Which is **NOT CORRECT**?
(A) Cyanobacterium is included by marine animal cells in the primary endosymbiosis.
(B) Genetic exchange between cyanobacterium and animal host.
(C) Red algae are the old species derived from primary endosymbiosis.
(D) Secondary endosymbiosis is happening again when carbon dioxide concentration is sharply declined.
(E) Land plants are appearing after secondary endosymbiosis.

63. Phylogeny is the study of the evolutionary history of related groups of organisms. Organisms are grouped into taxa based on shared characteristics that result from common ancestry. Identify which statement is **FALSE**.
(A) The term monophyletic refers to a taxon.
(B) A taxon includes an ancestral species and all of its descendents.
(C) Homologous structures look the same and serve the same function but differ in evolutionary origin and structure.
(D) Ancestral traits were present in the shared ancestor of the species within a taxon.
(E) Phylogeny is the evolutionary history of a group of organisms.

64. Does the distribution of bases in monkey DNA and human DNA follow Chargaff's rules?
(A) Yes, it is because the %A + %T is greater than the %G + %C in both species.
(B) Yes, it is because %A + %T does not equal %G + %C in both species.
(C) Yes, it is because the %A approximately equals the %T and the %G approximately equals the %C in both species.
(D) No, it is because %A is higher than %T and %G is higher than %C in both species.
(E) Yes, it is because the %A + %T is lower than the %G + %C.

65. A cross between homozygous purple-flowered and homozygous white-flowered pea plants results in offspring with purple flowers. This demonstrates _____.
(A) a dihybrid cross (B) dominance (C) the blending model of genetics
(D) true breeding (E) the mistakes made by Mendel

66. Which is correct for the relationship between photosynthesis and respiration in plants?
(A) Plants respire only when they don't photosynthesize.
(B) Photosynthesis is the plant's form of cellular respiration.
(C) Because photosynthesis supplements the plant the energy under light condition, the respiration will reduce when the plant is transferred from dark condition to light condition.
(D) Cellular respiration takes place only in plant roots, not throughout the plant.
(E) Respiration is not only needed for energy generation in the plants, but also provides compounds for the synthesis of other metabolites that is necessary for the plant life.

67. The role of photosynthetic organisms in an ecosystem is _____.
(A) reducing light and UV radiation
(B) fixing organic compounds for decomposers
(C) synthesize organic compounds from inorganic compounds
(D) reducing temperature by transpiration
(E) keep energy constant in an ecological system

68. Identify which one is **FALSE**.
(A) Nitrogen-fixing microbes provide energy for carbon fixation.
(B) Both eukaryotes and prokaryotes can assimilate nitrogen into organic compounds.
(C) Nitrogen may be a limiting plant nutrient, although the atmosphere is 80% nitrogen gas (N_2).
(D) Bacteria obtain energy from nitrification.
(E) Denitrifying bacteria obtain oxygen gas (O_2) from nitrogenous compounds.

69. What is true?
(A) Taste buds consist of sensory cells that act as mechanoreceptors.
(B) A taste bud consists of at least one sensory receptor cell from each of the major types of taste receptors.
(C) The infrared receptors of pit vipers belong to the same general class of sensory receptors as the mechanoreceptors associated with cat whiskers.
(D) Tectorial cells are common to the senses of hearing and equilibrium in humans.
(E) In vertebrate eyes, the conversion of light energy to chemical energy occurs most directly as the result of changes to cyclic GMP (cGMP).

70. As discussed in the text, the fruit fly *Drosophila melanogaster* has an allele that confers resistance to DDT and similar insecticides. Laboratory strains of *D. melanogaster* have been established from flies collected in the wild in the 1930s (before the widespread use of insecticides) and the 1960s (after 20 years of DDT use). Lab strains established in the 1930s have no alleles for DDT resistance. In lab strains established in the 1960s, the frequency of the DDT-resistance allele is 37%. Which statement below is true?
(A) Some fruit flies evolved resistance to DDT in order to survive.
(B) The heritable trait of DDT resistance cannot change even DDT use became widespread.
(C) Fruit flies became more resistant to DDT over time.
(D) When DDT was widely used, fruit flies with DDT resistance had greater evolutionary fitness than fruit flies lacking DDT resistance.
(E) Alleles for DDT resistance arose by mutation during the period of DDT use because of selection for pesticide resistance.

71. Which statement about evolution is correct?
(A) On November 24, 1899, Darwin published his hypothesis in On the Origin of Species by Means of Natural Selection, ushering in the era of evolutionary biology.
(B) Adaptation refers to an individual changing over its lifetime in response to the environment.
(C) Two species that are thought to have a recent common ancestor share several homologous structures.
(D) Over evolutionary time, the descendents of that ancestor have accumulated diverse modifications, or adaptations, that allow them to survive and reproduce in specific habitats. Many ancestors are co-existing in the world to make biodiversity.
(E) Natural selection acts on the variant individuals that make up a community.

72. Mendel took an experimental and quantitative approach. Which of the following statement is **NOT CORRECT**?
(A) Mendel grew up on a small farm in what is today the Czech Republic, and in 1843, he entered an Augustinian monastery.
(B) Mendel studied at the University of Vienna from 1851 to 1853, where he was influenced by a physicist who encouraged experimentation and the application of mathematics to science and by a botanist who stimulated Mendel's interest in the causes of variation in plants.
(C) Around 1857, Mendel began breeding garden peas to study inheritance.
(D) Pea plants have several advantages for genetic study. Pea plants are available in many varieties that have distinct heritable features, or characters, with different variant traits.
(E) Peas have a short plant height, and each mating produces many offspring.

73. Photosynthetic pigments in the thylakoid are light receptors. Which is **NOT CORRECT**?
(A) Chlorophyll *a*, which participates directly in the light reactions and absorbs best in the red and violet-blue wavelengths and absorbs least in the green, participates directly in the light reactions, but accessory photosynthetic pigments absorb light and transfer energy to chlorophyll *a*.
(B) Accessory pigments include chlorophyll *b*, carotenoids, and anthocyanin.
(C) An overall action spectrum for photosynthesis profiles the relative effectiveness of different wavelengths of radiation in driving the process. The action spectrum of photosynthesis was first demonstrated in 1883 in a clever experiment performed by Thomas Engelmann.
(D) The action spectrum of photosynthesis does not match exactly the absorption spectrum of any one photosynthetic pigment, including chlorophyll *a*.
(E) Each light-harvesting complex consists of pigment molecules (which may include chlorophyll *a*, chlorophyll *b*, and carotenoids) bound to proteins, in which the light-harvesting complexes act as an antenna for the reaction-center complex.

74. Which of these statements best describes neurodegenerative diseases?
(A) In Alzheimer's disease (AD), brain tissues often shrink and have a loss of cholinergic and other neurons in the cerebral cortex but not hippocampus.
(B) AD is characterized by memory loss, amyloid beta oligomers, and large amount of dephosphorylated tau protein.
(C) Parkinson's disease (PD) results from the death of neurons in the diencephalon.
(D) Dopamine can be used as a drug for PD.
(E) Acetylcholinesterase inhibitors and NMDA receptor antagonist can be used to treat AD.

75. Which of the following animals is classified correctly?
(A) The Taiwanese frog *Hoplobatrachus rugulosus* and the Taiwanese salamander *Hynobius formosanus* belong to the same order in *Class Amphibia*.
(B) The formosan sika deer *Cervus nippon taiouanus* and the Taiwanese wild boar *Sus scrofa* belong to the same order in *Class Mammalia*.
(C) The mosquito *Aedes aegypti* and asian giant hornet belong to the same order in *Class Insecta*.
(D) The giant panda and Taiwan leopard cat belong to the same family in *Order Carnivora*.
(E) The formosan landlocked salmon *Oncorhynchus masou formosanus* and rainbow trout belong to the different family in *Order Salmoniformes*.

76. What is the concentration of plasma glucose **at 30 minutes** according the following oral glucose tolerance experiment? (Glucose standard: 100 mg/dL with an absorbance of 0.48 in a 50 µl volume of cuvette)

Time (min)	0	10	20	30	60	90	120
Absorbance	0.48	0.49	0.58	0.36	0.58	0.55	0.49
Plasma (µl)	50	50	50	25	50	50	50

(A) 0.75 mg/ml (B) 1 mg/ml (C) 1.2 mg/ml (D) 1.5 mg/ml (E) 1.25 mg/ml

77. Which of the following differences between r-selection and K-selection is true?
I. The K-selected populations live longer than the r-selected species.
II. The K-selected species has higher reproduction rate than the r-selected species.
III. The K-selected species has later reproductive age than the r-selected species.
IV. In humans, males take a K-selected strategy to produce many sperms.
V. The K-selected species has a stronger competitive ability than the r-selected species.
VI. The K-selected species develop more rapidly than the r-selected species.
(A) I, II, III, IV, and V (B) II and IV (C) III and IV (D) II, IV, VI (E) I, III, V

78. Which of these statements about inhibitors is true?
(A) DAPI (4',6-diamidino-2-phenylindole) can be used to stain both live and fixed cells for fluorescent microscopy because it binds strongly to A-T rich regions in DNA.
(B) Actinomycin D is used for the study of protein stability because it inhibits translational elongation.
(C) Cycloheximide is used for the study of protein stability because it inhibits transcriptional elongation.
(D) Ethidium bromide is used to see protein gel bands because it is an intercalating agent for protein.
(E) Colchicine is used to see chromosomes in mitotic prophase because it inhibits microtubule polymerization.

79. Acclimatization to a high altitude involves:
I. normal arterial P_{O2}
II. hyperventilation
III. decreased affinity of hemoglobin
IV. increased hemoglobin and red blood cell production
(A) I, II, III, and IV (B) II, III, and IV (C) II and III (D) II and IV (E) III and IV

80. Which of the following statements about the Calvin cycle is true?
I. Sugarcane opens stomata on days, while pineapple opens stomata at nights.
II. On hot and dry days, sugarcane is more efficient to fix CO_2 than rice.
III. Rubisco is an enzyme involved in the first major step of carbon fixation in rice; its substrate molecules are ribulose-1,5-bisphosphate and CO_2 and its product is a three-carbon compound.
IV. Sugarcane and pineapple can use phosphoenolpyruvate carboxylase to capture more CO_2 into a four-carbon compound in mesophyll cells.
(A) I and II (B) II and III (C) III and IV (D) I, II, and III (E) I, II, III, and IV

後醫-英文

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
答案	C	E	A	C	E	A	B	D	E	A	C	B	A	D	B	A	D	A	A	A
題號	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
答案	A	C	C	D	B	A	B	A	E	A	D	A	B	B	E	B	C	A	D	B
題號	41	42	43	44	45	46	47	48	49	50										
答案	B	C	B	D	A	C	B	A	D	C										

後醫-有機化學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
答案	B	B	C	C	A	B	B	B	E	A	B	C	E	E	D	A	E	B	D	C
題號	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
答案	D	A	B	C	D	B	A	C	E	A	C	E	D	D	C	C	A	A	D	E
題號	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
答案	C	B	A	D	C	A	C	C	A	A	C	B	A	C	C	C	B	A	B	A
題號	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
答案	E	A	D	D	B	B	E	E	A	B	B	D	B	D	E	C	D	C	C	A

後醫-普通生物學

題號	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
答案	C	D	A	E	A	C	D	E	B	A	B	B	D	A	A	C	E	E	B	E
題號	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
答案	D	B	A	B	C	A	D	D	A	D	E	C	D	C	C	E	A	B	C	C
題號	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
答案	B	A	B	D	B	B	C	A	C	E	A	E	D	D	A	A	B	C	E	D
題號	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
答案	D	E	C	C	B	E	C	A	B	D	B	E	B	E	B	D	E	A	B	E