

第一大題：單選題

考生請注意！下列題目請依題號按順序填答於「試卷」首頁之選擇題作答區，每題2分。

Choose one alternative that best completes the statement or answers the question.

1. Carbon is able to form an immense diversity of organic molecules because of carbon's
 - A) ability to bond with up to four other atoms.
 - B) capacity to form single and double bonds.
 - C) ability to bond together to form extensive, branched, or unbranched "carbon skeletons."
 - D) tendency to form covalent bonds.
 - E) All of the choices are correct.
2. Many of the enzymes that control a firefly's ability to produce light energy from chemical energy are located
 - A) outside of cells.
 - B) within chloroplasts.
 - C) in the nucleus.
 - D) in membranes.
 - E) within mitochondria.
3. Facilitated diffusion across a biological membrane requires _____ and moves a substance _____ its concentration gradient.
 - A) energy and transport proteins . . . against
 - B) energy and transport proteins . . . down
 - C) energy . . . down
 - D) transport proteins . . . down
 - E) transport proteins . . . against
4. A culture of bacteria growing aerobically is fed glucose containing radioactive carbon and is then examined. As the bacteria metabolize the glucose, radioactivity will appear first in
 - A) NADH.
 - B) carbon dioxide.
 - C) pyruvic acid.
 - D) glucose 6-phosphate.
 - E) ATP.
5. The light reactions occur in the _____ while the Calvin cycle occurs in the _____.
 - A) cytoplasm . . . stroma
 - B) cytoplasm . . . thylakoid membrane
 - C) stroma . . . nucleus
 - D) stroma . . . thylakoid membranes
 - E) thylakoid membranes . . . stroma

見背面

6. During which phase of mitosis does the nuclear envelope re-form and the nucleoli reappear?
- A) interphase
 - B) anaphase
 - C) telophase
 - D) metaphase
 - E) prophase
7. Mendel's law of independent assortment states that
- A) genes sort independently of each other in animals but not in plants.
 - B) independent sorting of genes produces polyploid plants under some circumstances.
 - C) chromosomes sort independently of each other during mitosis and meiosis.
 - D) each pair of alleles segregates independently of the other pairs of alleles during gamete formation.
 - E) None of the choices are correct.
8. Which one of the following occurs when RNA polymerase attaches to the promoter DNA?
- A) initiation of a new polypeptide chain
 - B) addition of nucleotides to the DNA template
 - C) initiation of a new RNA molecule
 - D) termination of the RNA molecule
 - E) elongation of the growing RNA molecule
9. Why can some plants be cloned from a single cell?
- A) Plant cells are able to retrieve genes lost to the environment during development.
 - B) Plant cells can dedifferentiate and give rise to all of the specialized cells required to produce an entire plant.
 - C) Plant cells do not differentiate even when mature, so any cell can grow into an entire plant.
 - D) Plant cells can produce genes to replace those lost during development.
 - E) None of the choices are correct.
10. An advantage of using reverse transcriptase to prepare a gene for cloning is that
- A) reverse transcriptase is more efficient than RNA polymerase.
 - B) the resulting DNA strand will lack introns.
 - C) reverse transcriptase is more efficient than DNA polymerase.
 - D) for bacteria, RNA is the genetic material.
 - E) the resulting DNA strand will lack exons.
11. Which of the following situations would be most conducive to rapid speciation? (Assume the conditions described persist as long as necessary.)
- A) A Japanese mollusk species whose larvae are often carried from port to port in ship bilge now flourishes in San Francisco Bay.
 - B) Bighorn sheep occupy mountainous terrain from Canada through Death Valley, interbreeding all the way. The populations at the two ends of the range live in very different environments.
 - C) The growth of the Isthmus of Panama separates an abundant shrimp species into two large, completely

- isolated populations.
- D) Four circus wolves escape on Long Island. To everyone's surprise, they establish a small but viable population, coexisting successfully with humans in a partly suburban environment. The population is physically isolated from other wolves.
- E) A bunchgrass population is split in two by the Grand Canyon. Every few years, strong winds carry bunchgrass pollen across the canyon.
12. During the _____, over 95% of marine species and many terrestrial species became extinct.
- A) Precambrian
 - B) Mesozoic
 - C) Permian
 - D) Cenozoic
 - E) Cretaceous
13. Which of the following organisms first gave Earth its oxygen-containing atmosphere?
- A) plants
 - B) cyanobacteria
 - C) early protozoans
 - D) green algae
 - E) methanogens
14. Which one of the following statements about prokaryotes is false?
- A) Prokaryotes are genetically very similar.
 - B) The collective biomass of all prokaryotes is about 10 times that of all eukaryotes alive today.
 - C) Some prokaryotes are pathogens.
 - D) Some prokaryotes are decomposers.
 - E) Prokaryotes have existed on Earth for more than 3.5 billion years.
15. Which of the following plants has a dominant sporophyte generation and a seed but no fruit?
- A) pine tree
 - B) dandelion
 - C) fern
 - D) tulip
 - E) None of the choices are correct.
16. Fungi
- A) differ from members of the animal kingdom because fungi are autotrophic.
 - B) and green plants have cells that are surrounded by a cell wall made of cellulose.
 - C) are similar to bacteria because fungi use extracellular digestion to obtain their nutrients.
 - D) are similar to bacteria because fungal organisms are composed of prokaryotic cells.
 - E) are similar to green plants because fungi produce chlorophyll.

見背面

17. Most of the animals alive today:
- A) are vertebrates.
 - B) skip the blastula stage of development.
 - C) are haploid.
 - D) are invertebrates.
 - E) lack Hox genes.
18. Which one of the following animals is a deuterostome?
- A) an earthworm
 - B) a cricket
 - C) an octopus
 - D) a sea anemone
 - E) a sea star
19. Which one of the following statements most accurately reflects our understanding of human evolution?
- A) Humans and chimpanzees evolved from gibbons.
 - B) Humans evolved from chimpanzees.
 - C) Humans evolved from gibbons; chimpanzees evolved from orangutans.
 - D) Humans and chimpanzees have a common ancestor and are more closely related to each other than they are to any of the other anthropoids.
 - E) Humans and chimpanzees evolved from gorillas.
20. Which of the following types of study suggest that *Homo sapiens* originated in Africa and spread, replacing other hominid species?
- A) studies comparing the distributions of australopithecine and *H. erectus* fossils
 - B) studies of mitochondrial DNA among living human populations
 - C) studies of the distribution of "Lucy"-like fossils
 - D) comparative studies of the mitochondrial DNA of *H. sapiens* and *H. erectus*
 - E) studies of fossilized Neanderthal DNA
21. Structure in the living world is organized at hierarchical levels. Which of the following choices lists several of these, from least inclusive to most inclusive?
- A) molecule, cell, tissue, organ, organ system, organism
 - B) molecule, cell, organ, organ system, tissue, organism
 - C) cell, molecule, tissue, organ, organ system, organism
 - D) cell, molecule, organ, organ system, tissue, organism
 - E) molecule, cell, tissue, organ system, organ, organism
22. Which of the following organisms has a gastrovascular cavity?
- A) bird
 - B) clam
 - C) earthworm
 - D) grasshopper

- E) hydra
23. Which of the following is the usual cause of heartburn?
- A) reflux of acid chyme from the stomach into the lower esophagus
 - B) secretion of acid by the lining of the lower esophagus
 - C) retention of food at the bottom of the esophagus by a sphincter that is reluctant to open
 - D) compression of the lower esophagus by an overfilled stomach
 - E) irritation of the lower esophagus by substances in spicy food
24. The maximum amount of air that a human can inhale and exhale is called the
- A) physiological volume.
 - B) inhalation capacity.
 - C) tidal volume.
 - D) maximum capacity.
 - E) vital capacity.
25. Which one of the following is a likely advantage of a three-chambered heart in amphibians?
- A) the ability to divert deoxygenated blood away from the lungs when diving underwater
 - B) the ability to generate more body heat than a mammal
 - C) greater blood pressure than in a mammalian heart
 - D) greater separation of oxygenated and deoxygenated blood than in a mammalian heart
 - E) None of the choices are a likely advantage of a three-chambered heart in amphibians.
26. Which of the following is not an immediate function of histamine?
- A) causing local blood vessels to dilate
 - B) causing local blood vessels to become leakier
 - C) increasing systemic blood pressure
 - D) causing local swelling of the tissue
 - E) increasing blood flow to the area
27. Monoclonal antibodies are produced
- A) when a female is pregnant.
 - B) when an animal is infected by a single type of pathogen.
 - C) by cells that are formed when a B cell is fused to a T cell.
 - D) by cancerous tumors.
 - E) by cells that are formed when a B cell is fused to a tumor cell.
28. Which of the following lists structures in the order in which fluid flows through them?
- A) glomerulus, proximal tubule, distal tubule, Bowman's capsule, loop of Henle
 - B) Bowman's capsule, proximal tubule, loop of Henle, distal tubule, glomerulus
 - C) glomerulus, Bowman's capsule, proximal tubule, loop of Henle, distal tubule
 - D) proximal tubule, Bowman's capsule, loop of Henle, distal tubule, glomerulus
 - E) Bowman's capsule, glomerulus, proximal tubule, loop of Henle, distal tubule

29. Which of the following best describes the relationship of insulin to glucagon?
- A) High levels of insulin inhibit pancreatic secretion of glucagon.
 - B) They work together to prepare the body to deal with stress.
 - C) Insulin is a steroid hormone; glucagon is a protein hormone.
 - D) Insulin stimulates the pancreas to secrete glucagon.
 - E) They are antagonistic hormones.
30. What is the function of a sperm cell's acrosome?
- A) It contains the fuel that powers the sperm.
 - B) It contains the sperm's nucleus and is the part of the sperm that enters the egg during fertilization.
 - C) It contains the sperm's helical mitochondria.
 - D) It fuses with the jelly coat of the egg cell.
 - E) It contains enzymes that are released when the sperm encounters an egg and dissolves a hole in the egg's jelly coat.
31. The human embryo's first blood cells arise in the
- A) yolk sac.
 - B) developing bone marrow.
 - C) allantois.
 - D) developing liver.
 - E) amnion.
32. If you are in an airplane encountering turbulence and you start feeling sick to your stomach, would closing your eyes be a good thing to try, and why?
- A) Yes; it eliminates the disagreement between the information from your inner ears and the information from your eyes.
 - B) No; it focuses your attention on the nausea.
 - C) Yes; it eliminates the disturbing information that you are falling and bouncing through the sky.
 - D) No; it intensifies the feeling of falling and bouncing by eliminating the sight of the stable cabin.
 - E) Yes; it calms you by allowing the sensory information from your chemoreceptors to properly readjust.
33. Which of the following animals does not have an exoskeleton?
- A) spider
 - B) lobster
 - C) sea urchin
 - D) clam
 - E) ant
34. How many layers of vascular cambium will there be in the trunk of a 10-year-old tree?
- A) one B) nine C) two D) ten E) five

35. A hot, dry summer will reduce crop yields in part because
- A) carbon dioxide release and respiration are slowed because the stomata close more frequently to prevent excessive water loss.
 - B) the stomata of the plants never open.
 - C) carbon dioxide uptake and photosynthesis are slowed because the stomata close more frequently to prevent excessive water loss.
 - D) oxygen uptake and respiration are slowed because the stomata close more frequently to prevent excessive water loss.
 - E) too much carbon dioxide enters the plants.
36. One of the experiments performed by Charles and Francis Darwin was to cut off the tips of grass seedlings before exposing the seedlings to light from one side. Such decapitated seedlings did not bend. A valid conclusion from this experiment is that
- A) light is perceived by the tip of grass plants.
 - B) plants cannot engage in photosynthesis without the tip of the plant.
 - C) a foil cover over the tip of the seedlings would cause them to bend.
 - D) shorter plants do not respond to light.
 - E) None of the choices are valid conclusions.
37. Rachel Carson's book *Silent Spring* deals with the
- A) hydrological cycle.
 - B) fate of tropical rain forests.
 - C) environmental effects of pesticides.
 - D) 1985 baseball strike.
 - E) effects of lynx predation on snow hare populations.
38. Under the conditions known as El Niño, the mineral nutrient content of the seawater off the coast of Peru declines to very low levels. What effect will this likely have on marine life in the area?
- A) The lower the levels of minerals, the less polluted the water; hence, most populations will increase.
 - B) It will result in toxic red tides, which will reduce the populations of many species.
 - C) It will reduce the abundance of phytoplankton and, consequently, the abundance of other organisms.
 - D) It will increase the productivity of phytoplankton and, therefore, the productivity of other organisms by allowing sunlight to penetrate deeper into the ocean.
 - E) It will increase the productivity of phytoplankton and, therefore, the productivity of other organisms by decreasing salinity.
39. After many hours of observation, Jennifer noticed that a squirrel in her backyard seemed to retreat up a certain tree every time it was frightened. At the base of that tree was a wheelbarrow. Jennifer wondered how the squirrel found the same tree each time. Perhaps it simply knew to use the tree with the wheelbarrow. That night, Jennifer moved the wheelbarrow a few feet over and placed it against another tree. The next day, the squirrel retreated up the new tree, with the wheelbarrow resting at its base. This experiment suggests that the squirrel was using
- A) habituation.

見背面

- B) kinesis.
- C) spatial learning.
- D) imprinting.
- E) social learning.

40. The single greatest threat to biodiversity is
- A) overexploitation of populations for food.
 - B) global warming.
 - C) the introduction of exotic species.
 - D) habitat destruction.
 - E) overpopulation.

第二大題：解釋名詞

考生請注意！下列題目請填答於「試卷」「非選擇題作答區」請依序作答並書寫題號及題目！每題2分。
請定義或解釋下列各名詞所代表之意義，可以中文或英文作答。

1. innate immunity
2. adrenocorticotrophic hormone
3. biosphere
4. blastocyst
5. greenhouse effect
6. intertidal zone
7. neutrophil
8. paleontologist
9. omnivore
10. synaptic terminal



試題隨卷繳回