

一、單選題 (每題 2 分) ※注意：請於試卷「選擇題作答區」依題號作答。※

- Which of the following is **NOT** part of the cell's endomembrane system?
(A) endosomes (B) nuclear membrane (C) peroxisome
(D) smooth endoplasmic reticulum (E) rough endoplasmic reticulum
- Mendel conducted a series of plant crossing experiments and concluded his observation with his famous "Law of Heredity". The intellectual process for reaching his theory is a kind of _____ reasoning.
(A) conclusive (B) inductive (C) deductive (D) random
(E) arbitrary
- Choose the correct statement involving four polypeptide-assembled immunoglobulin molecules.
(A) disulfide bonds stabilize their quaternary structures
(B) does not have tertiary structures
(C) does not have quaternary structures
(D) all four polypeptides have the same primary structure
(E) phosphodiester bonds stabilize their tertiary structures
- How do the daughter cells at the end of mitosis and cytokinesis compare with their parent cell when it was in G₁ of the cell cycle?
(A) The daughter cells have half the amount of cytoplasm and half the amount of DNA.
(B) The daughter cells have half the number of chromosomes and half the amount of DNA.
(C) The daughter cells have the same number of chromosomes and half the amount of DNA.
(D) The daughter cells have the same number of chromosomes and the same amount of DNA.
(E) The daughter cells have the same number of chromosomes and twice the amount of DNA.
- During glycolysis, when glucose is catabolized to pyruvate, most of the energy of glucose is _____.
(A) transferred to ADP, forming ATP (B) transferred directly to ATP
(C) retained in the pyruvate (D) stored in the NADH produced
(E) used to phosphorylate fructose to form fructose-6-phosphate
- If a molecule of CO₂ released into the blood in your left toe is exhaled out of your nose, it must pass through all of the following structures **EXCEPT** _____.
(A) the right atrium (B) a pulmonary vein (C) an alveolus
(D) the trachea (E) a venule
- Which of the following animals' eyes can **NOT** form image visions?
(A) human (B) octopus (C) crab (D) flatworm (E) squid

8. Organisms categorized as osmoconformers are most likely _____?
(A) marine (B) amphibious (C) found in fresh water lakes and streams
(D) found in arid terrestrial environments
(E) found in terrestrial environments with adequate moisture
9. When an individual is subject to short-term starvation, most available food is used to provide energy (metabolism) rather than building blocks (growth and repair). Which hormone would be particularly active in times of food shortage?
(A) epinephrine (B) insulin (C) oxytocin (D) antidiuretic hormone (E) glucagon
10. Menstruation _____.
(A) is triggered by HCG (B) is triggered by an LH surge
(C) is triggered by an increase in the levels of estrogen and progesterone
(D) coincides with the postovulatory phase of the ovarian cycle
(E) coincides with the beginning of the pre-ovulatory phase of the ovarian cycle
11. The role of calcium in muscle contraction is to _____.
(A) make it possible for ATP to bind to actin (B) make it possible for ATP to bind to myosin
(C) make it possible for myosin to bind to actin (D) make it possible for ADP to bind to actin
(E) release ADP and phosphate from myosin
12. Which of the following is a unique feature of echinoderms?
(A) bilateral symmetry (B) a water vascular system (C) radial symmetry
(D) a deuterostome pattern of development (E) free-swimming larvae
13. The portion of a transmembrane protein embedded in the bilayer is:
(A) hydrophilic. (B) hydrophobic. (C) a glycoprotein. (D) a glycolipid. (E) a lectin.
14. In reality, the end product of photosynthesis in algae and green plants is:
(A) glucose. (B) starch. (C) sucrose. (D) a three-carbon sugar. (E) a five-carbon sugar.
15. Which of the following is **NOT** part of the endomembrane system?
(A) Peroxisome membrane (B) Endoplasmic reticulum (C) Plasma membrane
(D) Golgi complex (E) Nuclear envelope
16. Plastids that contain carotenoids but lack chlorophyll are known as:
(A) etioplasts. (B) chromoplasts. (C) amyloplasts. (D) proplastids. (E) chloroplasts.

17. Which of the following is **NOT** a characteristic shared by bryophytes and vascular plants?
(A) Multicellular sporangia (B) Sporopollenin in spore walls
(C) Tissues produced by an apical meristem (D) Retention of the embryo within an antheridium
(E) Antheridia and archegonia with sterile jacket layers
18. The main tissue systems of the vascular plant are the _____ systems.
(A) root and shoot (B) root, shoot, and reproductive (C) root, stem, and leaf
(D) dermal, vascular, and ground (E) xylem, phloem, and ground
19. Which of the following statements about transposons is **FALSE**?
(A) They are also called "jumping genes." (B) They are movable genetic elements.
(C) They may lead to mutation. (D) Plasmids can function as transposons.
(E) They occur only in bacteria.
20. Because meristems lack _____ tissues, meristem culture results in plants that lack _____.
(A) vascular; viruses (B) vascular; fungi (C) epidermal; viruses
(D) epidermal; fungi (E) epidermal; insect eggs
21. Which of the following statements about sympatric speciation is **FALSE**?
(A) It is more common than allopatric speciation.
(B) It involves a doubling of chromosome number.
(C) It involves the formation of polyploids.
(D) It can arise as a result of nondisjunction.
(E) It involves speciation without geographic separation.
22. The _____ is usually the first structure to emerge from a germinating seed.
(A) epicotyl (B) hypocotyl (C) cotyledon (D) radicle (E) coleoptile
23. When lettuce seeds are exposed to red light:
(A) Pfr is converted to Pr. (B) Pr is converted to Pfr.
(C) 660-nanometer light is converted to 730-nanometer light.
(D) 730-nanometer light is converted to 660-nanometer light.
(E) they will not germinate.
24. The primary purpose of seed banks is to:
(A) provide a storehouse for seeds to be used in times of famine.
(B) preserve the genetic characteristics of wild varieties and early cultivars of crop plants.
(C) make seeds available to farmers who cannot afford to purchase them.
(D) provide seeds to be used solely for genetic engineering.
(E) store dormant seeds until ways can be found to germinate them.

25. In most herbaceous plants grown in nitrate-rich soil, the glutamine synthetase–glutamate synthase pathway occurs in:
- (A) leaf vacuoles. (B) leaf mitochondria. (C) leaf chloroplasts.
(D) root mitochondria. (E) root plastids.
26. Unlike grassland plants, plants growing in shady forests:
- (A) have large leaf surfaces. (B) have thick cuticles. (C) have sunken stomata.
(D) transpire at a rate that is unaffected by air currents.
(E) transpire at a rate that is unaffected by humidity.
27. Which of the following statements about the seed coat is **FALSE**?
- (A) The micropyle may be visible on the seed coat. (B) It protects the embryo.
(C) It may be papery or very hard. (D) It may be impermeable to water.
(E) It develops from the ovary.

※下列題目請標明題號，依序作答於試卷內「非選擇題作答區」。※

二、名詞解釋 (每題 4 分)

1. acquired immunity
2. chiasma
3. homology
4. pluripotent
5. wobble (base pair)
6. Pleiotropy
7. Jasmonate
8. Phytoremediation
9. Plasmodesmata
10. Saprophyte

三、簡答題 (每題 6 分)

1. 請說明神經訊號傳導維持單一方向性的機制。

試題隨卷繳回