

單選題，一題兩分 ※ 注意：請於試卷內之「選擇題作答區」依序作答。

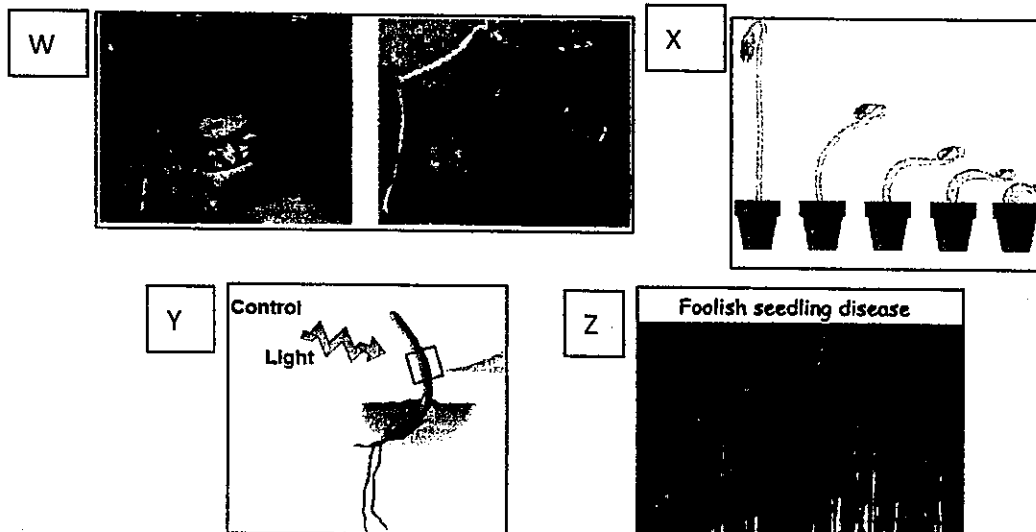
1. Which type of growth is responsible for the increase in the length of stems and roots in plants?
(a) Secondary growth (b) Tertiary growth (c) Primary/Apical growth (d) Lateral growth
2. What is the primary function of the vascular cambium in plants undergoing secondary growth?
(a) Producing secondary xylem towards the inside (b) Producing secondary phloem towards the inside
(c) Increasing the length of stems and roots (d) Developing the epidermis in young plant tissues
3. What is the primary driving force for the upward transport of water and minerals in xylem vessels?
(a) Transpiration pull (b) Osmosis (c) Pressure flow (d) Capillary action
4. Which vascular tissue is responsible for the bidirectional transport of organic nutrients, especially sugars, in plants?
(a) Epidermis (b) Xylem (c) Phloem (d) Cambium
5. Which statement correctly distinguishes between active and passive transport in plant cells?
(a) Active transport does not require energy and moves substances from higher to lower concentration areas, while passive transport requires energy and moves substances against their concentration gradient.
(b) Active transport requires energy and moves substances against their concentration gradient, while passive transport does not require energy and moves substances from higher to lower concentration areas.
(c) Both active and passive transport require energy, but active transport moves substances from areas of lower to higher concentration, while passive transport moves substances from regions of higher to lower concentration.
(d) Active and passive transport are identical processes, with the only difference being the types of substances transported.
6. What distinguishes channels from pumps in the context of membrane transport in plant cells?
(a) Channels facilitate passive transport and move substances against their concentration gradient, while pumps are involved in active transport and move substances from higher to lower concentration areas.
(b) Channels are involved in active transport and move substances from areas of lower to higher concentration, while pumps facilitate passive transport and move substances from regions of higher to lower concentration.
(c) Channels and pumps perform identical functions, and the terms can be used interchangeably in membrane transport.
(d) Channels are passive transport proteins that allow substances to move down their concentration gradient, while pumps are active transport proteins that move substances against their concentration gradient.
7. What is the primary role of an H⁺/sucrose symporter in plant cells?
(a) Facilitating the movement of water across the cell membrane
(b) Assisting in the transport of sucrose across the cell membrane
(c) Pumping protons out of the cell (d) Synthesizing sucrose within the cell
8. How does an H⁺/sucrose symporter typically energize sucrose transport?
(a) Movement of sodium ions (b) Movement of chloride ions
(c) Movement of protons (H⁺ ions) (d) Movement of potassium ions
9. Which part of the chloroplast is primarily responsible for the light reactions of photosynthesis?
(a) Stroma (b) Thylakoid membrane (c) Outer membrane (d) Inner membrane
10. What is the primary function of the electron transport chain in the thylakoid membrane during the light reactions?
(a) Production of glucose (b) Splitting of water molecules (c) Synthesis of ATP and NADPH (d) Fixation of carbon dioxide

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11. During the light reactions, what is the byproduct of the process that involves the splitting of water molecules?
(a) Carbon dioxide (b) Glucose (c) Oxygen (d) NADPH
12. Which enzyme is responsible for carbon dioxide fixation in the Calvin Cycle?
(a) Ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO)
(b) ATP synthase (c) NADP reductase (d) Phosphofructokinase
13. What is the final product of the Calvin cycle?
(a) Glucose (b) G3P (c) 3-PGA (d) RuBP
14. What is the role of oxygen in aerobic respiration?
(a) It serves as a substrate in glycolysis. (b) It is directly involved in the production of ATP.
(c) It acts as a coenzyme in the citric acid cycle. (d) It is the final electron acceptor in the electron transport chain.
15. Which step produces the most ATP?
(a) Glycolysis (b) Pyruvate decarboxylation (c) Citric acid cycle (d) Oxidative phosphorylation/Electron transport chain
16. Which two organelles produce ATP through chemiosmosis?
(a) Chloroplasts and mitochondria (b) Chloroplasts and lysosomes
(c) Mitochondria and lysosome (d) Vacuoles and chloroplasts
17. Where does the proton that drives ATP synthesis through chemiosmosis accumulate in cellular respiration?
(a) Mitochondrial matrix (b) Intermembrane space of the mitochondria (c) Cytoplasm (d) Nucleus
18. In the electron transport chain of photosynthesis and cellular respiration, what is the ultimate source of electrons that drives the proton pumping and ATP synthesis through chemiosmosis?
(a) Carbon dioxide (b) Oxygen (c) Glucose (d) Water
19. What stages or structures are haploid in the alternation of generations?
(a) Sporophytes, spores, gametes (b) Gametophytes, gametes, zygotes
(c) Spores, gametophytes, gametes (d) Spores, gametes, zygotes

20. According to the pictures below, please arrange the effects of phytohormones in the following order: Auxin-GA-ABA-ethylene.

- (a) W-X-Y-Z
(b) X-Z-W-Y
(c) Y-X-W-Z
(d) Y-Z-W-X



21. The perceived pitch of a sound depends on
(A) which region of the basilar membrane is vibrating. (B) which part of the oval window produces waves in the cochlear fluid.
(C) the listener having had training in music. (D) which part of the tympanic membrane is vibrating.
22. Afferent neuronal systems include the
(A) parasympathetic nervous system (B) sympathetic nervous system (C) motor neuron system (D) sensory systems.
23. Why are action potentials usually conducted in one direction?
(A) The axon hillock has a higher membrane potential than the terminals of the axon.
(B) Voltage-gated K⁺ channels cause membrane potential overshoot after the action potential.
(C) The brief refractory period prevents reopening of voltage-gated Na⁺ channels.
(D) Voltage-gated channels for both Na⁺ and K⁺ open in only one direction.
24. Which teeth is highly developed in carnivores?
(A) premolars (B) molars (C) canine teeth (D) incisors
25. The main structure for different antibody to bind to different antigen is at
(A) light chain constant region (B) light chain variable region
(C) heavy and light chain constant region (D) heavy and light chain variable region
26. Which of the following cell is not involved in antibody-mediated adaptive immunity
(A) helper T cells (B) dendritic cell (C) effector B cells
(D) all of the above involved in antibody-mediated adaptive immunity
27. The antibody receptor diversity in human arises from:
(A) alternative splicing of mRNA (B) thousands of antibody receptor genes in the genome
(C) recombination of chromosome segment in the antibody receptor gene
(D) post-translational modification of the antigen binding site
28. Which immune cell can be activated by cancer cells that are missing "self" markers of MHC?
(A) Natural killer cell (B) cytotoxic T cells (C) helper T cells (D) effector B cells
29. The point of connection between two communicating neurons is called
(A) the synapse (B) the glia (C) the synapsis (D) the axon hillock
30. Which of following description of neurotransmitter is false?
(A) a chemical that released from presynaptic neuron to communicate with postsynaptic neuron
(B) gas, short peptide, amino acid can be used as neurotransmitters
(C) is released when action potential reaches axon terminal (D) each neurotransmitter has only one specific receptor
31. Which of the following description of membrane potential is false?
(A) for neuron, resting potential means when membrane potential became 0 mV
(B) postsynaptic potentials are graded, and action potentials are all-or-none
(C) hyperpolarization means membrane potential became more negative
(D) under physiological condition, Na⁺ ions move into cell will cause depolarization

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32. The umami receptor in the sense of taste detects _____.
(A) hydrogen ions (B) glucose (C) glutamate (D) sodium ions
33. Which description of digestion and absorption is false?
(A) Lipid need to be broken down to monosaccharides by bile salts for absorption.
(B) Protein is first digested by pepsin in the stomach.
(C) Brush border cells in the intestine have microvilli to enhance absorption efficiency.
(D) Most water released by digestion system is re-absorbed.
34. Bird digestion system has a special part named "crop" which is
(A) connected with small intestine (B) temporary food storage space (C) has thick muscle to grind food (D) part of stomach.
35. Small intestine's lumen receives
(A) Chyme from the stomach (B) Enzymes and bicarbonate from the pancreas.
(C) Bile from the gallbladder. (D) all of above.
36. Which one is not considered connective tissue
(A) adipose tissue (B) ganglion (C) bone (D) blood
37. Which description is correct for skeleton muscle and cardiac muscle
(A) both are striated (B) cardiac muscle has multiple nucleus.
(C) skeleton muscle has branches. (D) cardiac muscle cannot be control by neuron.
38. Which pair of system and organ is incorrect?
(A) Urinary system > kidneys (B) Circulatory system > blood vessels
(C) Integumentary system > gametes (D) Nervous system > spinal cord
39. Glia in the nervous system has multiple function except
(A) provide framework for neuron migration (B) induce blood-brain barrier
(C) recycle neurotransmitter (D) increase the maximum depolarization potential of action potential
40. Ovulation is the follicular response to a burst of secretion of
(A) estradiol (B) progesterone (C) LH (D) prolactin
41. The acrosomal reaction of sea urchin fertilization means
(A) the formation of a fertilization envelope. (B) the fusion of egg and sperm nuclei.
(C) the release of hydrolytic enzymes from the sperm. (D) the generation of an electrical impulse by the egg.
42. Exocrine glands secrete all of the following EXCEPT _____.
(A) mucus (B) hormones (C) milk (D) tears
43. Which part of neuron can change membrane potential when stimulation arrives?
(A) dendrite. (B) cell body. (C) post-synaptic site. (D) all of above.
44. In an analysis of the nucleotide composition of DNA, which of the following will be found?
(A) A = C (B) A = G and C = T (C) A + C = G + T (D) G + C = T + A

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題號：343

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45. A particular triplet of bases in the template strand of DNA is 5' AGT 3'. The corresponding codon for the mRNA transcribed is
(A) 3' UCA 5'. (B) 3' UGA 5'. (C) 5' TCA 3'. (D) 3' ACU 5'. (E) 3' TCA 5'
46. The nitrogenous base adenine is found in all members of which group?
(A) Actin, ATP, and DNA (B) proteins, triglycerides, and estrogen (C) ATP, RNA, and DNA (D) glucose, ATP, and DNA
47. During the embryo development, the correct steps is
(A) blastula > cleavage > gastrulation > organogenesis. (B) blastula > gastrulation > cleavage > organogenesis.
(C) cleavage > blastula > organogenesis > gastrulation. (D) cleavage > blastula > gastrulation > organogenesis.
48. Which of following is false for alternative RNA splicing
(A) removes different exon(s) to produce different mRNA.
(B) can allow the production of mRNA of different sizes from a single gene.
(C) can allow the production of proteins of different sizes from a single gene.
(D) is processed by spliceosome with snRNA.
49. Which of the following occur only in eukaryotic, but not prokaryotic gene expression?
(A) RNA polymerase binds to the promoter (B) 5' cap and 3' poly tail were added form mature mRNA
(C) RNA polymerase requires a primer to elongate the molecule.
(D) Translation can begin as soon as transcription has begun even a little
50. Which of the following describes the function of an enzyme known as Dicer?
(A) It trims small double-stranded RNAs into miRNA (B) It degrades single-stranded mRNA
(C) It degrades single-stranded DNA (D) It chops up DNAs from infecting viruses

試題隨卷繳回