

科目 普通生物學 類組別 A1 共 3 頁第 1 頁 *請在答案卡內作答

1. What is the typical resolving power of a light microscope? (A) 2 mm (B) 20 μ m (C) 200 nm (D) 2 nm (E) 0.2 nm.
2. If you are using rabbit-anti-mouse X protein primary antibody in human cell study, what type of secondary antibody is correct for immunocytochemistry? (A) donkey-anti-human (B) donkey-anti-mouse (C) goat-anti-mouse (D) donkey-anti-goat (E) donkey-anti-rabbit.
3. Why does rough ER appear "rough"? (A) ribosome studded (B) vesicle studded (C) lysosome studded (D) peroxisome studded (E) endosome studded.
4. Which is the most abundant ion inside a cell? (A) Na (B) K (C) Ca (D) Cl (E) Mg.
5. Which ion is crucial for regulation of muscle contraction? (A) Na (B) K (C) Ca (D) Cl (E) Mg.
6. Which voltage-gated channel is involved in the depolarizing phase of action potential? (A) Na channel (B) K channel (C) Ca channel (D) Cl channel (E) water channel.
7. Why electron microscopy can resolve much more detail than light microscopy? (A) X-ray (B) vacuum (C) low temperature (D) ultrathin section (E) shorter wavelength.
8. Which is the most abundant protein in vertebrates? (A) G-protein (B) collagen (C) myosin (D) hemoglobin (E) actin.
9. Which protein is NOT involved in cell-cell adhesion? (A) N-CAM (B) E-cadherin (C) integrin (D) fibronectin (E) P-selectin.
10. What is prion? (A) DNA (B) RNA (C) protein (D) virus (E) bacteria.
11. Which one is NOT correct for a comparison of prokaryotic and eukaryotic cells? (A) only eukaryotic cells have endocytosis (B) prokaryotic cells use cell fission to reproduce (C) only eukaryotic cells have microfilaments (D) prokaryotic cells' ribosome is 70S (E) both prokaryotic and eukaryotic cells have membrane-bounded nucleus.
12. Which cytoskeleton is in mitotic spindle? (A) microtubule (B) microfilament (C) intermediate filament (D) cytokeratin (E) vimentin.
13. What is S phase during cell cycle? (A) mitosis (B) cytokinesis (C) chromatid separating (D) DNA synthesis (E) daughter cells forming.
14. Which amino acid is NOT a typical phosphorylation site for kinases? (A) glutamate (B) tyrosine (C) serine (D) threonine (E) none.
15. What is the key design that enables the confocal microscope to get sharp images? (A) fluorescence (B) laser (C) pinhole (D) beam splitter (E) z-motor.
16. Which period is the most frequent seasonal turnover of lake stratification? (A) spring/summer (B) spring/autumn (C) spring/winter (D) summer/autumn (E) autumn/winter.
17. What mechanism can best explain "altruism" seen in Belding ground squirrels? (A) sexual selection (B) color selection (C) group selection (D) individual selection (E) kin selection.
18. What is the function of statocyst of an invertebrate? (A) vision (B) olfaction (C) reproduction (D) balance (E) development.
19. What is the major nitrogenous waste in birds? (A) ammonia (B) urea (C) uric acid (D) amine (E) amino acid.

20. Which hormone is involved in a positive feedback? (A) calcitonin (B) insulin (C) ADH (D) oxytocin (E) epinephrine.
21. Which one has the lowest blood pressure? (A) systolic pressure (B) diastolic pressure (C) aorta (D) capillaries (E) veins.
22. Which one along the digestive track is the first place to digest proteins (A) oral cavity (B) stomach (C) duodenum (D) small intestine (E) large intestine.
23. Which component is NOT involved in blood clotting? (A) thrombin (B) fibrin (C) platelets (D) vitamin K (E) monocytes.
24. Which one is NOT the 4 attributes of lymphocytes (B cells and T cells)? (A) specificity (B) diversity (C) memory (D) the capacity to distinguish self from nonself (E) inheritability.
25. What are *Hox* genes? (A) genes for specifying the body plan (B) genes for generating bones (C) genes for reproduction (D) genes for homeostasis (E) genes of plant cells.
26. Which animal is NOT deuterostomia? (A) sea star (B) honeybee (C) human (D) lizard (E) sea urchin.
27. Which of the following pairs of structures is least likely to represent homology? (A) the wings of a bat and the forelimbs of a human (B) the hemoglobin of a baboon and the hemoglobin of a gorilla (C) the mitochondria of a plant and those of an animal (D) the bark of a tree and the protective covering of a lobster (E) the brain of a frog and the brain of a dog.
28. The smallest biological unit that can evolve over time is: (A) a cell (B) an individual organism (C) a population (D) a species (D) an ecosystem.
29. Most of the mass of organic material of a plant comes from: (A) water (B) carbon dioxide (C) soil minerals (D) atmospheric oxygen (E) nitrogen.
30. What is a population's carrying capacity? (A) the number of individuals in that population (B) a constant that can be estimated for all populations (C) inversely related to r (D) the population size that can be supported by available resources for that species within the habitat (E) set at 8 billion for the human population.
31. The final electron acceptor of the electron transport chain that functions in oxidative phosphorylation is: (A) oxygen (B) water (C) NAD (D) pyruvate (E) ADP.
32. The light reactions of photosynthesis supply the Calvin cycle with: (A) light energy (B) CO_2 and ATP (C) H_2O and NADPH (D) ATP and NADPH (E) sugar and O_2 .
33. Signal-transduction pathways benefit cells for all of the following reasons except: (A) they help cells respond to signal molecules that are too large or too polar to cross the plasma membrane (B) they enable different cells to respond appropriately to the same signal (C) they help cells use up phosphate generated by ATP breakdown (D) they can amplify a signal (E) variations in the signal-transduction pathways can enhance response specificity.
34. The primer that initiates synthesis of a new DNA strand is usually (A) RNA (B) DNA (C) an Okazaki fragment (D) a structural protein (E) a thymine dimer.
35. Which component is not directly involved in the process known as translation? (A) mRNA (B) DNA (C) tRNA (D) ribosomes (E) GTP.
36. What of the following characteristics of processes is common to both bacteria and viruses? (A) nucleic acid as the genetic material (B) binary fission (C) mitosis (D) ribosomes in the cytoplasm (E) conjugation.
37. Which of the following has the largest genome size and the smallest numbers of genes per million base pairs? (A) *H. influenzae* (bacterium) (B) *S. cerevisiae* (yeast) (C) *A. thaliana* (plant) (D) *D. melanogaster* (fruit fly) (E) *H. sapiens* (human).

38. In *Drosophila*, which genes initiate a cascade of gene activation that includes all other genes in the list? (A) homeotic genes (B) gap genes (C) pair-rule genes (D) egg-polarity genes (E) segment polarity genes.
39. In a population in Hardy-Weinberg equilibrium, 16% of the individuals show the recessive trait. What is the frequency of the dominant allele in the population? (A) 0.84 (B) 0.36 (C) 0.6 (D) 0.4 (E) 0.48.
40. Most of biological diversity has probably arisen by (A) anagenesis (B) cladogenesis (C) phyletic evolution (D) hybridization (E) sympatric speciation.
41. If human and pandas belong to the same class, then they must also belong to the same: (A) order (B) phylum (C) family (D) genus (E) species.
42. Which of the following represents a probable order in the biological history of Earth? (A) metabolism before mitosis (B) an oxidizing atmosphere followed by a reducing atmosphere (C) eukaryotes before prokaryotes (D) DNA genes before RNA genes (E) animals before algae.
43. Penicillins function as antibiotics mainly by inhibiting the ability of some bacteria to: (A) form spores (B) replicate DNA (C) synthesize normal cell walls (D) produce functional ribosomes (E) synthesize ATP.
44. Which of the following is an incorrect statement about the possible endosymbiotic origins of plastids and mitochondria? (A) they are the appropriate size to be descendants of bacteria (B) they contain their own genome and produce all their own proteins (C) they contain circular DNA molecules (D) their membranes have enzymes and transport systems that resemble those found in the plasma membrane prokaryotes (E) their ribosomes are more similar to those of bacteria than to those of eukaryotes.
45. A land plant that produces flagellated sperm and has a diploid-dominant generation is most likely a: (A) fern (B) moss (C) liverwort (D) charophycean (E) hornwort.
46. Which of the following is not thought to be ancestral to humans? (A) a reptile (B) a bony fish (C) a primate (D) an amphibian (E) a bird.
47. Carnivorous adaptations of plants mainly compensate for soil that has a relatively low content of: (A) potassium (B) nitrogen (C) calcium (D) water (E) phosphate.
48. The application of ecological principles to return a degraded ecosystem to its natural state is specifically characteristic of: (A) population viability analysis (B) landscape ecology (C) conservation ecology (D) restoration ecology (E) resource conservation.
49. Which of the following is not a protein? (A) hemoglobin (B) cholesterol (C) an antibody (D) an enzyme (E) insulin.
50. If an enzyme solution is saturated with substrate, the most effective way to obtain an even faster yield of products is to: (A) add more of the enzyme (B) heat the solution to 90°C (C) add more substrate (D) add an allosteric inhibitor (E) add a noncompetitive inhibitor.