

注意事項：不必抄題，但須依題號依序作答，答案一律寫在試卷上，否則不予計分。

I. Choose the most appropriate answer for the following questions,
1.5 points each. (75%)

1. It is difficult to observe individual chromosome during interphase because
(A) The DNA has not been replicated yet
(B) They have uncoiled from long, thin strand
(C) The spindle must move then to the metaphase plate before they become visible
(D) Homologous chromosomes do not pair up until division start
2. Which of the following is not a function of mitosis in humans?
(A) repair of wounds
(B) growth
(C) replace of lost or damaged cells
(D) production of gametes from diploid cells
3. In mice, brown color is dominant; white is recessive. Suppose you want to know the genotype of a brown mouse. The easiest way to do this would be to
(A) It can't be done
(B) mate it with a brown mouse
(C) mate it with a white mouse
(D) mate it with a mouse of its own genotype
4. Which of the following carry the same genetic information?
(A) a sister chromatid
(B) X and Y chromosome
(C) all autosomes
(D) homologous chromosomes
5. You would be unlikely to see which of the following human cells dividing?
(A) skin cell
(B) cancer cell
(C) nerve cell
(D) cell from an embryo
6. There are 22 chromosomes in the nucleus of a toad skin cell, a toad egg would contain _____ chromosomes.
(A) 22
(B) 11
(C) 44
(D) 88
7. Which of the following are arranged in the correct order by size, from largest to smallest?
(A) chromosome-gene-codon-nucleotide
(B) nucleotide-chromosome-gene-codon
(C) codon-chromosome-gene-nucleotide
(D) chromosome-gene-nucleotide-codon
8. An RNA or DNA molecule is a polymer made of subunits called
(A) bases
(B) amino acids
(C) nucleotides
(D) nucleic acids
9. The information carried by a DNA molecule is in
(A) its amino acid sequence
(B) the sugars and phosphates forming its backbone
(C) the order of the bases in the molecule
(D) the total number of nucleotides it contains
10. which of the following process occur in the cytoplasm of a eukaryotic cell?
(A) DNA replication
(B) translation
(C) transcription
(D) splicing
11. which of the following would not normally be used in recombinant DNA experiment?
(A) DNA ligase
(B) transposon
(C) plasmid
(D) restriction enzyme
12. Your bone cells, muscle cells, and skin cells look different because
(A) different kinds of genes are present in each kind of the cell
(B) they are present in different organisms
(C) different genes are active in each kind of cell
(D) they contain different numbers of genes
13. Operon enable bacteria to
(A) function in frequently changing environments
(B) differentiate
(C) resist attack by predators
(D) mutate more rapidly
14. After an mRNA molecule is transcribed from a eukaryotic gene, portions called _____ are removed and remaining _____ are spliced together to produce an mRNA molecule with a continuous coding sequences.
(A) oncogenes.....proto-oncogenes
(B) promoters.....operators
(C) exons.....introns
(D) introns.....exons

(背面仍有題目,請繼續作答)

15. An individual with the genotype AaBbCC is able to produce how many different kinds of gametes?
(A) 2 (B) 3 (C) 4 (D) 7
16. Blood types (A, B, O) are controlled by
(A) sex-linked genes (B) linked genes (C) multiple genes (D) multiple alleles
17. Which of the following structures would NOT be characteristic of the most plant cells?
(A) a cellulose wall (B) chloroplast (C) a centriole (D) a central vacuole
18. Which of the following is a form of transport that does not involve the expenditure of energy?
(A) sodium-potassium pump (B) osmosis (C) endocytosis (D) active transport
19. The most widely accepted current concept that best explains the function of plasma membrane is
(A) fluid mosaic model (B) protein-lipid sandwich
(C) lipid bilayer (D) porous phospholipid lining
20. The science of naming and classifying organisms is called
(A) Biology (B) Polyploidy (C) Genetics (D) Taxonomy
21. Individual of different species living in the same area may be prevented from interbreeding by responding to different mating dances. This is called
(A) Temporal isolation (B) Habitat isolation
(C) Mechanical isolation (D) Behavioral isolation
22. It is unlikely that the human population will give rise to a new species because
(A) the human population is too large (B) geographical isolation is unlikely to occur
(C) the human population is too diverse (D) natural selection cannot affect humans
23. Which of the following is not a characteristic of all animals?
(A) They are eukaryotes (B) They have tissues, organs, and organ systems
(C) They ingest their food (D) They are heterotrophic
24. Which of the following is not shared by birds and reptiles?
(A) endothermic metabolism (B) amniotic eggs
(C) gill structure in embryo (D) scales made of keratin
25. A _____ is a chordata but not a vertebrate.
(A) shark (B) lancelet (C) sea star (D) frog
26. A lion can mate with a tiger, but any offspring produced will be infertile and thus will not be able to produce offspring. This situation suggests that lions and tigers cannot be part of the same
(A) ecosystem (B) community (C) population (D) family
27. About twelve to twenty-four hours after the last meal, a person's blood sugar level normally varies from about 60 to 90 milligrams per 100 milliliters of blood, though it may attain 130 mg/100 ml after meals high in carbohydrates. That the blood sugar level is maintained within a fairly narrow range in spite of uneven intake of sugar is due to the body's ability to carry out
(A) adaptation (B) inheritance (C) metabolism (D) homeostasis
28. Uncle David had his gallbladder removed and afterward
(A) could not eat foods containing large amount of fat
(B) needed to take an amino acid supplement
(C) had trouble digesting proteins
(D) could eat monosaccharides and disaccharides but not polysaccharides
29. In the blood, bicarbonate ions
(A) help transport oxygen (B) act as buffers to guard against pH changes
(C) are transported by hemoglobin (D) are poisonous and must constantly be removed
30. Which of the following in a human is most similar in function to the gill lamella of a fish?
(A) vocal cords (B) bronchioles (C) alveoli (D) tracheae
31. Just after blood leaves the left ventricle of the human heart, it passes through the
(A) pulmonary (B) left atrium (C) aorta (D) right ventricle
32. In circulating by the shortest route from the lungs to the foot, how many times would a drop of blood pass through the left ventricle?
(A) 0 (B) 1 (C) 2 (D) 3
33. A vaccine contains
(A) white blood cells that fight infection (B) lymphocyte antigens
(C) inactivated disease-causing microbes (D) a hormone that boosts immunity

34. In a series of immune system experiments, the thymus glands were removed from baby mice. Which of the following would you predict as a likely results?
 (A) The mice suffered from numerous allergies
 (B) The mice readily accepted tissue transplants
 (C) The mice suffered from autoimmune
 (D) The mice never developed cancerous tumors
35. Which of the following happens first as a nephron processes blood?
 (A) excretion (B) osmosis (C) filtration (D) reabsorption
36. Which of the following would be filtered from the blood but not normally found in urine?
 (A) water (B) red blood cell (C) urea (D) amino acid
37. Steroid hormones are produced only by the
 (A) sex organs and adrenal cortex (B) adrenal medulla and pancreas
 (C) thyroid gland and pancreas (D) thyroid gland and sex organs
38. Which of the following hormones has the broadest range of targets?
 (A) epinephrine (B) prolactin (C) calcitonin (D) antidiuretic hormone(ADH)
39. External fertilization occurs mostly in
 (A) land animals (B) insect (C) aquatic animal (D) mammals
40. Doctors hoping to increase the chances of implantation of embryos fertilized in vitro might treat the recipient with
 (A) progesterone (B) oxytocin (C) prolactin (D) follicle-stimulating hormone
41. A stimulus triggers an action potential by
 (A) causing sodium ions to leak into the neuron
 (B) triggering the release of neurotransmitter
 (C) activating the sodium-potassium pump
 (D) causing sodium ions to leak out of the neuron
42. Which of the following is part of the central nervous system?
 (A) sympathetic nerve (B) spinal nerve (C) spinal cord (D) ganglion
43. Eating carrots really is good for your eyes. Carrots contain vitamin A, which is used to make a substance called rhodopsin, which
 (A) keeps the lens clear and transparent
 (B) is a visual pigment that absorbs light
 (C) colors the iris of the eye
 (D) provides energy for the function of rods and cones
44. Inside a muscle fiber, _____ triggers contraction and _____ provides the energy.
 (A) ATP.... calcium ion (B) myosin....actin
 (C) actin....myosin (D) calcium ion....ATP
45. Rhythms that are repeated every twenty-four hours are collectively and specifically known as
 (A) biorhythms (B) biological clock (C) tropisms (D) circadian rhythms
46. The plant hormone that is gaseous is
 (A) auxin (B) ethylene (C) florigen (D) cytokinin
47. Which statement is false?
 (A) Sporophyte plants reproduce asexually (B) Flowers are reproductive shoots
 (C) Trees are gametophytes (D) Gametophytes are haploid
48. Sugars are carried throughout the plant in _____ tissue.
 (A) cortex (B) parenchyma (C) xylem (D) phloem
49. The Casparian strip is found in the
 (A) cortex (B) endodermis (C) pericycle (D) epidermis
50. Which of the following is a vascular plant?
 (A) bryophyte (B) fern (C) red algae (D) green algae

II. Answer the following questions. (25%)

- Describe the exponential and logistic population growth curves, explain their shapes and explain why they are different. What is exponential growth unrealistic in a natural setting? (13%)
- Describe some factors that might affect carrying capacity? (6%)
- State whether a large, widely distributed population or a small, isolated population is more likely to undergo speciation, and explain why? (6%)