

說明：一、請一律以「答案卷」作答，作答時不得使用鉛筆，違者該科答案卷不予計分；限用黑色或藍色墨水的筆書寫。

二、考生應在答案卷上規定範圍內作答，且不得書寫任何與答案無關之文字、符號，違者該科不予計分。

三、答案卷以每人一張為限，不得要求增補；試題與答案卷必須繳回，不得攜出試場。

高雄醫學大學 111 學年度學生轉系考試【普通生物學】試題 第 1 頁，共 7 頁

1. Aquaporins

- A) allow water to cross the plasma membrane via facilitated diffusion.
- B) allow water to cross the plasma membrane against its concentration gradient.
- C) allow for the active transport of water.
- D) are found in all cells.
- E) all are correct.

2. The nitrogen-fixing activity of cyanobacteria takes place in

- A) thylakoid B) heterocyte C) chloroplast D) plasmid E) endospore

3. Which substance could be an enzyme cofactor?

- A) protein B) polypeptide C) zinc atom D) ribosome E) vitamin

4. How does inhibition of an enzyme-catalyzed reaction by a competitive inhibitor differ from inhibition by a noncompetitive inhibitor?

- A) Competitive inhibitors interfere with the enzyme; noncompetitive inhibitors interfere with the reactants.
- B) Competitive inhibitors bind to the enzyme reversibly; noncompetitive inhibitors bind to it irreversibly.
- C) Competitive inhibitors change the enzyme's tertiary structure; noncompetitive inhibitors cause polypeptide subunits to dissociate.
- D) Competitive inhibitors bind to the active site of the enzyme; noncompetitive inhibitors bind to a different site.
- E) Noncompetitive inhibitors bind to the active site of the enzyme; competitive inhibitors bind to a different site.

5. Which statement regarding the function of mitosis is *false*?

- A) Mitosis allows organisms to grow.
- B) Mitosis promotes genetic diversity.
- C) Mitosis is necessary for asexual reproduction in eukaryotes.
- D) Mitosis promotes repair tissues.
- E) All are incorrect.

6. Mendel's law of independent assortment states that

- A) chromosomes sort independently of each other during mitosis and meiosis.
- B) independent sorting of genes produces polyploid plants under some circumstances.

- C) the allele that a gamete receives for one gene does not influence the allele the gamete receives for another gene.
- D) genes are sorted concurrently during gamete formation.
- E) genes are transmitted to progeny.
7. Which of the following statement is **True** for a virulent phage?
- A) phage replicates without destroying host cell
- B) phage genome integrates in the chromosome of bacteria
- C) a large number of phages are released
- D) bacterial cell contains phage DNA
- E) all statements are true
8. What results from conjugation between a bacterium that lacks an F factor (F^-) and a bacterium that has an F factor on its chromosome (F^+)?
- A) The F^- bacterium ends up carrying one or more plasmids from the F^+ bacterium; the F^+ bacterium is unchanged.
- B) The F^+ bacterium ends up with a recombinant chromosome that carries some genes from the F^- bacterium, and the F^- bacterium ends up with an unaltered chromosome.
- C) The F^+ bacterium ends up with a recombinant chromosome that carries some genes from the F^- bacterium, and the F^- bacterium ends up with a chromosome that lacks those genes.
- D) The F^- bacterium ends up with a recombinant chromosome that carries some genes from the F^+ bacterium, and the F^+ bacterium ends up with an unaltered chromosome.
- E) The F^+ bacterium ends up with a recombinant chromosome that carries some genes from the F^- bacterium, and the F^+ bacterium ends up with an unaltered chromosome.
9. Below are three statements. Which choice properly matches the statements with the correct biological processes?
- I. This occurs in the nucleus of eukaryotic cells with DNA polymerase.
- II. Transfer RNAs bind amino acids in the cytoplasm.
- III. An RNA polymerase enzyme is required.
- A) I: replication; II: translation; III: transcription
- B) I: translation; II: translation; III: replication
- C) I: transcription; II: translation; III: translation
- D) I: replication; II: transcription; III: replication
- E) I: replication; II: transcription; III: transcription
10. Speciation without geographic isolation is called _____ speciation.
- A) convergent B) allopatric C) incomplete D) diversifying E) sympatric
11. The process through which species not closely related may come to resemble one another if they live in a similar environment is known as
- A) coevolution. B) homology. C) convergent evolution. D) pedomorphosis.
- E) diversified
12. What is an example of exaptation?

- A) Some insects do not develop wings when resources are plentiful.
 - B) Human middle ear bones are derived from ancestral gill arch tissue.
 - C) Wings of bats and wings of birds are homologous.
 - D) Mutation rates can increase at higher temperatures.
 - E) Mutation rates can change at various times.
13. The largest group of prokaryotes is the _____, which obtain both energy and carbon from _____.
- A) autotrophs; inorganic molecules
 - B) chemoautotrophs; decaying organic material
 - C) chemoheterotrophs; organic molecules
 - D) photoautotrophs; light
 - E) chemoautotrophs; organic material
14. Evidence for similarities between Archaea and Eukarya includes the
- A) absence of introns from genes in both groups.
 - B) fact that both contain circular DNA without histones.
 - C) presence of peptidoglycan in the cell walls of both groups.
 - D) fact that both have several kinds of relatively complex RNA polymerases.
 - E) absence of cell wall in both groups.
15. _____ are toxic proteins secreted by pathogenic bacteria, and _____ are toxic components of the outer membrane of gram-negative bacteria.
- A) Endotoxins; parasites
 - B) Endotoxins; botulinum toxins
 - C) Exotoxins; enterotoxins
 - D) Exotoxins; endotoxins
 - E) Endotoxins; enterotoxins
16. *Plasmodium*, the organism that causes malaria, is a(n)
- A) amoeba.
 - B) stramenopile.
 - C) ciliate.
 - D) alveolate.
 - E) excavate.
17. Which option correctly represents the most likely sequence of the evolution of plants, from earliest to most recent?
- A) bryophytes, seedless vascular plants, gymnosperms, angiosperms
 - B) seedless vascular plants, bryophytes, angiosperms, gymnosperms
 - C) bryophytes, seedless vascular plants, angiosperms, gymnosperms
 - D) bryophytes, gymnosperms, seedless vascular plants, angiosperms
 - E) bryophytes, angiosperms, seedless vascular plants, gymnosperms
18. Which structure is found in angiosperms but *not* gymnosperms?
- A) root
 - B) spores
 - C) seeds
 - D) ovule
 - E) fruit
19. Most familiar types of fungi including mushrooms, puffballs, and shelf fungi are examples of

A) chytrids. B) ascomycetes. C) zygomycetes. D) basidiomycetes. E) streptomyces.

20. The function of the sphincter between the stomach and small intestine is to

- A) retain chyme in the stomach until pepsin digestion is complete.
- B) periodically release chyme into the small intestine in squirts.
- C) release bile into the duodenum when chyme is present.
- D) release pancreatic secretions into the duodenum when chyme is present.
- E) pancreatic secretions transiently into the duodenum when chyme is present.

21. Which hormone is produced by adipose cells and helps to control appetite?

- A) insulin B) bile C) gastrin D) leptin E) interferon

22. Which statement regarding breathing and circulation in insects is *false*?

- A) Insects lose very little water by using a tracheal system to breathe.
- B) The tracheal system of insects consists of a series of branching air tubes that extend from the surface to deep inside the body.
- C) Terrestrial animals such as insects spend much more energy than aquatic animals to ventilate their respiratory surfaces.
- D) The circulatory system of insects is not involved in transporting gases.
- E) Insects spend little water by using a tracheal system to breathe.

23. What part of the human brain contains control centers that establish a breathing rhythm?

- A) midbrain B) cerebellum C) pituitary D) thalamus E) medulla oblongata

24. Which statement about mammalian circulatory systems is *false*?

- A) The pulmonary circuit carries blood between the heart and the lungs.
- B) The systemic circuit carries blood between the heart and the rest of the body.
- C) Mammals have two atria and two ventricles in their hearts.
- D) The left side of a mammal's heart sends blood to the lungs.
- E) The pulmonary circuit carries blood between the heart and the body.

25. In mammals, blood returning from the head will pass through the _____ just before entering the right atrium.

- A) left atrium B) superior vena cava C) inferior vena cava D) aorta E) right atrium

26. During ventricular systole, the semilunar valves _____ and the AV valves _____.

- A) open; open B) close; open C) open; close D) close; close E) open, unchanged.

27. Which of the following cells are phagocytes?

- A) monocytes and neutrophils
- B) basophils and eosinophils
- C) eosinophils and lymphocytes
- D) lymphocytes and basophils
- E) monocytes and mast cells

28. Which is the correct order of steps taken by B and T cells to defend against infection in body fluids and cells?

1. B and T cells move to the lymph nodes, spleen, and other parts of the lymphatic system.
2. B and T cells leave the bone marrow and thymus and move to the bloodstream.
3. B and T cells meet and begin to fight viruses or other infectious agents.
4. B and T cells develop antigen receptors.

A) 4, 2, 3, 1 B) 2, 4, 3, 1 C) 4, 3, 2, 1 D) 2, 4, 1, 3 E) 4, 2, 1, 3

29. Clonal selection

- A) determines the pool of mature leukocytes that will be stimulated by macrophages.
- B) requires the activation of natural killer cells.
- C) describes the proliferation of B and T lymphocytes after they have been activated by an antigen.
- D) requires the presence and activation of complement.
- E) describes the selection of mature non-self T cells.

30. Complement proteins can do all of these functions *except*

- A) enhance phagocytosis by innate immune cells by attaching to cell invaders.
- B) help trigger the inflammatory response.
- C) attack cancer and virus-infected cells after they are released by natural killer cells.
- D) act as chemical signals to recruit more immune cells to the site of infection.
- E) lysis of target cells.

31. What is passive immunity dependent upon?

- A) a person's own immune system producing antibodies
- B) antibodies made by another organism
- C) antibody-producing cells from another organism
- D) antigens from a person's own body
- E) antigen stimulates antibody production

32. What is the advantage of excreting nitrogenous waste in the form of ammonia?

- A) Ammonia is less toxic than uric acid.
- B) Ammonia is less soluble than uric acid.
- C) Ammonia excretion conserves energy.
- D) Ammonia does not diffuse across cell membranes.
- E) Ammonia excretion expends energy.

33. Which option correctly lists the structures in the kidney in the order in which fluid flows through them?

- A) proximal tubule, Bowman's capsule, loop of Henle, distal tubule, glomerulus
- B) Bowman's capsule, proximal tubule, loop of Henle, distal tubule, glomerulus
- C) glomerulus, Bowman's capsule, loop of Henle, proximal tubule, distal tubule
- D) glomerulus, proximal tubule, distal tubule, Bowman's capsule, loop of Henle

- E) glomerulus, Bowman's capsule, proximal tubule, loop of Henle, distal tubule
34. Where along the nephron is glucose reabsorbed from the filtrate back into the blood?
- A) distal tubule B) loop of Henle C) proximal tubule D) Bowman's capsule
- E) renal pelvis
35. What is the function of antidiuretic hormone?
- A) to increase urination
- B) to increase water reabsorption
- C) to stimulate sodium reabsorption
- D) to counter the effects of alcohol consumption
- E) to reduce water reabsorption
36. Which endocrine gland synthesizes melatonin?
- A) pineal B) adrenal cortex C) thyroid D) parathyroid E) pituitary
37. Which statement about glands and hormones is *true*?
- A) The anterior pituitary produces multiple hormones that affect activity of other endocrine glands and cells of the body.
- B) The posterior pituitary produces melatonin, which helps regulate biological rhythms.
- C) The pineal gland is the master control center of the endocrine system.
- D) The hypothalamus is an endocrine gland responsible for producing the hormone calcitonin.
- E) All statements are true.
38. Which hormone stimulates growth of an ovarian follicle?
- A) LH B) FSH C) estrogen D) progesterone E) androgen
39. One neurotransmitter associated with sleep, mood, attention, and learning is
- A) acetylcholine. B) nitric oxide. C) epinephrine. D) serotonin. E) melatonin.
40. Which results from stimulation by the parasympathetic nervous system?
- A) increased heart rate
- B) inhibition of the digestive organs
- C) inhibition of urination
- D) stimulation of saliva secretion
- E) inhibition of saliva secretion
41. Which list correctly orders the structures within the ear as they transfer a sound wave during hearing?
- A) eardrum, hammer, anvil, stirrup, oval window, auditory canal
- B) eardrum, stirrup, hammer, anvil, oval window, auditory canal
- C) auditory canal, eardrum, hammer, stirrup, anvil, oval window
- D) auditory canal, eardrum, stirrup, hammer, anvil, oval window
- E) auditory canal, eardrum, hammer, anvil, stirrup, oval window

42. Which of the following characteristics is referred to HIV, but not other viruses.
- A) 2 copies of RNA molecules B) reverse transcription C) enveloped virus D) A+B
- E) all are correct
43. Which part of a bone contains red bone marrow?
- A) compact bone
- B) fibrous connective tissue
- C) spongy bone
- D) yellow bone marrow
- E) fatty tissue
44. Which statement best describes the power stroke of muscle contraction?
- A) The myosin head bends, pulling the thick filament toward the center of the sarcomere.
- B) The myosin head bends, pushing the thin filament toward the center of the sarcomere.
- C) The actin head bends, pulling the thin filament toward the center of the sarcomere.
- D) The actin head bends, pulling the thick filament toward the center of the sarcomere.
- E) The myosin head bends, pulling the thin filament toward the center of the sarcomere.
45. which of the following about gram-positive and gram-negative bacteria is True?
- A) gram-negative bacteria have more peptidoglycan in their cell walls.
- B) gram-positive bacteria have fimbriae but gram-negative bacteria do not.
- C) certain bacteria are not gram-positive or gram-negative.
- D) only gram-negative bacteria can form capsules.
- E) endotoxin is existed in Gram-positive bacteria
46. What is the plant hormone which is produced in roots and promote the attraction of mycorrhizal fungi to roots?
- A) brassinosteroids B) jasmonates C) strigolactones D) abscisic acid E) gibberellins
47. urine flows from the collecting duct to
- A) ureter B) urethra C) capsule D) glomerulus E) renal pelvis
48. A torpor for animals to survive long period of high temperature and water scarcity.
- A) hibernation B) estivation C) adaptation D) thermoregulation E) acclimatization
49. Which of the following is a TRUE statement about virus
- A) all viruses have capsid and membrane envelope
- B) only retrovirus can reversely transcribe RNA to DNA
- C) RNA viruses can serve as a template for DNA synthesis
- D) only bacteriophages have lysogenic cycle
- E) virulent phage breaks open host cell wall for phage assembly
50. a polysaccharide sticky layer which covers the bacteria surface and can resist phagocytosis
- A) outer membrane B) capsule C) envelope D) cell wall E) pili