

※ 注意：請於試卷上「選擇題作答區」依序作答。

I. 單選題 (每題2分，共52分)

1. The type of cells that line the blood vessels and lungs are
 - A) simple squamous epithelium.
 - B) simple cuboidal epithelium.
 - C) simple columnar epithelium.
 - D) stratified squamous epithelium
 - E) transitional epithelium
2. A population that is growing logistically
 - A) has a high intrinsic rate of increase.
 - B) grows fastest when density is lowest.
 - C) grows fastest at an intermediate population density.
 - D) grows fastest as it approaches carrying capacity.
 - E) is always slowed by abiotic factors.
3. A researcher discovers that an organism's resting metabolic rate is significantly lower at 15°C than that at 25°C. Which of the following organisms might this researcher have been study?
 - A) cat
 - B) deer
 - C) mouse
 - D) pigeon
 - E) snake
4. The cells in tissues and organs of mammalian body are in contact with an internal environment consisting of
 - A) blood
 - B) matrix
 - C) interstitial fluid
 - D) mucous membrane
 - E) connective tissue
5. Mary stick her finger with a sharp pin. The area affected is very small and only one pain receptor fires. However, the afferent sensory fiber fires repeatedly at a high frequency (it hurts!) and excites the second neuron in the spinal cord. This is an example of _____.
 - A) spatial summation
 - B) temporal summation
 - C) tetanus
 - D) habituation
 - E) long-term potentiation
6. Which of the following statements about respiration in human is **FALSE**?
 - A) Hemoglobin has a lower affinity for oxygen during exercise due to increased temperature and decreased pH.
 - B) An increase in arterial H^+ concentration is detected by the central chemoreceptors.
 - C) During exercise, tissue partial pressure of O_2 decreases.
 - D) The neurons responsible for the rhythmic breathing are located in the medulla.
 - E) Hemoglobin is nearly 75% saturated at the normal resting oxygen partial pressure of mixed venous blood.
7. Which of the following statements about circulation in human is true?
 - A) Veins and venules contain high blood volume compared with arteries & arterioles.
 - B) During the diastole, the heart muscle contracts.
 - C) Rising pressure in ventricles open the AV valves and close the semilunar valves.
 - D) Neurogenic stimuli from the nervous system keep the heart beating.
 - E) Stretch receptors in carotid sinus serve as mechanoreceptors that induce the pain sensation from heart.
8. The hydrochloric acid in the stomach
 - A) is secreted by the chief cells.
 - B) decreases when chyme is emptied into the duodenum.
 - C) is released in response to sympathetic stimulation.
 - D) activates trypsinogen.
 - E) decreases when the rate and strength of stomach contractions increase.

見背面

9. Why are we able to differentiate tastes and smells?
- A) The action potentials initiated by taste receptors are transmitted to a separate region of the brain than those initiated by receptors for smell.
 - B) The sensory region of the cerebral cortex distinguishes something we taste from something we smell by the difference in the action potential.
 - C) The brain distinguishes between taste, arising from interoceptors, from smell arising from exteroceptors.
 - D) Because we are able to see what we taste, the brain uses this information to distinguish taste from smell.
 - E) Taste receptors are more sensitive, which means these receptors will initiate a receptor potential before smell receptors do.
10. Which of the following choices does *NOT* pair an endocrine gland or hormone with its function?
- A) parathyroid --- blood calcium levels
 - B) ovary --- female sexual characteristics
 - C) melatonin --- circadian rhythm
 - D) glucagon --- blood glucose levels
 - E) prolactin --- blood potassium levels
11. What type of feature is emphasized in cladistic classification system?
- A) plesiomorphic character
 - B) parallel character
 - C) convergent character
 - D) apomorphic character
 - E) synapomorphic
12. The initial developmental course of fruit fly is determined by
- A) paternal genes
 - B) maternal genes
 - C) zygotic genes
 - D) segment polarity genes
 - E) homeotic genes
13. Sparrows are receptive to learning songs only during a critical period. Which of the following terms about behavior best fits the above description.
- A) fixed action pattern
 - B) operant conditioning
 - C) imprinting
 - D) habituation
 - E) classical conditioning
14. Fall leaf color on deciduous trees is a result of
- A) the production of more accessory pigments because of the cooler temperatures.
 - B) the reduction in the production of accessory pigments because of the cooler temperatures.
 - C) cessation of chlorophyll production, which allows the accessory pigments to be revealed.
 - D) the increased angle of the sun during the fall, which reflects more of the accessory pigments causing the human eye to see the red, yellow, and orange colors that were masked by the green chlorophyll.
 - E) chlorophyll will absorb near the yellow wavelengths of light, but photosynthesis will be greatly reduced.
15. Before ARF transcription factors can trigger auxin-induced gene expression, what must happen?
- A) Auxin binds to ubiquitin, a degradation tag.
 - B) Auxin binds to TIR1, an auxin receptor.
 - C) Auxin degrades Aux/IAA proteins which repress ARF transcription factors.
 - D) Auxin must bind to the ARF transcription factor.
 - E) Ubiquitin must destroy TIR1 to release Aux/IAA proteins.

25. A friend who is not a biologist tells you that she grows irises from iris roots. You explain to her that the "root" she is planting is not a root, but instead is called a rhizome. "Why?" she asked. You explain.
- A) "A rhizome, although a modified stem, acts as a root does. In other words a rhizome is a stem-root combination."
 - B) "A rhizome has nodes and internodes and is really a modified stem that can exist underground."
 - C) "A root stores nutrients, rhizomes are underground stems that do not store nutrients."
 - D) "A root grows vertically, not horizontally."
 - E) "A rhizome is a modified root that is able to grow leaves."
26. In magnesium-deficient plants, it is often observed that the older leaves show more severe symptoms like chlorosis than younger leaves. What is the best explanation?
- A) There is more time for the symptoms to develop in older leaves.
 - B) Chlorophyll is transported from the older leaves to the younger leaves.
 - C) Magnesium is more soluble in younger leaves.
 - D) Scarce magnesium is removed from older leaves to support younger, more active leaves.
 - E) Older leaves need less chlorophyll.

※ 注意：請於試卷上「非選擇題作答區」依序作答，並應註明作答之題號。

II. 解釋名詞 (每題 4 分)

- 1. keystone species
- 2. endothermy
- 3. motor unit
- 4. niche
- 5. fitness (biological definition)
- 6. antigen-presenting cell

III. 解釋下列各組名詞 (每題 4 分)

- 1. photoheterotrophs and chemoheterotrophs
- 2. phototropism and photoperiodism
- 3. centromere and centriole
- 4. law of segregation and independent assortment
- 5. lysosome and peroxisome
- 6. vernalization and stratification

試題隨卷繳回