

參考用

一、單選題 (請選擇一個最適合的答案; 每題 3 分; 共計 60 分)

1. Most of a cell's enzymes are
(A) lipids. (B) proteins. (C) amino acids. (D) nucleic acids. (E) carbohydrate.
2. Cellulose, the most abundant organic compound on earth, is formed by linking glucose by _____ bond.
(A) $\alpha 1 \rightarrow 4$ (B) $\beta 1 \rightarrow 4$ (C) $\alpha 1 \rightarrow 6$ (D) $\beta 1 \rightarrow 6$ (E) $\gamma 1 \rightarrow 4$
3. What is the main advantage of the C4 and CAM photosynthesis strategies over the C3 strategy?
(A) They make it possible for the plant to use the Calvin cycle at night and during the day.
(B) They allow the plant to fix carbon more efficiently under conditions of low atmospheric CO₂.
(C) They allow the plant to fix carbon more efficiently in dim or cool conditions.
(D) They help the plant conserve water and synthesize glucose efficiently under hot, dry conditions.
(E) They allow the plant to avoid photorespiration by producing a four-carbon sugar in place of glucose.
4. Your bone cells, muscle cells, and skin cells look different because
(A) they are present in different organs.
(B) each cell contains different kinds of genes.
(C) they contain different numbers of genes.
(D) different genes are active in each kind of cell.
(E) each cell has different mutations.
5. DNA replication
(A) results in the formation of four new DNA strands.
(B) occurs by the addition of nucleotides to the end of the DNA molecule.
(C) produces two daughter DNA molecules that are complementary to each other.
(D) uses each strand of a DNA molecule as a template for the creation of a new strand.
(E) begins when two DNA molecules join together to exchange segments.
6. All the offspring of a cross between a black-eyed mendalien and an orange-eyed mendalien have black eyes. This means that the allele for black eyes is _____ the allele for orange eyes.
(A) dominant to
(B) recessive to
(C) codominant to
(D) incompletely dominant to
(E) pleiotropic to
7. RFLP analysis is being used as evidence to link suspects with blood and tissues found at crime scenes. DNA fingerprints consist of many "bands" or "lines". The pattern of these bands in a DNA fingerprint shows
(A) the order of DNA nucleotides in a particular gene.
(B) the individual's genotype.
(C) the order of genes along particular chromosomes.
(D) the presence of dominant or recessive alleles for particular traits.
(E) the presence of certain DNA restriction fragments.

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8. Which of the following cellular structures is characteristic of amoebas?
(A) Microvilli (B) Cilia (C) Flagella (D) Pili (E) Pseudopodia
9. Which of the following types of reproductive barriers separates a pair of moth species that could interbreed except that the females' mating pheromones are not attractive to the males of the other species?
(A) habitat isolation
(B) temporal isolation
(C) behavioral isolation
(D) mechanical isolation
(E) gametic isolation
10. A mountain range divides a freshwater snail species into two isolated populations. Erosion eventually lowers the range and brings the two populations together again, but when they mate, the resulting hybrids all produce sterile young. This scenario is an example of
(A) sympatric speciation.
(B) incipient speciation.
(C) gradualism.
(D) allopatric speciation.
(E) punctuated equilibrium.
11. Which one of the following is **not** a characteristic of the chloroplast ATP synthase?
(A) It is a protein complex.
(B) It transports H^+ from the thylakoid compartment to the stroma.
(C) It couples the flow of H^+ to the phosphorylation of ADP.
(D) It is embedded in the thylakoid membrane.
(E) It requires the input of NADPH.
12. Why do cigarette smokers cough more than nonsmokers?
(A) The tar in cigarette smoke tends to make alveoli stick closed. Coughing opens them.
(B) Cigarette smoke harms the cilia that normally move debris out of the lungs. Coughing is the remaining way to clean the lungs.
(C) Cigarette smoking partially paralyzes the muscles in the lungs, resulting in an increased residual volume. Coughing exchanges this "dead air".
(D) By raising the pressure in the lungs, coughing forces more oxygen into the blood.
(E) Coughing stimulates blood flow to the lungs.
13. The main function of the AV node is to
(A) initiate the heartbeat.
(B) set the rhythm of the heartbeat.
(C) relay the signal to contract from the right ventricle to the right atrium.
(D) relay the signal to contract from the right heart to the left heart.
(E) relay the signal to contract to the ventricles.

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14. Which one of the following tissues has already been produced artificially and used on many patients?
- (A) heart muscle
 - (B) esophageal lining
 - (C) lining of the small intestine
 - (D) skin
 - (E) urinary bladder
15. Which of the following is a correct sequence of events leading to leaf fall in deciduous trees?
- (A) formation of abscission layer, increase in ethylene levels, decrease in auxin levels
 - (B) cooler temperatures, decrease in auxin levels, increase in ethylene production, formation of abscission layer
 - (C) shortening days, formation of abscission layer, decrease in ethylene levels, increase in auxin levels
 - (D) shortening days, formation of abscission layer, decrease in ethylene levels, increase in auxin levels
 - (E) decrease in ethylene levels, shorter day lengths, increase in auxin levels, formation of abscission layer
16. When you are very nervous, perhaps before you must speak in front of a college class, you notice that your mouth is dry and your heart is racing. This is most likely due to stimulation by the
- (A) enteric division of your autonomic nervous system.
 - (B) sympathetic division of your autonomic nervous system.
 - (C) parasympathetic division of your autonomic nervous system.
 - (D) All of the choices are correct.
 - (E) None of the choices is correct.
17. Which of the following endocrine glands is an outgrowth of the brain?
- (A) thymus (B) pineal (C) adrenal cortex (D) thyroid (E) parathyroid
18. A plant stem modified for nutrient storage is called a _____?
- (A) tuber (B) taproot (C) rhizome (D) runner (E) bulb
19. In England, at a time when milk was still delivered to doorsteps each morning in foil-capped glass bottles, a songbird called the great tit started pecking through the caps and drinking the cream in the necks of the bottles. This behavior spread through the great tit population in a matter of years. The emergence and spread of this behavior probably depended on
- (A) habituation.
 - (B) trial and error plus habituation.
 - (C) trial and error plus imitation.
 - (D) trial and error plus imprinting.
 - (E) habituation plus imitation.
20. Which one of the following organisms best illustrates K-selection?
- (A) the production of thousands of eggs every spring by frogs
 - (B) mice that produce three litters of 10-15 babies in the course of a summer
 - (C) a polar bear producing one or two cubs every three years
 - (D) a specie of weed that quickly spreads into a region of cleared trees
 - (E) All of the choices are examples of K-selection

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二、簡答題 (共計 40 分)

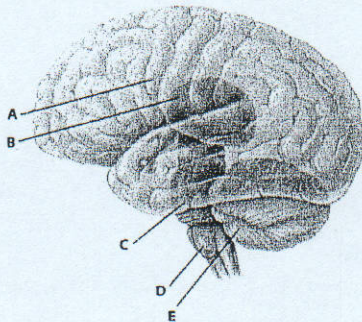
1. Please indicate whether the following descriptions is true (T) or false (F)? (10 points; 2 points for each question)

- (1) In non-vascular plants, the sporophyte is generally dependent throughout its life cycle on the gametophyte.
- (2) In plants, a spore will develop into a sporophyte.
- (3) An ovule is a sporangium covered by integument.
- (4) In ferns, a cluster of sporangia is called annulus.
- (5) Pine leaves have dichotomous veins.

2. What are the major functions of lysosomes, ribosomes, and chloroplasts? (10 points)

3. Please answer the following questions that refer to the diagram of a brain (indicate which part is the answer and write down its name in English)? (8 points)

- (1) You start to fall but then catch yourself, regaining your balance. Which of the following brain regions is responsible for the rapid coordination of muscle activity that kept you from falling? (4 points)
- (2) What part of the brain sorts incoming information into categories (such as touch signals from a hand) before relaying it to the cerebral cortex? (4 points)



4. Please fill in the letter representing the term corresponding to the description.

Each question has only one answer. (12 points; 2 points for each question)

- (1) _____ Fruit developed from many separated ovaries formed in a single flower.
- (2) _____ The development of fruit without fertilization.
- (3) _____ Seeds fail to germinate even when external conditions are favorable.
- (4) _____ Seeds absorb water.
- (5) _____ Germination of seeds triggered by low temperature.
- (6) _____ Fruit wall.

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|--------------------|------------------|-------------------|----------------|
| A. Vernalization | B. Scarification | C. Multiple fruit | D. Dormancy |
| E. Plumule | F. Caster bean | G. Imbibitions | H. Hesperidium |
| I. Aggregate fruit | J. Pepo | K. Stratification | L. Pericarp |