

一、單選題(每題 3 分,共計 60 分)

- Which are the products of respiration: a: ATP; b: CO₂; c: H₂O; d: Glucose; e: O₂
(A) abc, (B) abcd, (C) abcde, (D) abce, (E) bcde
- Cellulose, the most abundant organic compound on earth, is formed by linking glucose by _____ bond.
(A) $\alpha 1 \rightarrow 4$ (B) $\alpha 1 \rightarrow 6$ (C) $\beta 1 \rightarrow 4$ (D) $\beta 1 \rightarrow 6$ (E) $\gamma 1 \rightarrow 4$
- Which of the following are produced during the light reactions of photosynthesis?
(A) Glucose, ADP, NADP⁺ (B) Glucose, ADP, NADP⁺, CO₂ (C) ADP, NADP⁺, O₂ (D) ATP, NADPH, O₂ (E) ATP, NADPH, CO₂
- Karyotyping
(A) shows chromosomes as they appear in metaphase of meiosis II.
(B) can reveal alterations in chromosome number.
(C) examines points of crossing over.
(D) reveals the presence of cancerous genes.
(E) reveals the results of independent orientation of chromosomes during meiosis I.
- The mechanism that "breaks" the linkage between linked genes is called
(A) incomplete dominance
(B) independent assortment
(C) codominance
(D) crossing-over
(E) pleiotropy
- Which one of the following statement is **not** characteristic of eukaryotic RNA?
(A) Introns are added to the RNA
(B) Exons are spliced together
(C) A small cap of extra nucleotides is added to one end of the RNA
(D) A long tail of extra nucleotides is added to the other end of the RNA
(E) The completed RNA molecule is exported out of the nucleus
- How many different proteins (or enzymes) are made from *lac* operon?
(A) 0 (B) 1 (C) 2 (D) 3 (E) 4
- A plant with 12 chromosomes produces all gametes with 12 chromosomes; if self-fertilization occurs, the zygote would have _____ chromosomes?
(A) 3 (B) 6 (C) 9 (D) 12 (E) 24
- Our breathing control centers in the brain directly sense and respond to
(A) blood pH and CO₂ concentration
(B) blood O₂ concentration
(C) blood pH and O₂ concentration
(D) alveolar CO₂ concentration
(E) alveolar O₂ concentration
- Heart attacks
(A) are caused by excessive blood pressure in the heart
(B) actually cause no permanent damage to the heart
(C) are the result of angina pectoris
(D) are unrelated to cigarette smoking.

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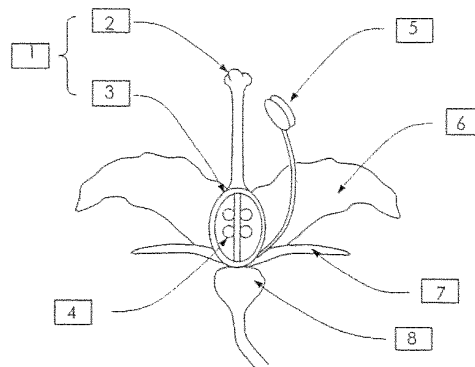
- (E) result from the death of cardiac muscle cells
11. A test tube is inoculated with 1×10^3 cells of a bacterial strain that has a generation time of 30 minutes. The carrying capacity of the test tube for this strain is 6×10^9 cells. What will the bacterial population be after 90 minutes of culturing?
(A) 3×10^3 (B) 8×10^3 (C) 9×10^3 (D) 1×10^9 (E) 1×10^{12}
12. Hermaphrodites are animals that
(A) possess both male and female reproductive systems
(B) have the gonads of one sex but the external appearance of the other
(C) develop from unfertilized eggs
(D) must fertilize themselves
(E) have abnormal reproductive systems
13. Which of the following is **not** a neurotransmitter?
(A) nitric oxide (B) acetylcholine (C) biogenic amines (D) endorphins (E) all of the choices are neurotransmitters
14. Which of the following kinds of receptors consists of naked, branched nerve fiber endings?
(A) tendon stretch receptors
(B) deep pressure receptors
(C) utricle hair cells
(D) pain receptors
(E) temperature receptors
15. Which of the following structures is the first to emerge from a germinating dicot seed?
(A) shoot hook (B) cotyledons (C) root (D) shoot sheath (E) root hair
16. A hot dry summer will reduce crop yield in part because
(A) the stomata of the plants never open
(B) too much carbon dioxide enters the plants
(C) carbon dioxide uptake and photosynthesis are slowed because the stomata close more frequently to prevent excessive water loss
(D) oxygen uptake and respiration are slowed because the stomata close more frequently to prevent excessive water loss
(E) carbon dioxide release and respiration are slowed because the stomata close more frequently to prevent excessive water loss
17. What prevents a seed released in the fall from germinating immediately?
(A) shortening day length
(B) abscisic acid
(C) the need to be frozen before it can germinate
(D) falling temperatures
(E) gibberellins
18. Which of the following was probably **not** present in the primitive Earth's atmosphere?
(A) CH_4 (B) CO_2 (C) NH_3 (D) O_2 (E) H_2O
19. A series of reciprocal adaptations in two species defines
(A) interspecific competition
(B) niche compartmentalization

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- (C) resource partitioning
 (D) coevolution
 (E) competitive exclusion
20. Which of the following is **not** a likely consequence of the thinning of the ozone layer?
 (A) increases in lethal and nonlethal skin cancer
 (B) increases in cataracts
 (C) global warming
 (D) harm to the phytoplankton in the ocean
 (E) All of the choices are likely consequences of the thinning of the ozone layer

二、簡答題 (每題 10 分, 共計 40 分)

1. Please indicate whether the following descriptions about fungi is true (T) or false (F)?
 (A) Fungi are heterotrophs
 (B) Fungi have nuclear mitosis
 (C) Fungal cell wall is made of pectin
 (D) Fungi produce non-motile spores
2. Compare the difference between prokaryotes and eukaryotes in terms of
 (A) nucleus, (B) endoplasmic reticulum, (C) mitochondria, and (D) DNA?
3. Please briefly describe how a helper T cell is activated by its specific antigen, and how an activated helper T cell stimulates humoral as well as cell-mediated immunity?
4. **Matching** -- Please match the numbers in the boxes with letters representing the correct terms



- A. Anther
 B. Carpel
 C. Filament
 D. Ovary
 E. Ovule
 F. Petal
 G. Receptacle
 H. Sepal
 I. Stamen
 J. Stigma
 K. Style