

1. Please explain what is Hardy-Weinberg principle ? (10 分)
2. Waste disposal is as important to homeostasis as water and solute balance. Metabolism produces a number of toxic by-products, particularly the nitrogenous (nitrogen-containing) wastes that result from the breakdown of proteins and nucleic acids. The form of an animal's nitrogenous wastes depends on the animal's evolutionary history and its habitat. Please describe what is the major nitrogenous wastes excreted by (a) most fish (b) mammals (c) reptiles and birds, and explain why? (15 分)
3. Differentiate the following terms
- law of segregation and independent assortment (4 分)
 - mitosis and meiosis (4 分)
 - ribozyme and ribosome (4 分)
 - centromere and centrosome (4 分)
 - ectotherm and endotherm (4 分)
4. Match each hormone (left column) with its effect on target cells (center column) and the gland where it is produced (right column)(每題 2 分; 請依範例方式作答,例:1. bq, 2. d.e, 3.....)
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|----------------|-------------------------------|-----------------------|
| 1. thyroxine | a. lowers blood glucose | p. pineal gland |
| 2. insulin | b. stimulates ovaries | q. testes |
| 3. PTH | c. triggers "fight or flight" | r. parathyroid gland |
| 4. epinephrine | d. promotes male traits | s. adrenal medulla |
| 5. melatonin | e. regulates metabolism | t. hypothalamus |
| 6. ADH | f. related to daily rhythm | u. pancreas |
| 7. androgen | g. raises blood calcium level | v. anterior pituitary |
| 8. FSH | h. boosts water retention | w. thyroid gland |
5. Match each of the following. (配合題;每小題1分;請以1-A, 2-C....格式作答)
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|---|-------------------------|
| ___ 1. Autonomous auxiliary DNA circles found in bacteria; easily enter the organism they are found in; used as a vehicle to transport desired foreign genes. | A. sticky ends |
| ___ 2. A technology used to amplify the desired piece of DNA; recently popularized in the movie <i>Jurassic Park</i> . | B. RFLP |
| ___ 3. Abbreviation for restriction fragment length polymorphism; analyze the human DNA products after restriction enzyme digestion; "fingerprints." | C. PCR |
| ___ 4. Organisms produced by moving genes of one species to another; desired characteristics such as disease resistance or increased size are transferred. | D. plasmids |
| ___ 5. Ends of DNA fragments produced by asymmetric cleavage with restriction endonucleases; same ends are produced by the same enzyme irrespective of the source of the DNA. | E. transgenic organisms |
6. Match each of the following. (配合題;每小題1分;請以1-A, 2-C....格式作答)
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|--|----------------------------------|
| ___ 1. Long-lived affect cells very distant from the releasing cell; hormones. | A. paracrine molecules; signals |
| ___ 2. Molecules on the plasma membrane; important in early development; lipids, carbohydrates, and proteins. | B. direct contact cell's |
| ___ 3. The molecules neurons; signals released very close to the target cells; neurotransmitters. | C. endocrine released by signals |
| ___ 4. Short-lived causing local effects; destroyed by extracellular enzymes; important in early development and coordination of activities of neighboring cluster of cells. | D. synaptic molecules signals |
7. Indicate the site of the following reactions occurs inside a cell (please answer the question with English term) (請指出下列反應於細胞內發生之場所或部位(如 nucleus or ribosome etc.);請以英文作答 3 points/each)
- Glycolysis
 - Pyruvate decarboxylation
 - Electron transport
 - Krebs cycle
 - Light-dependent reactions
 - Calvin cycle
8. Indicate the final electron acceptors or donors of the following reactions (請指出下列反應之電子接受者或提供者; 3 points/each)
- Fermentation
 - aerobic respiration
 - photosynthetic electron transport system
 - photosystems I and II in plant