

請依序作答：

1. Consider the following crosses in pea plants and determine the genotypes of the parents in each cross. Yellow and green refer to seed color; tall and short refer to plant height. (請注意：有 A、B、C 三小題) (12%)

Cross	Progeny			
	Yellow, Tall	Yellow, Short	Green, Tall	Green, Short
A) Yellow, tall × Yellow, tall	89	31	33	10
B) Yellow, short × Yellow, short	0	42	0	15
C) Green, tall × yellow, short	21	20	24	22

- 2.
- 甲、How do you see the importance of meiosis in Life? (2%)
- 乙、When does the crossing-over take place? Before or after Metaphase I? (2%)
- 丙、How many crossing-over a chromosome pair may have? (2%)
- 丁、How to relate Mendelism with meiosis? (4%)
3. 有四個不同的果蠅地理小種(landrace)，比較牠們第二條染色體條帶（每個字母代表一個條帶），各小種順序如下：(1) mnrqpostuv (2)mnopqrstuv (3)mnrqtsupov (ancestral strain) (4)mnrqtsopuv 請問在演變的過程發生了什麼事？牠們出現的順序為何？(8%)
4. 請說明一下豌豆、大腸桿菌、果蠅、及阿拉伯芥在遺傳學研究上的貢獻。(10%)
5. 廣義的遺傳標誌(Genetic Marker)可分為哪幾類？並指出其應用及限制。(10%)
6. What are the differences between biosynthesis of DNA and RNA? (10%)
7. Please describe the mechanism of nuclear splicing. (10%)
8. If nucleotide sequences in the anticodon is GUC, what kinds of genetic codes could pair with it? (4%)
9. Please explain the following terms: (18%)
- (1) Okazaki fragment
  - (2) Rolling-circle model
  - (3) Translation initiation complex
  - (4) RNA editing
  - (5) Cosmid
  - (6) Southern blotting
10. Please describe the enzyme involved in following reactions: (8%)
- (1) Removal of RNA primer base by base in *E. coli* replication
  - (2) Synthesis for a DNA strand complementary to a RNA template
  - (3) DNA sequencing by Sanger method
  - (4) Breakage of the thymine-thymine dimer bonds caused by UV under light