

請分區作答：

遺傳

1. Summer squash color is determined by the interaction of more than one gene. The presence of *CC* or *Cc* allele combinations produces a squash that is white in color, and the *C* allele is epistatic to the *G* allele. The presence of *GG* or *Gg* produces a squash that is yellow in color, and *ccgg* produces a squash that is green. After two fully heterozygous squash are crossed give the phenotypes, and frequency of occurrence, of the  $F_2$  offspring. Assume that the *C* and *G* genes assort independently.
  - a. What does "assort independently" mean? (3%)
  - b. What are the  $F_2$  phenotypes and proportions expected? (7%)
  - c. What are the  $F_2$  phenotype proportion you would expect if *C* and *G* genes do not assort independently? (5%)
2. How to measure the degree of linkage between genes? (5%) Assuming you have a triple mutant and a wild type pea plants. Describe your test and analysis plan step by step (10%)
3. Describe how mRNA, rRNA, and tRNA coordinate to produce a sequence and function collect enzyme in *E. coli* including the initiation. (10%)
4. 解釋名詞：mutation mapping, inbreeding coefficient, nondisjunction, recombinant DNA, polymorphism (2% each)

育種

5. 請解釋後裔檢定(progeny test)，並舉例說明後裔檢定在育種上之應用。(12分)
6. 輪迴選種(Recurrent selection)的原始族群(或基本族群)應具有那些特徵，請說明特徵(5分)，並請列舉三種以上適合作原始族群的例子(5分)。
7. 一異交作物的六個自交系(A, B, C, D, E, & F)間，作了各種可能的雜交組合，得到下表的各組合之產量。請利用下表組合力測試之試驗結果，回答下列問題。
 

Cross	A	B	C	D	E	F
A	50	160	210	220	270	330
B		60	240	190	210	290
C			50	220	250	300
D				40	190	210
E					80	300
F						60

  - a. 各品系的一般組合力(general combining ability, GCA)為何？(6分)
  - b. 表格中最高的特殊組合力(specific combining ability, SCA)是多少？是由哪些自交系組合而來？(3分)
  - c. 如要挑選四個自交系得到具有最高產量的合成品種，請說明應該挑哪四個品種。(3分)
  - d. 請計算(AxB)×(CxD)之雙交種的預估產量。(4分)
8. Simple Sequence Repeats (SSR)為育種上用來輔助選拔常使用的一種分子標誌。
  - a. 請以描述或圖示解釋何為 Simple Sequence Repeats (SSR) (4分)。
  - b. 請說明 SSR 可用哪些方法偵測 (4分)。
  - c. 請說明或舉例，在何種情況下，SSR 可做為育種上使用之分子標誌 (4分)。

數字為單位面積之單位產量

試題隨卷繳回