

請依序作答：

1. How does the pedigree-selection breeding procedure differ from the bulk-population breeding procedure? (10%)
2. Why is recurrent selection a more efficient breeding method in cross pollinated crops than self-pollinated crops? (10%)
3. How can you determine a crop plant is primarily cross- or self-fertilizing?(10%)
4. What factors influence gain from selection? (10%)
5. How does cytoplasm male sterility differ from genic male sterility? Why are male restorer genes necessary (C line or R line)? (10%)
6. 某 dihybrid 的 F₂ 外表型分離比為 1:2:1:2:4:2:1:2:1，請推論
 - a. 此二對等位基因的顯隱性關係分別為何？(3%)
 - b. 此二基因有無遵守孟氏遺傳定律？(2%)
7. 兩同質結合的親本，具一對立性狀甲表現型、及乙表現型，F₂ 除親本型的性狀外，還具有丙性狀，甲：乙：丙為 340：148：140，某人假設其遺傳模式為一對完全顯性的基因控制，其期望值比例為 2：1：1，經統計分析，接受此假說。請問他錯在哪裡？(3%) 正確情形為何？(2%)
8. 說明及圖示 *E.coli* 的 tRNA、mRNA、及 rRNA 如何共同作用，使基因可以正確的轉譯出一條 polypeptide(10%)
9. 遺傳訊息存於 DNA 上，試問
 - a. 試問構成基因組 (體) DNA sequence 可分為哪三類？(3%)
 - b. 玉米基因組體大小為 4.5×10^9 bp，試估算理論基因數目？(2%)
 - c. 承上，是否高估？理由何在？(3%)
 - d. 試算該基因組 (體) 的總長度？(2%)
10. About Sex-linked recessive inheritance (2% of each)
 - (T or F) 1. Most affected individuals are female.
 - (T or F) 2. Affected females come from affected fathers and affected or carrier mother.
 - (T or F) 3. The sons of affected females should be affected.
 - (T or F) 4. Approximately half the sons of the affected mother should be affected.
11. Please fill out where the “?” mark is: (12%)

Multihybrid self-fertilization, when n equals number of genes segregating two alleles each

	n=1	n=2	n=3	General rule
Number of F ₁ Gamete genotype	?A-1	?A-2	?A-3	?A-4
Proportion of recessive homozygotes among the F ₂ s	?B-1	?B-2	?B-3	?B-4
Number of different F ₂ phenotypes, given complete dominance	?C-1	?C-2	?C-3	?C-4
Number of different F ₂ genotypes	3	9	27	3 ⁿ