

※ 注意：請於答案卷上依序作答，並應註明作答之題號。

- 一、A geneticist studying the pathway of synthesis of phenylalanine in *Neurospora* isolated several mutants that require phenylalanine to grow. Table indicated the growth performance of *Neurospora* mutants (+: growth; -: no growth):

	Additive (添加物)			
	phenylpyruvate	prephenate	chorismate	phenylalanine
Wild-type	+	+	+	+
Mutant 1	-	-	-	+
Mutant 2	+	+	-	+
Mutant 3	+	-	-	+

請寫下可能的 phenylalanine 生合成途徑？(10%)

- 二、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)(10%)

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

- 三、請畫一個圖，顯示三種 RNA (tRNA, rRNA, mRNA) 作用時的相互關係？(10%)
- 四、染色體數 $2A+XX$ ，在人類和果蠅都是母的； $2A+XY$ ，人類和果蠅都是公的。試問：1) 這兩者性別決定的機制並不相同，請說明各機制？(4%)
- 2) 在性別遺傳中會提到 dosage compensation，什麼是 dosage compensation？(3%)
- 3) 人類及果蠅分屬不同的決定機制，各機制的 dosage compensation 如何達成？(3%)
- 五、親緣關係遠的的兩物種雜交後代要具有稔性，請就兩者的染色體型態、數目、以致配對情形。(6%)又如果染色體數目不同，交後代卻能具有稔性，可否推測其配對情形？(4%)
- 六、說明遺傳物質能忠實傳遞之原理及如何造成變異性。(10%)
- 七、例舉跳動因素(transposable element)之類型及其共同結構特性。(10%)
- 八、試述抑制突變可促使 reverse mutation 成為常態型之模式。(10%)
- 九、試說明基因小族(genefamily)與 multiple alleles 之相異處及機能。(10%)
- 十、試以圖述基因表現即遺傳信息流程之基本程序與修飾作用。(10%)