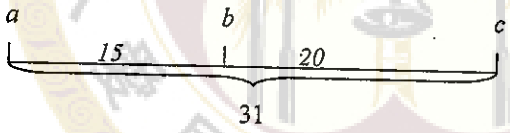
1. Please compare the differences in structure between prokaryotic and eukaryotic mRNA. (8 %)
2. For each of the following nucleic acid molecules, deduce whether it is DNA or RNA and single-stranded or double-stranded, and also indicate the explanation (10 %)

Molecule	%A	%G	%T	%C	%U
a	33	33	17	17	
b	33	17	33	17	
c	26	24	0	24	26
d	15	40		30	15
e	30	20	15	20	15

3. Please describe the reaction catalyzed by the following enzyme: (12 %)
   (1) Aminoacyl-tRNA synthetase
   (2) Helicase
   (3) RNA polymerase III
   (4) Ribozyme
   (5) Telomerase
   (6) Transposase
4. Please describe the procedure of translation in eukaryotes. (10 %)
5. Please describe the principle of the dideoxy method of DNA sequencing. (10 %)
6. In the transformation experiment of Avery, McLeod, and McCarty, what was the strongest evidence that the substance responsible for the transformation was DNA rather than protein? (10 %)
7. The accompanying diagram summarizes of the recombination frequencies observed in a large experiment to study three linked genes.



   (a)What was the observed frequency of double crossing-over in this experiment? (5 %) .
   (b)Calculate the interfence. (5%)
8. 金花石蒜(2n=8M+6T)與紅花石蒜(2n=22A)，其 F1 雜交後代有稔性（雖然稔性較低），請分析其原理。(10%)
9. 木瓜具有雄株、雌株及兩性株三種性別，其基因型分別表示為 M_1m, mm, M_2m，當 M_1m X mm 其後代性別比為『雄：雌= 1:1』，M_2m X mm 其後代性別比為『兩性：雌= 1:1』，但是當 M_2m X M_2m 時其後代性別比例『兩性：雌』卻偏離 3:1，較接近 2:1，請回答：
   (a) M_1, M_2, m 之顯隱性關係？(5 %)
   (b) M_2m X M_2m 時其後代性別比例『兩性：雌』偏離 3:1、趨近 2:1 之原因？(5 %)
10. Please fill out where the "?" mark is: (10%)
    Multihybrid self-fertilization, when n equals number of genes segregating two alleles each. (取正確 10 格計分)

	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_2s	?B-1	?B-2	?B-3	?B-4
Number of different F2 phenotypes, given complete dominanace	?C-1	?C-2	?C-3	?C-4
Number of different F2 genotypes	3	9	27	3^n

試題隨卷繳回