

Please write legibly. If it takes me too long to decipher your handwriting, I won't be able to give credit for your answer.

If you wish to keep your grade hidden from others, you must write your name above and also on the back of the last sheet.

1. Define(12 points):

Episome

Silent mutation

Macro-alteration

Transition mutation

Nonsense mutation

Frameshift

2. How do somatic mutations differ from germ-line mutations? (10 points)

3. Extra credit (15 points) Describe in detail the process of autogamy. Use the back of this sheet.

4. Describe in detail and explain what happens when cytosine deaminates. Do this for both methylated and unmethylated cytosine. (10 points)

5. Describe how repair would occur to the region where cytosine deamination occurs for both methylated and unmethylated cytosine. (10 points)

6. Including all controls, design an experiment to determine how you would discover if Substance X is a mutagen. Use the Ames Assay but without the liver microsomes. Be sure to include how you would discover if the substance causes base-substitutions or frameshift mutations. Write your answer on the back of this page. (20 points)
7. Describe both the kind of damage caused by ultraviolet light and the two ways we discussed for repair. When writing your answer to the repair portion of the question, be sure to use a step-by-step approach. Use the attached blank sheet to answer this question. (20 points)
8. Conjugation is done using Hfr+ strains of bacteria. The results are as follows:

Order of appearance	Strain 1	Strain 2	Strain 3	Strain 4
1st	I	F	L	R
2nd	B	S	Y	D
3rd	N	D	W	S
4th	E	R	H	F
5th	H	I	E	L

- a) Draw the map of the bacterial chromosome. (5 points)
- b) Which marker would you select for if you wanted an Hfr + from the ex-conjugants of Strain 3? (5 points)
9. A strain of bacteria with A+, B+, C+, D+ is used to grow transducing phage. The phage are then used to infect an A-, B-, C-, D- strain. The infected cells are then plated onto a plate lacking the substance needed to grow A- strains. The colonies that grow are replica plated onto separate plates to determine their genotypes. The only transduced bacteria that were recovered were:
- A+D+ 80
 A+B+ 90
 A+B+D+ 13
 A+C+D+ 7
- Deduce the order of the genes. (8 points)