



I: Complementation

1) Use the following chart to determine the number of complement groups and list which mutants are in the same group.

Mutant yeast 1-5

		1	2	3	4	5
Mutant yeast 1-5	1	-	+	+	-	-
	2		-	+	+	+
	3			-	+	+
	4				-	-
	5					-

a. How many genes are in the pathway for the product that is affected by the mutant phenotype?



Mutant strain	Without complementation, mutant does not grow and metabolite _____ accumulates:	The strain can survive on minimal media supplemented with _____.
1	glucose	G6P or F6P or pyruvate
2	G6P	F6P or pyruvate
3	F6P	pyruvate
4	glucose	G6P or F6P or pyruvate
5	glucose	G6P or F6P or pyruvate



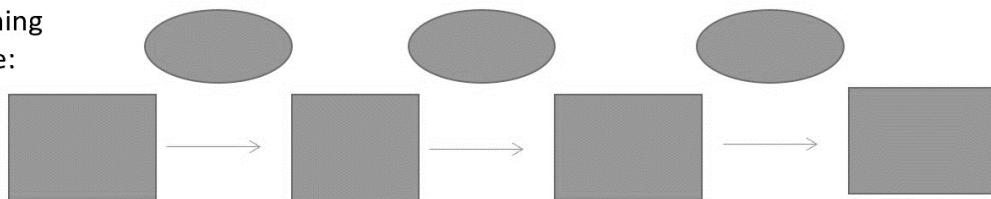
b. Use the previous “supplementation” data to determine which enzyme each mutation affects.

2) A, B, C, and D have been identified as intermediates in a biochemical pathway, but the order is not known. Use the provided data to determine the order of the metabolites as well as where each mutant blocks the pathway.

Mutant	Without complementation, mutant does not grow and metabolite _____ accumulates:	Pathway is completed when mutant is complemented by _____.
1	D	A
2	B	D or A
3	C	A or B or D
4	D	A

Mutant containing mutant enzyme:

Metabolite:



3) Use the following table, where the letters represent chemical products and the numbers represent mutant enzymes, to determine the order of intermediates in the pathway as well as where each mutant blocks the pathway.

	K	T	L	G	I
Group 1	+	+	+	-	+
Group 2	-	+	-	-	-
Group 3	-	+	-	-	+
Group 4	-	+	+	-	+



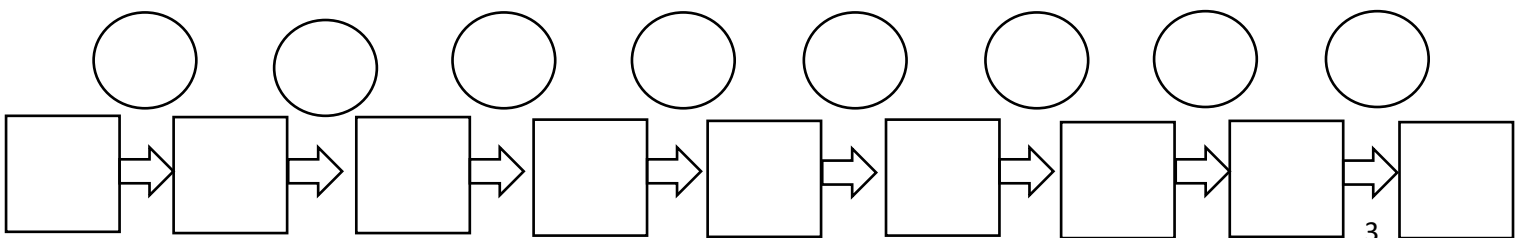
4) Use the following data set to find the number of complementation groups, as well as which

mutants are in each group.

	1	2	3	4	5	6	7	8	9	10
1	-	+	+	-	+	+	+	-	+	+
2		-	+	+	-	+	+	+	+	-
3			-	+	+	-	-	+	+	+
4				-	+	+	+	-	+	+
5					-	+	+	+	+	-
6						-	-	+	+	+
7							-	+	+	+
8								-	+	+
9									-	+
10										-

5) You have 9 molecules that you believe play a role in this pathway. Use the following data to determine the order of the molecules, as well as the enzymes.

	A	B	C	D	E	F	G	H	I
Group 1	+	+	-	+	+	-	+	+	+
2	-	-	-	+	+	-	+	-	+
3	+	+	-	+	+	+	+	+	+
4	-	-	-	+	+	-	-	-	+
5	-	-	-	-	+	-	-	-	-
6	-	+	-	+	+	-	+	-	+
7	-	-	-	-	+	-	-	-	+
8	+	+	-	+	+	-	+	-	+





II: Translation

1) What does it mean that the genetic code is degenerate?

2) How can it be that there are 20 amino acids, 30-50 types of tRNAs, and 64 codons?

3) What is the function of aminoacyl-tRNA synthetases? How many amino acids is each specific to? How many tRNAs does each recognize?

4) For initiation of translation, there are 5 essential components. List them below. (hints are provided)

- i. (type of RNA)
- ii. (type of RNA)
- iii. (protein+RNA)
- iv. (proteins)
- v. (energy source)

5) To start translation, where does the ribosome bind on prokaryotic mRNA? Where does it bind on eukaryotic mRNA? Where does translation actually start?

6) The following diagram shows a ribosome after initiation has been completed. Label the missing components.

