

Name _____

By printing your name above you acknowledge that while there may have been group discussions of these problems, the work below is yours.

I want to encourage you to work together on these problems, but make sure you understand how to solve each problem on your own. Show all of your work. No credit will be given for answers without work. If a question requires you to determine a genotype show how you obtained it. Please write neatly. If I can't read it, I can't grade it. The homework is due Wednesday, February 16th, before class begins. If it is handed in after class has started there is a 5-point deduction and a further 5 points for each day it is late.

You are studying a newly discovered Bacteriophage virus and have isolated a number of mutants that you call flop (fuzzy little opaque plaque) mutants. You perform a series of pair-wise complementation tests with ten different point mutants on an appropriate bacterial host and obtain the results shown in the table below. A "+" indicates a wildtype plaque phenotype was observed, where as a "-" indicates the mutant flop phenotype was observed.

	f1	f2	f3	f4	f5	f6	f7	f8	f9	f10
f1	-	+	-	-	+	+	+	+	+	+
f2	+	-	+	+	+	+	+	+	+	+
f3	-	+	-	-	+	+	+	+	+	+
f4	-	+	-	-	+	+	+	+	+	+
f5	+	+	+	+	-	-	+	+	-	-
f6	+	+	+	+	-	-	+	+	-	-
f7	+	+	+	+	+	+	-	-	+	+
f8	+	+	+	+	+	+	-	-	+	+
f9	+	+	+	+	-	-	+	+	-	-
f10	+	+	+	+	-	-	+	+	-	-

- How many genes control this trait?
- Identify which point mutants are located in the same gene.

After you have determined how many different genes can produce the flop phenotype in the experiment above, you run across an 11th mutant in the back of the freezer. When you do the complementation test with this mutant it acts very strangely:

	f1	f2	f3	f4	f5	f6	f7	f8	f9	f10
f11	-	+	-	-	-	-	+	+	-	-

Describe how just **one** genetic change in this new phage mutant could have produced the results you observed.

In *Drosophila*, mutations in the *singed* gene produce flies with short curled bristles. There is a recessive loss-of-function allele, sn^P , of the *singed* gene that exhibits unusual characteristics. Flies that are homozygous for this particular mutation (sn^P/sn^P) have short curled bristles. They also have numerous patches of wildtype (sn^+) bristles on their heads and bodies. Describe the mechanism by which these wildtype patches are being produced in a homozygous (sn^P/sn^P) mutant fly.

When these homozygous sn^P/sn^P mutant flies are mated some of the crosses produce only *singed* progeny while some of the crosses produce both *singed* and wildtype progeny in variable numbers. Explain the genetic basis for these observations.

$$sn^P/sn^P \times sn^P/sn^P$$

↓

all *singed* progeny

$$sn^P/sn^P \times sn^P/sn^P$$

↓

singed and *wildtype* progeny