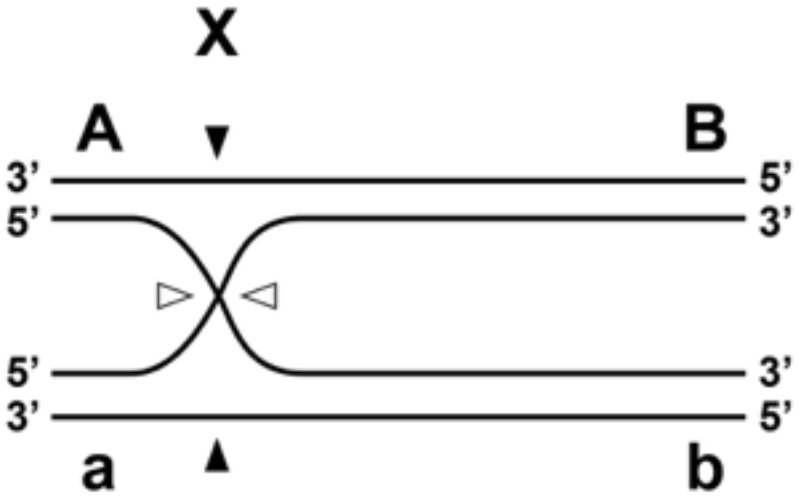
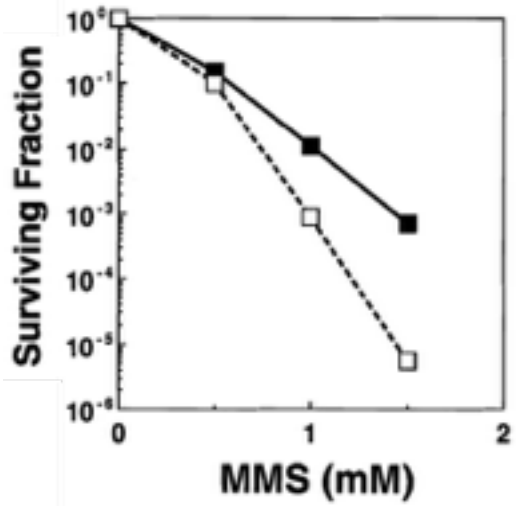
21) You have an experimental setup that allows you to create the crossover structure shown below and observe its resolution. Assume that these are two phage genomes, a and A are alleles of gene A, and b and B are alleles of gene B. All four alleles can be measured in your plaque assay. What is the relative frequency of genotypes produced by resolution of these structures during Holliday junction recombination? X denotes the site of crossover and the triangles indicate potential cut sites.



a.AB,ab > Ab,aB
b.AB,ab > Aa, Bb
c.AB,ab < Ab,aB
d.AB,ab = Ab,aB
e.No recombination occurs

40) Methyl methanesulfonate is an alkylating agent that adds bulky lesions to DNA and requires translesion synthesis by PolV (umuC/D') for repair. Your labmate mixed up three strains of bacteria for a crucial experiment. These are:
X - umuC-
Y - wildtype
Z - ruvC-
You come up with a way to identify these strains. You plate out aliqouts of each onto media containing MMS. You observe the following results.

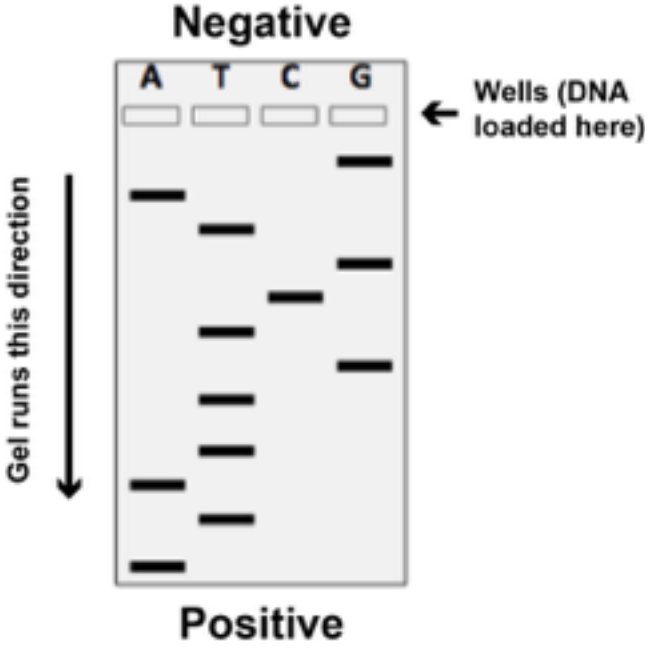


A) Which strain or strains will behave as shown on the light curve?
Y
Y and Z
None
X and Y
Z
X
Y and X

B) Which strain or strains will behave as shown on the dark curve?
Y
Y and Z
None
X and Y
Z
X
Y and X

C) If there are two strains that behave the same way, what other assay could you use to determine which strain has which genotype?
Repeat using UV sensitivity – one mutant is likely to be more sensitive
Perform an Ames test – one mutant likely has higher mutation rates
None of these
Co-infect with phage and perform a cis test – one mutant will give lower recombination frequencies
Repeat using a higher MMS dose – one mutant is likely sensitive at a higher dose

41) You run a sequencing gel and obtain the following result. What is the sequence of the original template DNA?



a.5’-ATATTGTCGTAG-3’
b.5’-CTACGACAATAT-3’
c.5’-AAATTTTTCGGG-3’
d.5’-GGGCTTTTTAAA-3’
e.5’-GATGCTGTTATA-3’