

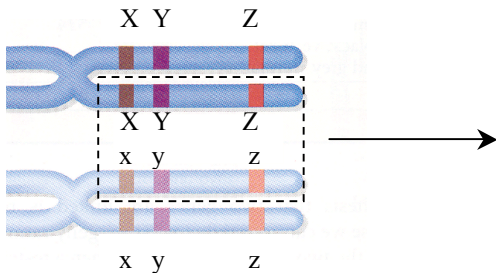
Name _____
Molecular Biology 312 Problem Set 2

You have recently identified the gene that encodes the RNA template of the Telomerase enzyme in a newly discovered single celled eukaryotic species. The RNA sequence in the region that serves as the telomere template is: 5' UCCUAAUCC 3'. Using this information and your knowledge of how telomerase adds DNA to the ends of the chromosome, describe the 6 basepair repeat sequence found at the telomeres of this organism. **(Warning: think about the 5' and 3' polarity of the telomere DNA Sequence, look at the figure from lecture, or the animation on Helicase)**

- Your answer must show the end of a chromosome with proper 3' and 5' ends labeled
- Your answer must show the repeat sequence at the end of the chromosome
- Your answer must show how the RNA template would pair with the telomere sequence to add another repeat

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You are studying a strain of yeast that has a pair of homologous chromosomes one of which contains the wild type alleles X, Y, and Z (in that order) and the other of which contains the mutant alleles x, y, and z. There is a recombination hotspot between the X and Y genes, and after meiosis, you see a subset of haploid cells with the genotypes X y z and x Y Z. In the space provided below draw a holiday junction that would generate these recombinants when the chromosomes are paired at metaphase and indicate with arrows whether it must be resolved vertically or horizontally to generate the X y z and x Y Z products. Be sure to label the 5' and 3' ends of the DNA.



In your yeast cultures, you are able to recover all four meiotic products from a single cell division. Occasionally, you see three haploid cells that are “Y” and one that is “y”, instead of the 1:1 ratio of 2 “Y” containing cells and 2 “y” containing cells that you would expect. Explain how this “gene conversion” event could occur.