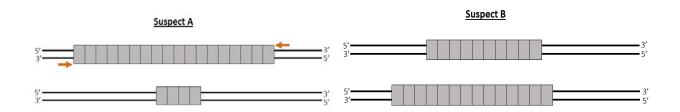**7.013 SPRING 2018 RECITATION 20 BASED ON LECTURE 35**
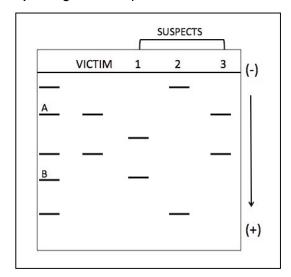
Question

PCR can be used in forensics to identify a criminal among a pool of suspects by comparing PCR products derived from regions of the suspects' DNA with DNA found at the crime scene. The figure below depicts one genomic region in 2 different suspects. The two alleles for each suspect are shown. Each of the gray boxes represents a copy of a short tandem repeat (STR) sequence 4 bases long.

a) Why the STR sequences are not longer than 4-16 bases?

b) The orange arrows in the figure above depict the forward and reverse primer binding sites on the genomic region of the maternal chromosome of Suspect A. The arrowhead is the 3' end of the primer. Draw and indicate where the primers will bind in each region.

c) What molecular force allows the primers to bind in the correct location?

d) To perform the experiment DNA was isolated from each suspect as well as from the crime scene. Using one tube per sample (Suspect A, Suspect B, & crime scene DNA), the forensic scientists added all the necessary PCR ingredients and began the PCR reaction. If the scientists made an error in their PCR program such that they omitted the 95°C step, how would this affect their result? Explain why.

d) The CODIS loci are a set of 13 genomic loci used in forensic STR mapping. Why are 13 loci employed, rather than one in the example.

e) The gel electrophoresis data below is from a crime scene. The electrodes are shown.

i. Which is the larger fragment: Fragment A or Fragment B**? Explain** your choice.

ii. Which suspect is most likely the criminal? **Explain** your choice

iii. Why might the data not be entirely clear?

7.013 Introductory Biology
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