

7.012 Fall '04- Replication Section Answers

Shown below is a 240 base pair segment of a modified version of an *E. coli* gene. It includes the promoter and the first codons of the gene.

The sequences of both strands of the DNA duplex are shown in Figure 1. The top strand reads 5' to 3' left to right (1 to 240); the bottom, complimentary, strand reads 5' to 3' right to left (240 to 1).

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5' -ATGTGAGTTAGCTCACTCATTAGGCACCCAGGCTTTACACTTTATGCTTCCGGCTCGTA
  1 -----+-----+-----+-----+-----+-----+ 60
3' -TACACTCAATCGAGTGAGTAATCCGTGGGGTCCGAAATGTGAAATACGAAGGCCGAGCAT

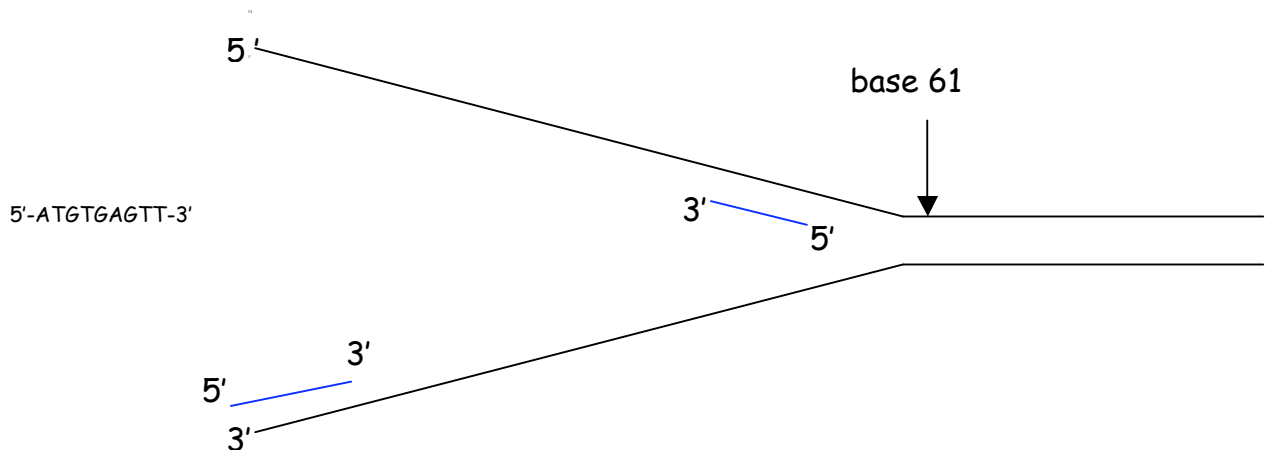
      TGTGTGTGGAATTGTGAGCGGATAACAATGTCACACAGGAAACAGCTAAGACCATGTTT
61 -----+a-----+-----+-----d---e+--f-----c+-----+ 120
      ACAACACACCTTAACACTCGCCTATTGTTACAGTGTGTCCTTTGTCGATTCTGGTACAAA

      ACGCCAAGCTCGGAATTAACCCTCACTAAAGGGAACAAAAGCTGGAGCTCCACCGCGGTG
121 -----+-----+-----g+-----+-----+-----+ 180
      TGCGGTTTCGAGCCTTAATTGGGAGTGATTTCCCTTGTTTTTCGACCTCGAGGTGGCGCCAC

      GCGGCCGCTCTAGAAGTAGTGATCCCCCGGGCTGCAGGCATTCGATATCAAGCTTATCG-3'
181 -----+-----+-----+-----+-----+-----x-----+ 240
      CGCCGGCGAGATCTTGATCACCTAGGGGGCCCGACGTCCGTAAGCTATAGTTTGAATAGC-5'
  
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What direction is DNA polymerized? **5' → 3'**

Let's open up the first 60 bases as a replication fork.



DNA synthesis requires a primer. Suppose you want to replicate the **bottom** strand-what would be the 5'-3' sequence and orientation of a primer (9 bases long)? **5'-AUGUGAGUU-3'**

What about the top strand? What would be the sequence and orientation of a primer? **5'-UACGAGCCG-3'**

What will happen as the DNA continues to open at the replication fork? Write any additional primers.

