1. What is a helicase and why is helicase necessary for DNA replication?

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1. What is the clamp and why is the clamp necessary for DNA replication?

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1. A DNA polymerase has an error rate of at 10-4 mutations/base pair. How many errors do you expect during replication of the *E. coli* genome (5x106 base pairs)?

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1. The observed error rate for replication in *E. coli* is actually 10-10 mutations/base pair. List mechanisms that contribute to this high fidelity.

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1. A DNA polymerase has an error rate of at 10-4 mutations/base pair. How many errors do you expect for replication of the human genome (3x109 base pairs).

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1. The observed error rate for replication of the human genome is 10-8 mutations/base pair (around 100 mutations/genome). Assume 100 genome replications per generation (between a human gamete and a fertilized egg). What is the error rate per genome per replication?

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1. Draw the mechanism of polymerase proof reading. Show the chemical mechanism of nucleotide incorporation and excision.

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