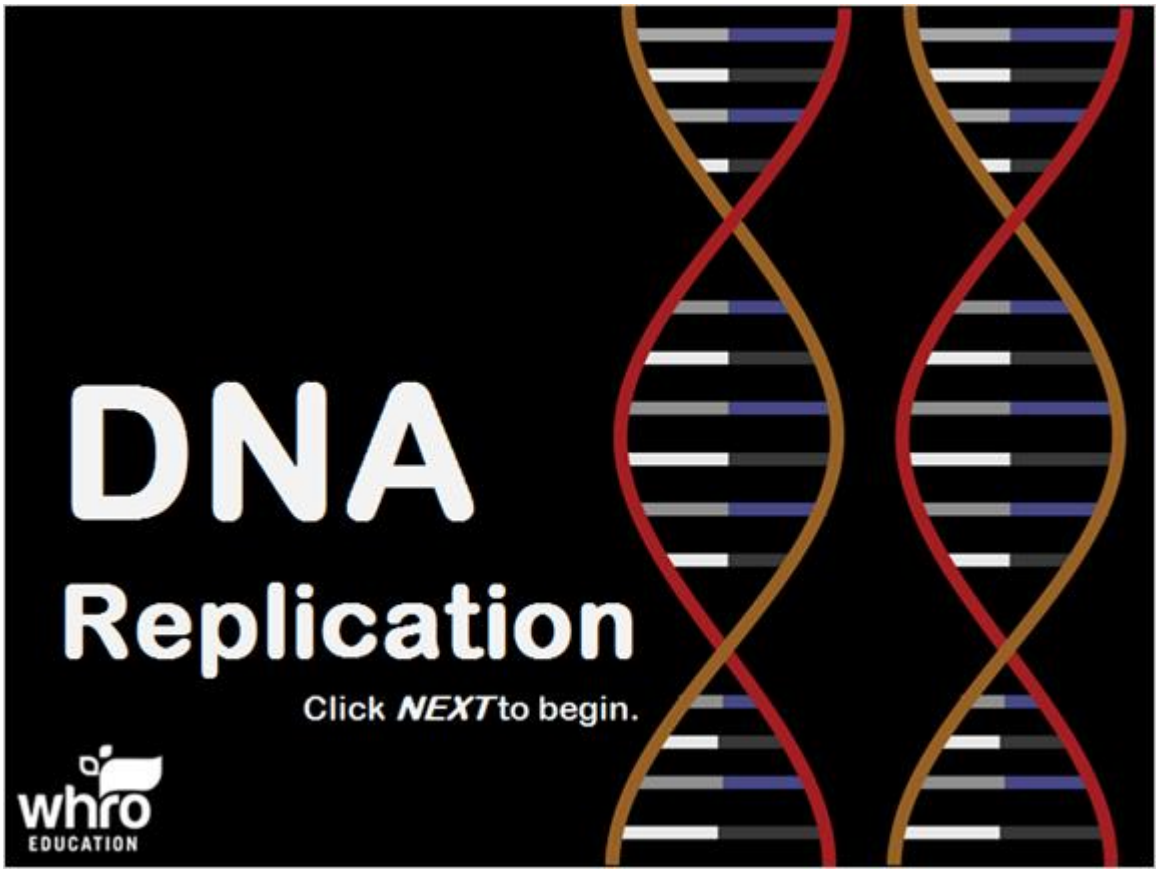
Module 6: DNA, RNA, and Molecular Genetics
Topic 2 Content: DNA Replication Notes



DNA Replication

Click ***NEXT*** to begin.

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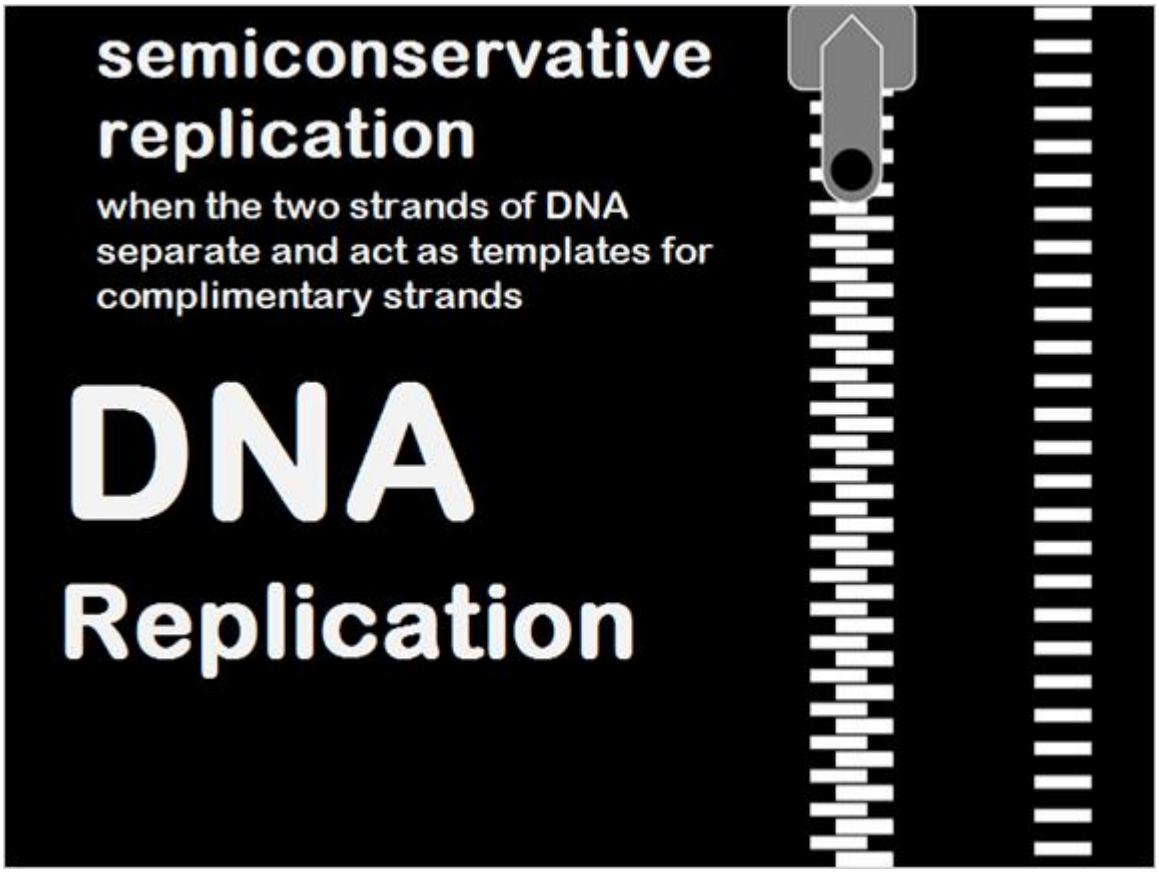

DNA replication occurs much like the unzipping and zipping of a zipper. The DNA molecule must be unzipped during semiconservative replication. The DNA is zipped when a new strand of nucleotides are joined to each parental strand. The process creates two identical DNA strands.

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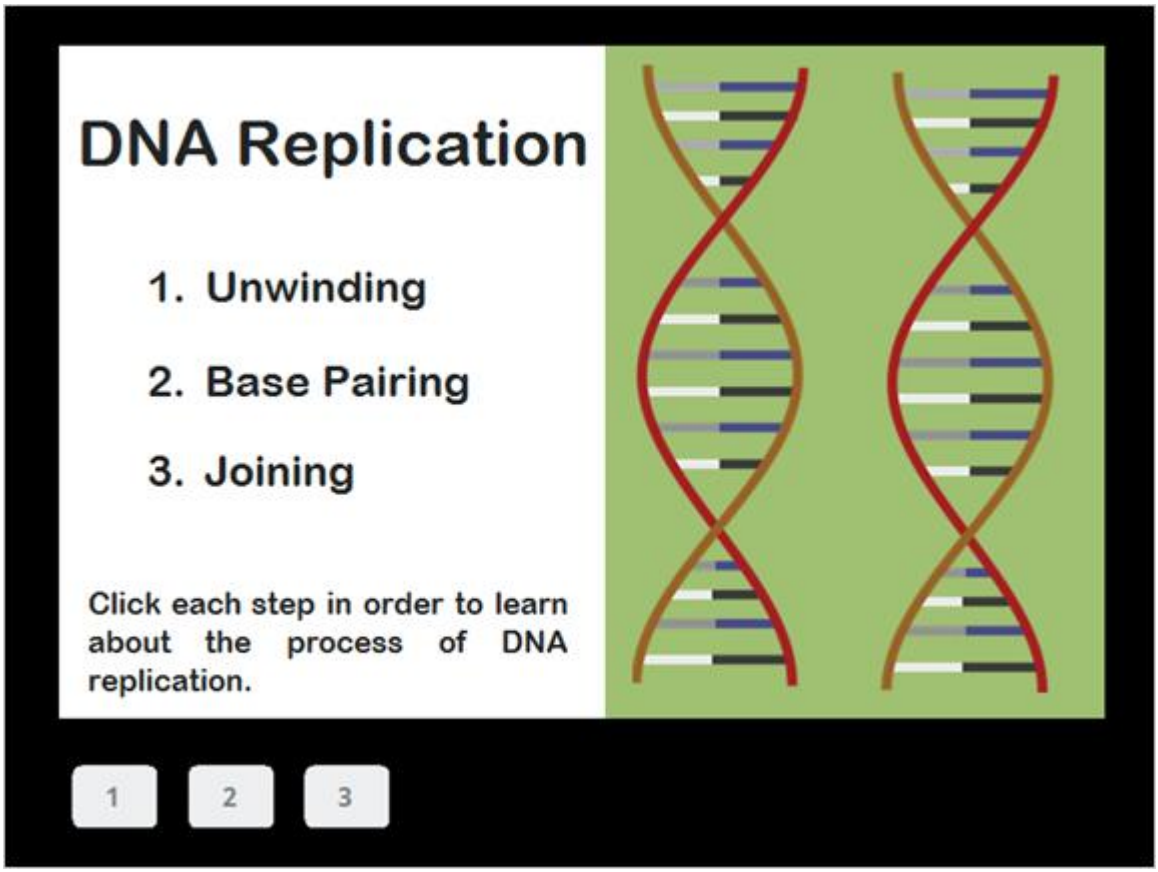
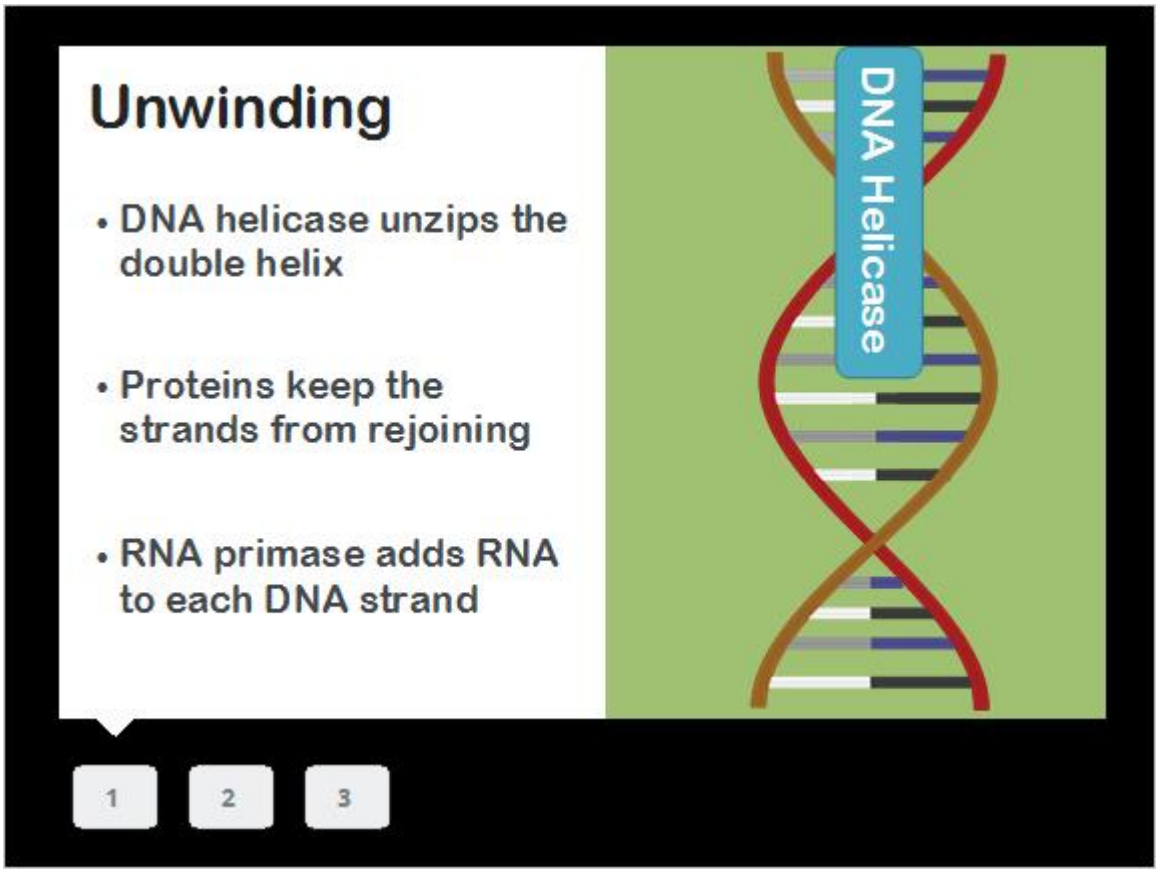
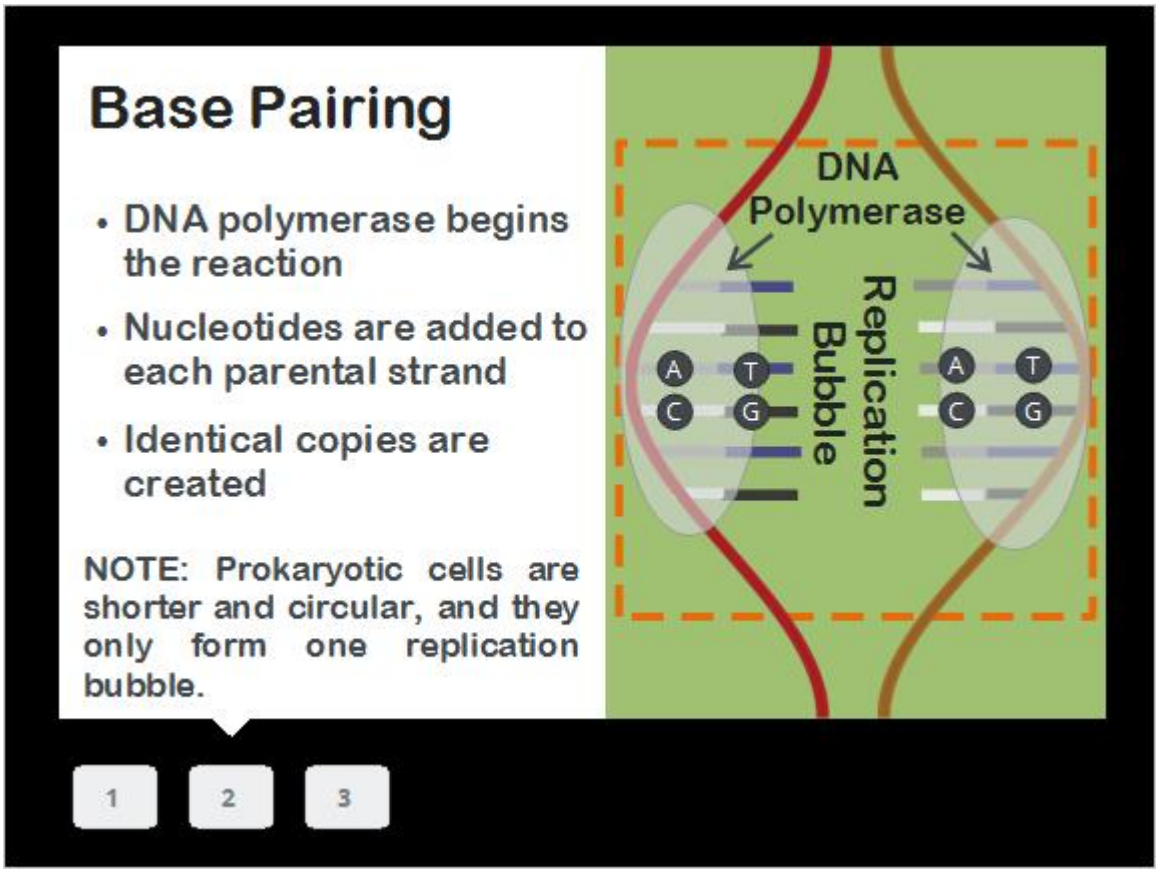


DNA replication occurs in three main stages: unwinding, base pairing, and joining. The process of replicating DNA relies on the work of many different enzymes. Click each step in order to learn about the process of DNA replication.



Step 1: Unwinding

In the first stage, the enzyme DNA helicase unwinds and unzips the double helix by breaking the hydrogen bonds between the base pairs. Additional proteins called single-stranded binding proteins keep the strands from rejoining during replication, and another enzyme, RNA primase, adds short pieces of RNA to each DNA strand.

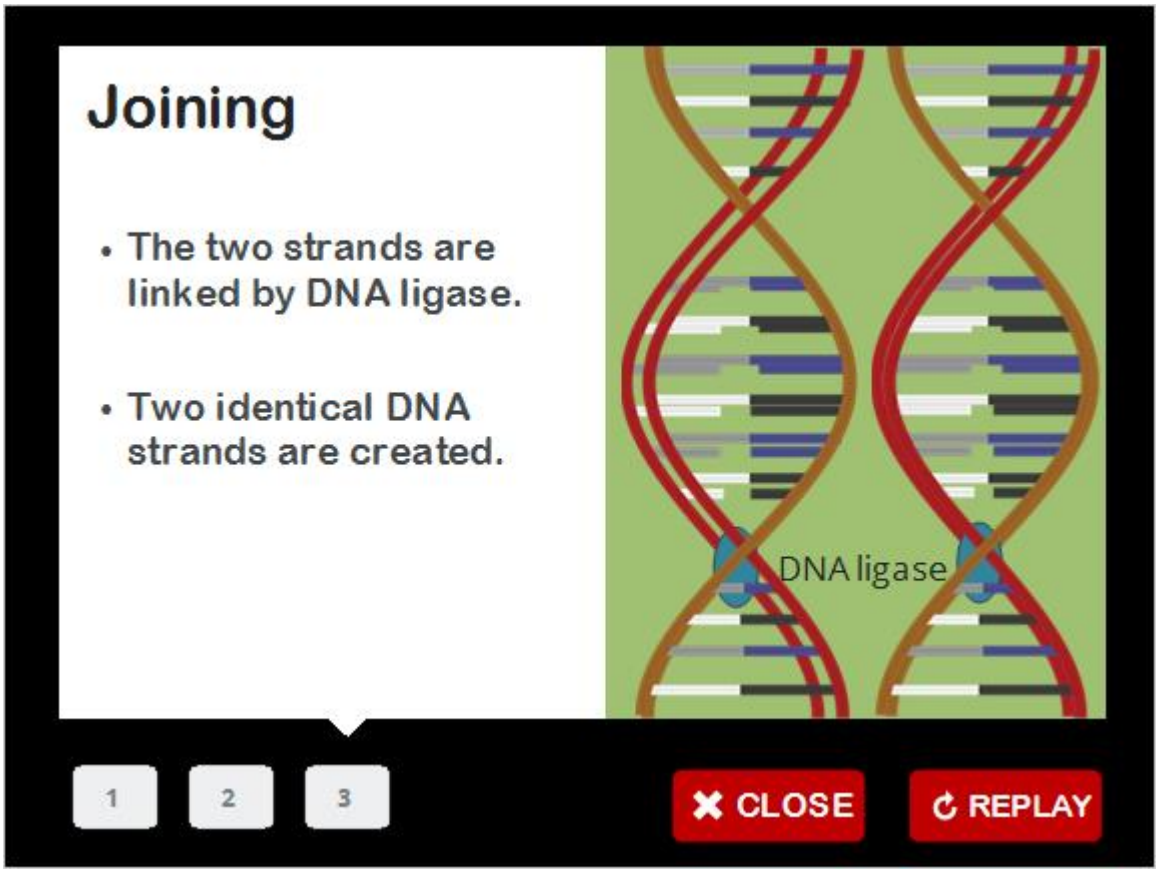


Step 2: Base Pairing

In the next step of DNA replication, free nucleotides are matched to nucleotide bases in the parental strand. The enzyme DNA polymerase begins this reaction. Remember, as the nitrogen bases are paired to the parental strand, adenine pairs with thymine and guanine pairs with cytosine. This is how identical copies of DNA are replicated.

The area of DNA where the strands are unzipped and replication starts is called the replication bubble. There are many of these bubbles open along the DNA, so that the process can occur quickly. On average, DNA replication takes only about eight hours in a human cell because of the many points of origin.

In prokaryotic cells, DNA is shorter and circular. The DNA still has to be copied before the cell can split via binary fission. However, because the DNA is shorter, only one replication bubble is formed.



Step 3: Joining

The last stage of replication is when the two strands are linked together with help from the enzyme DNA ligase. After joining, two identical strands are created.