1. DNA replication, like all biological polymerization processes, proceeds in three enzymatically catalyzed and coordinated steps: initiation, elongation, and termination.
    - Initiation: This process is initiated at particular points in the DNA, known as "origins", which are targeted by initiator proteins. Once the origin has been located, these initiators recruit other proteins and form the pre-replication complex, which unwinds the double-stranded DNA.
    - Elongation: Primase adds RNA primers to the template strands. The leading strand receives one RNA primer while the lagging strand receives

several. The leading strand is continuously extended from the primer by a DNA polymerase, while the lagging strand is extended discontinuously from each primer forming Okazaki fragments. RNase removes the primer RNA fragments. When this is complete, a single nick on the leading strand and several nicks on the lagging strand can be found. Ligase works to fill these nicks in, thus completing the newly replicated DNA molecule.

- Termination: requires that the progress of the DNA replication fork must stop or be blocked. Termination at a specific locus, when it occurs, involves the interaction between two components: (1) a termination site

sequence in the DNA, and (2) a protein which binds to this sequence to physically stop DNA replication. In various bacterial species, this is named the DNA replication terminus site-binding protein, or Ter protein.

New DNA is made by enzymes called DNA polymerases, which require a template and a primer (starter) and synthesize DNA in the 5' to 3' direction.

DNA replication requires other enzymes in addition to DNA polymerase, including DNA primase, DNA helicase, DNA ligase, and topoisomerase.

2.

Enzyme	Function
Topoisomerase	Relaxes the super-coiled DNA

DNA helicase	Unwinds the double helix at the replication fork
Primase	Provides the starting point for DNA polymerase to begin synthesis of the new strand
DNA polymerase	Synthesizes the new DNA strand; also proofreads and corrects some errors
DNA ligase	Re-joins the two DNA strands into a double helix and joins Okazaki fragments of

the lagging
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