i. **Initiation**

Repeats in the ori site are bound by **DNA-A** proteins which initiates strand separation. **DNA-B** (which is a helicase) is brought by **DNA-C**, and further unwinds the DNA strands. A **primase** will then bind and construct an RNA primer

ii. **Elongation** and **Termination**

Remaining supercoiling is relieved by **topoisomerase II** (a DNA gyrase)

Elongation involves DnaB (a **helicase**) which unwinds the strand **and single stranded binding proteins** bind in order to keep the two strands separated. DNA polymerase then replicates each strand

Termination – end of replication; is signalled by **the ter locus** which is rich in G and T. A protein known as ter protein is also involved. It is a **contrahelicase** preventing unwinding.

b. The **lagging** strand

This strand is **looped** around and replication then occurs 5'-3'. DNA polymerase II unclamps and then reclamps on the lagging strand whenever the primer of the okazaki fragments is encountered.

DNA polymerase I then **excises** the RNA primer and replaces it with DNA

And enzyme called **ligase** then seals the remaining nicks

4. DNA replication is **Eukaryotes**

Eukaryotes contain at least 19 different DNA polymerases

a. The principle DNA **replicase** is DNA pol **δ** – polymerase for the **lagging** strand synthesis and is highly processive

b. DNA pol **α** – contains 4 subunits with a processivity of 200 and is involved in **initiation** of nuclear DNA replication

c. DNA pol **ε** – involved in **leading** strand synthesis and is the sensor of DNA **damage** checkpoint control

Replication is similar to that of *E. coli* but is more **complex** in that the human cell contains 6 billion base pairs of DNA that needs to be copied and contains an origin of replication every 3 to 300 kbp

C. RNA Replication (from RNA to DNA)

This process is known as **Reverse transcription** and is carried out by means of the enzyme **reverse transcriptase**.

RNA functions as a single stranded template