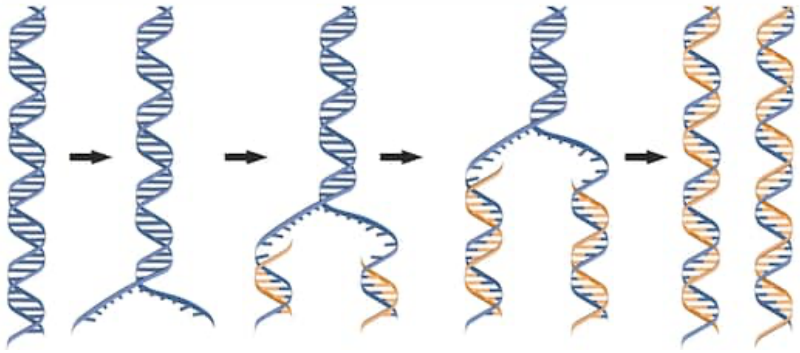
CONCEPT: INTRODUCTION TO DNA REPLICATION

●Much more is known about _____ DNA replication than eukaryotic DNA replication.

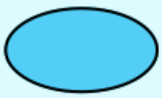
□ However, scientists believe most of the process is fundamentally _____ in prokaryotes & eukaryotes.

□ Old/parental strands *separate* & act as _____ to synthesize new DNA that's *complementary* to it.



Components of DNA Replication

●DNA replication requires a host of _____ enzymes/proteins working together:

Enzyme / Protein		Function
	**Topoisomerase** (DNA Gyrase in Prokaryotes)	Relieves DNA supercoiling ahead of replication fork.
	**Helicase**	Unwinds DNA double helix at the replication fork.
	**_____-Stranded Binding Protein**	Binds to and stabilizes single-stranded DNA.
	**_____ase**	Creates RNA primers which act as a starting point for DNA synthesis.
	**DNA Polymerase ____** (Prokaryotes)	Builds a new DNA strand using the old DNA strand as a template.
	**DNA Polymerase ____** (Prokaryotes)	Replaces RNA primers with DNA.
	**DNA _____**	Covalently joins together Okazaki Fragments in lagging DNA strand.

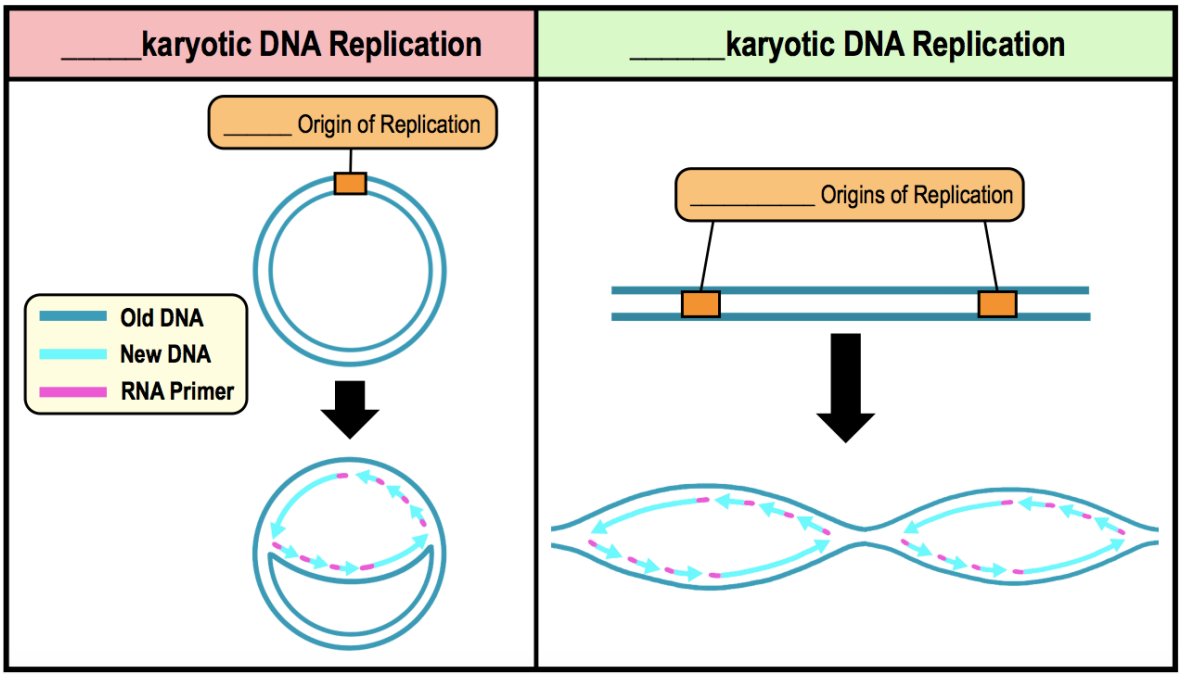
CONCEPT: INTRODUCTION TO DNA REPLICATION

Origin of Replication

●DNA replication begins at specific DNA sequences called the _____ **of Replication (ORI).**

□ Prokaryotes have *small* _____ chromosomes with just _____ ORI.

□ Eukaryotes have *large* _____ chromosomes with _____ ORIs.

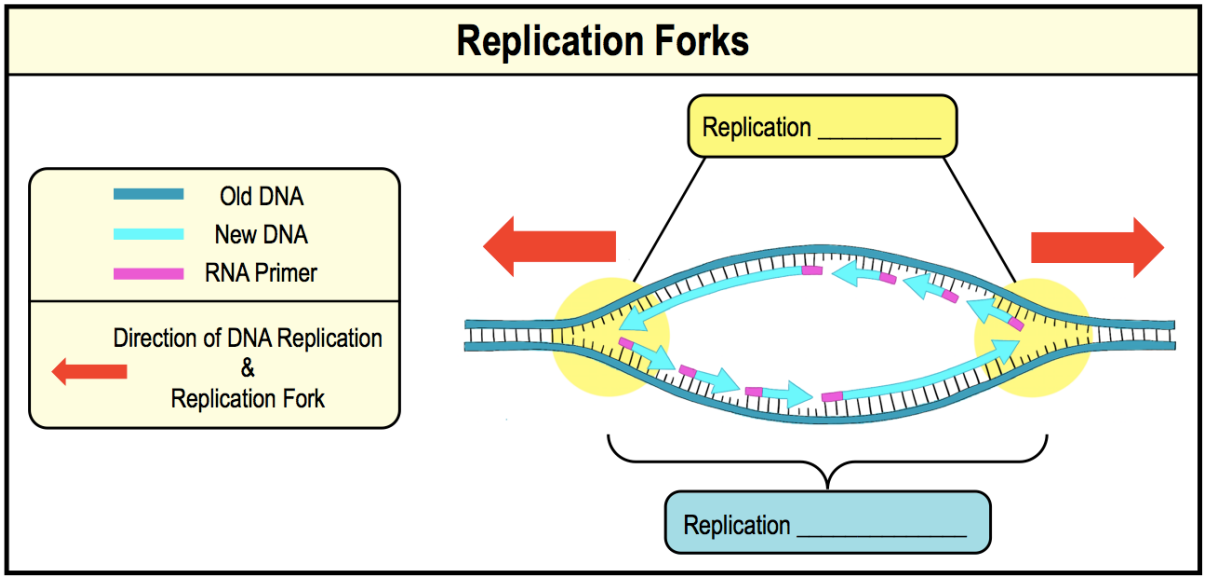


Replication Forks

●Proteins *bind* to the ORI & *separate* the 2 strands of DNA, forming a *replication* _____ (or "*bubble*").

□ **Replication Forks**: _____-shaped regions at each end of the *"bubble"* where DNA is unwound.

□ DNA replication proceeds _____-directionally (in _____ directions).



CONCEPT: INTRODUCTION TO DNA REPLICATION

PRACTICE: Which of the following is incorrect regarding DNA replication forks?

a) DNA replication forks begin forming at the origin of replication (ORI).

b) DNA replication forks are caused by helicase separating two complementary strands of DNA.

c) There are two replication forks found in each replicating prokaryotic chromosome.

d) DNA replication forks are found at both ends of the replication "bubble".

e) None of the above are incorrect.

Unwinding the DNA: Topoisomerase, Helicase & SSBs

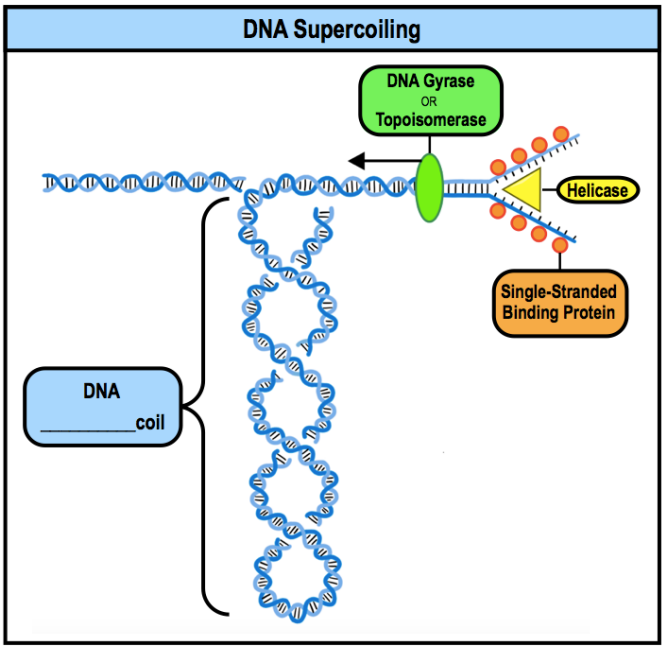
●Several proteins participate in the _____ of DNA during DNA replication:

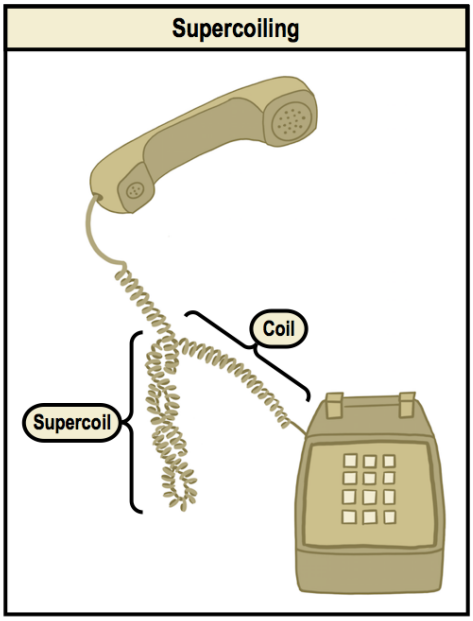
1) **Topoisomerase** (**DNA Gyrase**): cuts & rejoins DNA to relieve strain caused by *DNA* _____.

□ *Supercoiling* can _____ DNA replication & must be relieved for DNA replication to proceed.

2) **Helicase**: unwinds DNA by breaking _____ bonds (creating _____-stranded DNA).

3) **Single-Strand Binding Proteins** (_____): prevent reannealing & degradation of each separated DNA strand.





PRACTICE: What is the function of the enzyme topoisomerase in DNA replication?

a) Relieving strain in the DNA ahead of the replication fork caused by the untwisting of the double helix.

b) Elongating new DNA at a replication fork by adding nucleotides to the existing chain.

c) Reattaching the hydrogen bonds between the base pairs in the double helix.

d) Building RNA primers using the parental DNA strand as a template.