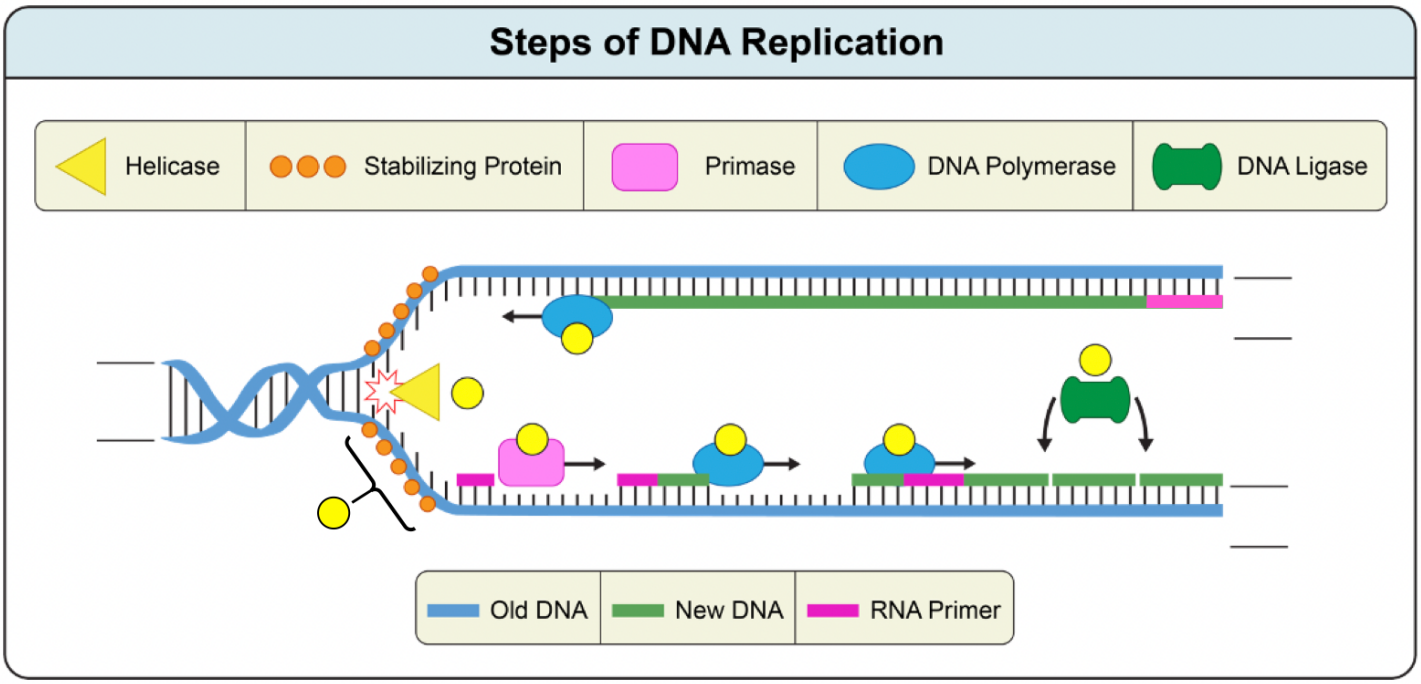
CONCEPT: STEPS OF DNA REPLICATION

- DNA Replication can be simplified into ___ steps.
  1. **Helicase** binds & _____ the two strands of the template DNA by breaking hydrogen bonds.
  2. **Stabilizing Proteins** _____ to and stabilizes single-stranded DNA.
  3. **Primase** adds the RNA primer to the template DNA so that polymerase can start replicating.
     - □ Continuously adds primers to the _____ strand to make several Okazaki fragments.
  4. **DNA Polymerase** adds new DNA nucleotides in the ___ to ___ direction.
  5. **DNA Polymerase** removes RNA _____ and replaces them with DNA.
  6. **DNA Ligase** _____ Okazaki fragments together on the lagging strand to create a single, new DNA strand.



EXAMPLE: DNA polymerase can join new nucleotides only to the end of a pre-existing strand, and the strands are anti-parallel. This will provide the basis of:

a) Leading strands of DNA

b) Formation of Okazaki fragments

c) The formation of the ORI

d) Both leading and lagging strands of DNA

e) DNA ligase and stabilizing proteins

CONCEPT: STEPS OF DNA REPLICATION

PRACTICE: Which of the following statements correctly describes the difference between the leading and the lagging strands of DNA during DNA replication?

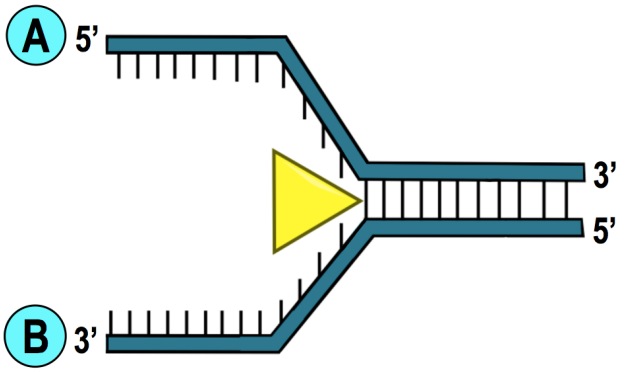
a) The leading strand is synthesized by adding nucleotides to the 3' end of the growing strand, and the lagging strand is synthesized by adding nucleotides to the 5' end.

b) The leading strand is synthesized in the same direction as the movement of the replication fork, and the lagging strand is synthesized in the opposite direction.

c) The lagging strand is synthesized continuously, whereas the leading strand is synthesized in short fragments that are ultimately stitched together.

d) The leading strand slows its rate of replication so that the lagging strand can catch up.

PRACTICE: Below is a close-up of the portion of a DNA replication bubble.



Helicase is shown as a yellow triangle currently moving from left to right. Based on what you know about the creation of new DNA during replication, which is the lagging strand and why?

a) A is the lagging strand, as DNA is always synthesized in the 5' to 3' manner.

b) B is the lagging strand, as DNA is always synthesized in the 5' to 3' manner.

c) A is the lagging strand, as DNA is always synthesized in the 3' to 5' manner.

d) B is the lagging strand, as DNA is always synthesized in the 3' to 5' manner.

e) It is impossible to tell, with the information provided.