CONCEPT: LEADING & LAGGING DNA STRANDS

●Upon separation of the DNA, at each *replication fork*, there are _____ single-stranded DNA molecules:

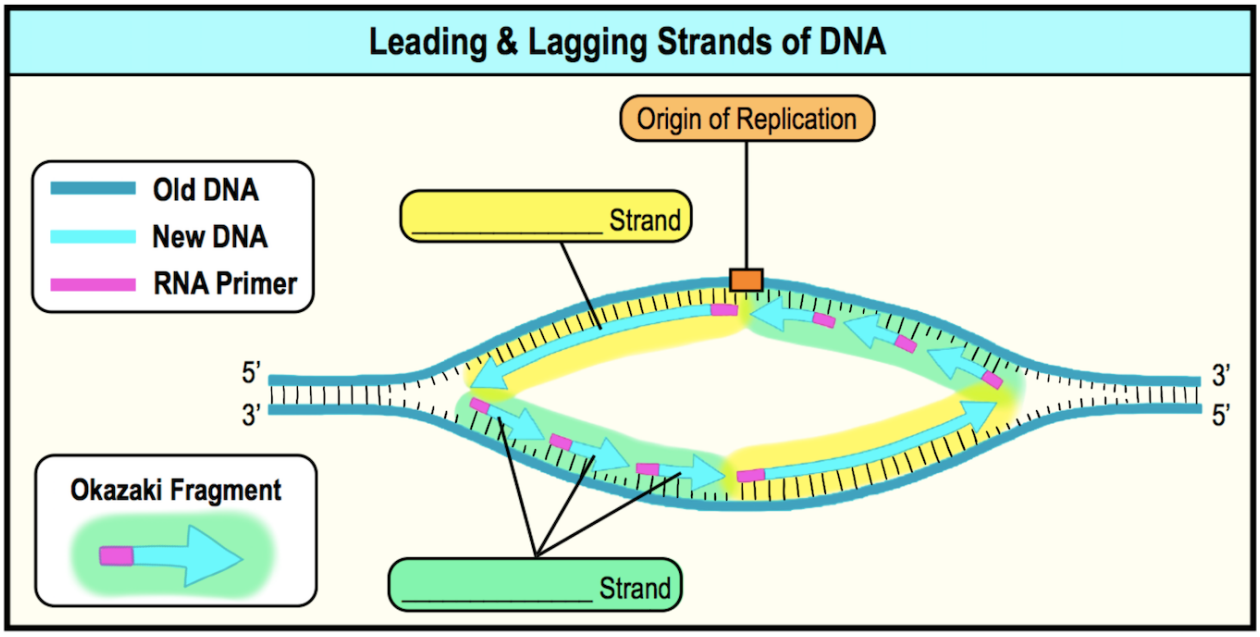
1) **Leading DNA Strand:** continuous replication in _____ direction as the replication fork movement.

□ Only _____ RNA primer is required for replication of the Leading strand.

2) **Lagging DNA Strand:** discontinuous replication in _____ *direction* as replication fork movement.

□ Replicates in multiple, small segments (_____ *fragments*) that each require an RNA primer.

□ Okazaki fragments are eventually covalently annealed by *DNA* _____.



PRACTICE: Which is involved in replicating the lagging strand of DNA, but is not involved in leading strand replication?

a) Ribosome. b) RNA primer. c) DNA polymerase. d) Okazaki fragments.

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

b) 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.

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 is synthesized at twice the rate of the lagging strand.

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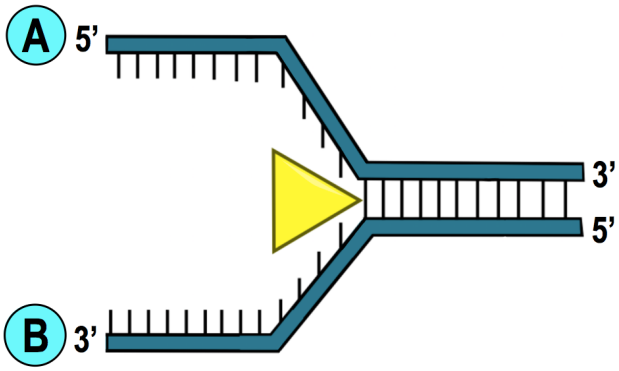
PRACTICE: The mechanisms of DNA synthesis differs between the two new daughter strands during replication. This is due to the fact that:

a) one RNA primer attaches to the 5' end of the parent strand and the other primer to the 3' end.
b) Both daughter strands can't extend toward the replication fork because there would not be room for two DNA polymerase enzymes.
c) Both RNA primers attach to the 3' end of the template strands, which are at opposite ends from each other.
d) The DNA strands run antiparallel to each other and the DNA polymerase can only add nucleotides to the 3' end of the growing strand.

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.