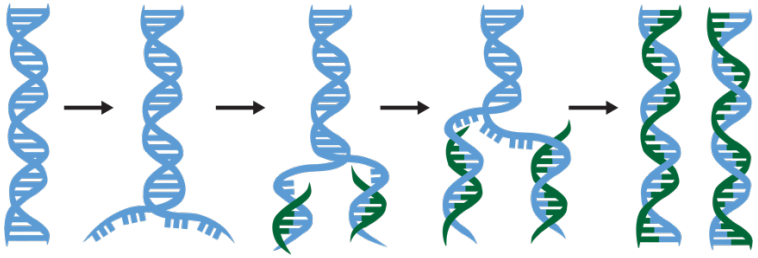
CONCEPT: INTRO TO DNA REPLICATION

- Under DNA replication, a *template strand* is used to synthesize a new DNA strand that is *complementary* to it.
  - □ **Template Strand:** The _____ or _____ strand that is copied during replication.
  - □ **Complementary (Daughter) Strand:** The newly synthesized strand of DNA copied from the _____ strand.



  - □ **Semiconservative Model:** Both double helices have 1 _____ strand and 1 _____ strand.

EXAMPLE: Which of the following statements most accurately describes DNA replication?

a) It is semi-conservative with all of the DNA copied is restructured within both new double helices.

b) It is dispersive with the two new double helices having a mixture of template and daughter strands.

c) It is semi-conservative with the template strand being found within both new double helices.

d) It is conservative with one new double helix possessing 2 old strands and the other possessing 2 new strands.

Components of DNA Replication

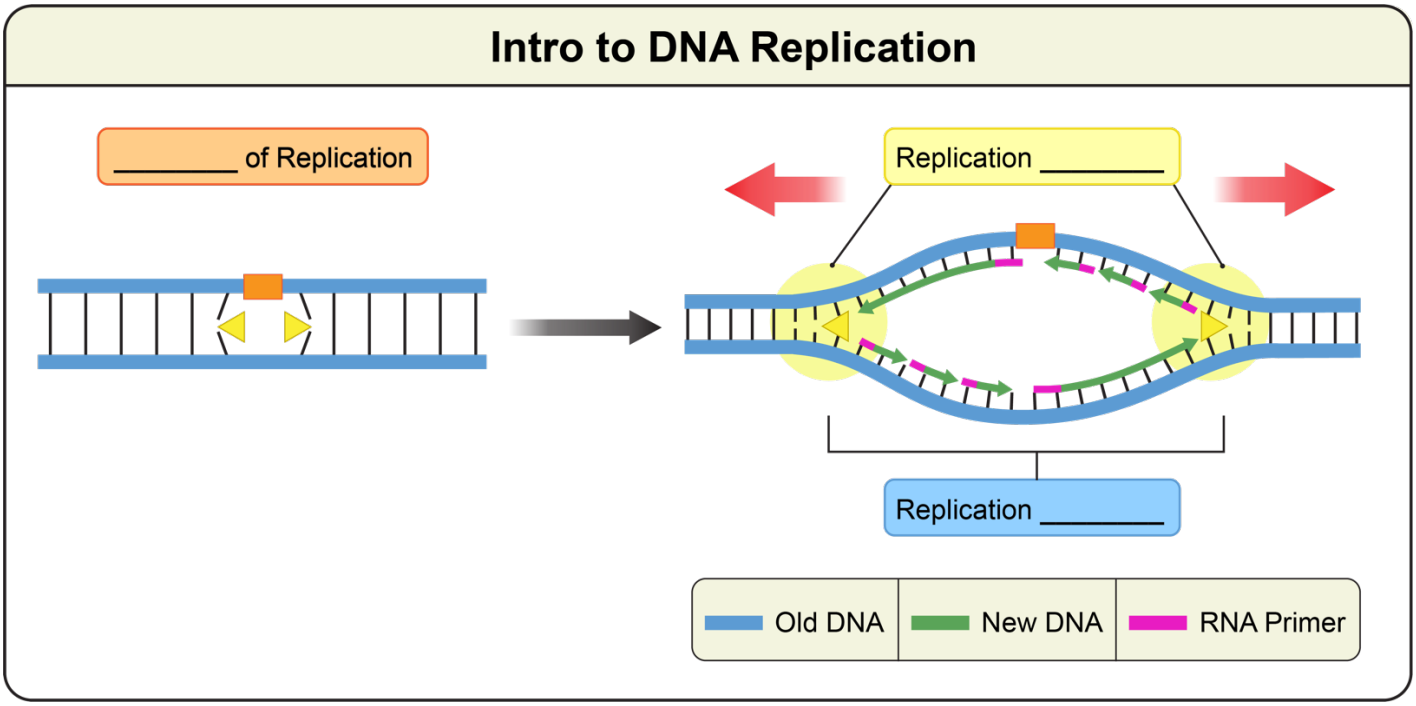
- DNA replication requires a host of _____ enzymes/proteins working together:

Enzyme / Protein		Function
	**Helicase**	_____ DNA double helix at the replication fork.
	**_____ Protein**	_____ to and stabilizes single-stranded DNA.
	**_____ase**	Creates RNA primers as a _____ point to replication.
	**_____ Polymerase**	Creates a new DNA strand using the _____ strand of DNA.
	**DNA _____ase**	_____ together new strands of DNA.

CONCEPT: INTRO TO DNA REPLICATION

Replication Forks

- Replication begins with helicase unwinding DNA at a specific site called the **_____ of Replication (ORI).**
- The 2 strands of DNA are separated, forming 2 *replication* _____.
  - □ **Replication Forks**: ___-shaped regions at each end of the *"bubble"* where DNA is unwound.
  - □ DNA replication proceeds ___-directionally (in _____ directions).



EXAMPLE: 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 is 1 replication fork found for every replication bubble formed.

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

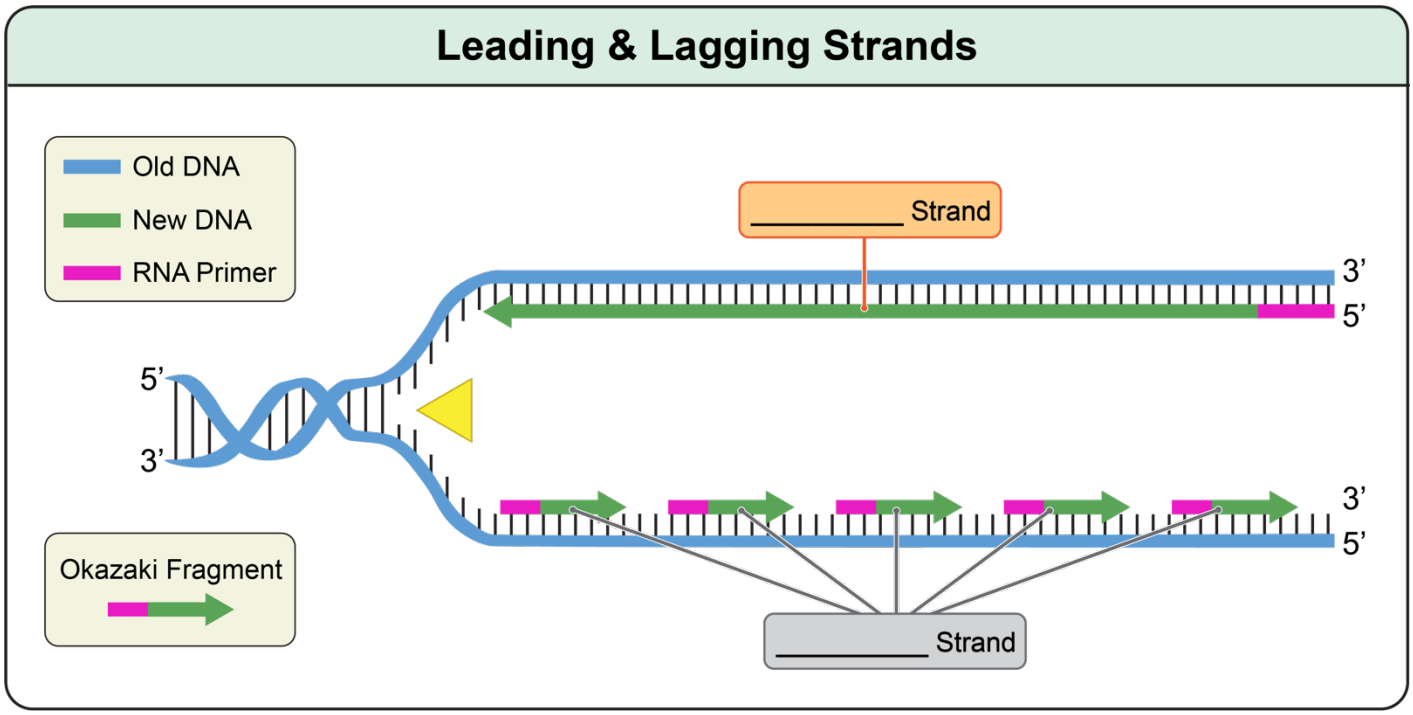
PRACTICE: How many helicase enzymes are needed for a strand of DNA that possess 5 origins of replication?

a) 2 b) 5 c) 6 d) 8 e) 10

CONCEPT: INTRO TO DNA REPLICATION

Leading vs Lagging Strand

- After separating the double helix, replication creates ____ new strands.
  - □ The strand types are dependent on the direction of the replication fork.
  - □ **Leading Strand:** continuous replication in _____ direction as replication fork movement.
    - Only ___ RNA primer is required for replication.
  - □ **Lagging Strand:** discontinuous replication in _____ direction as replication fork movement.
    - □ **Okazaki Fragments:** Multiple, small, replicated segments that each require an RNA primer.



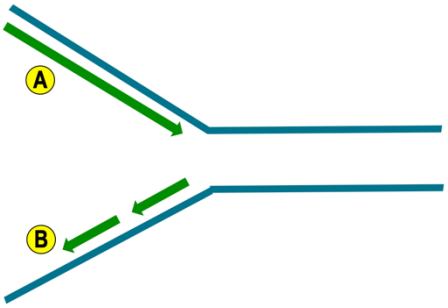
EXAMPLE: A newly synthesized leading strand of DNA is given as the following:

3' ATTCGACTAA 5'

Determine the template DNA strand that was copied.

CONCEPT: INTRO TO DNA REPLICATION

PRACTICE: Based on the image below, which of the following statements is true?



a) **Arrow A** represents the lagging strand and moves in the opposite direction of the replication fork movement.

b) **Arrow B** represents the lagging strand and moves in the same direction of the replication fork movement.

c) **Arrow A** represents the leading strand and moves in the same direction of the replication fork movement.

d) **Arrow B** represents the leading strand and moves in the opposite direction of the replication fork movement.