

AP Biology
Chapter 16 Guided Reading Assignment

Name Answer Key.

1. Explain Griffith's experiment and the concept of transformation in detail.

Griffith was able to create pathogenic bacteria by mixing heat killed pathogenic bacteria, with live non-pathogenic bacteria. "Something" was transferred to the non-pathogenic bacteria transforming it into a pathogenic version.

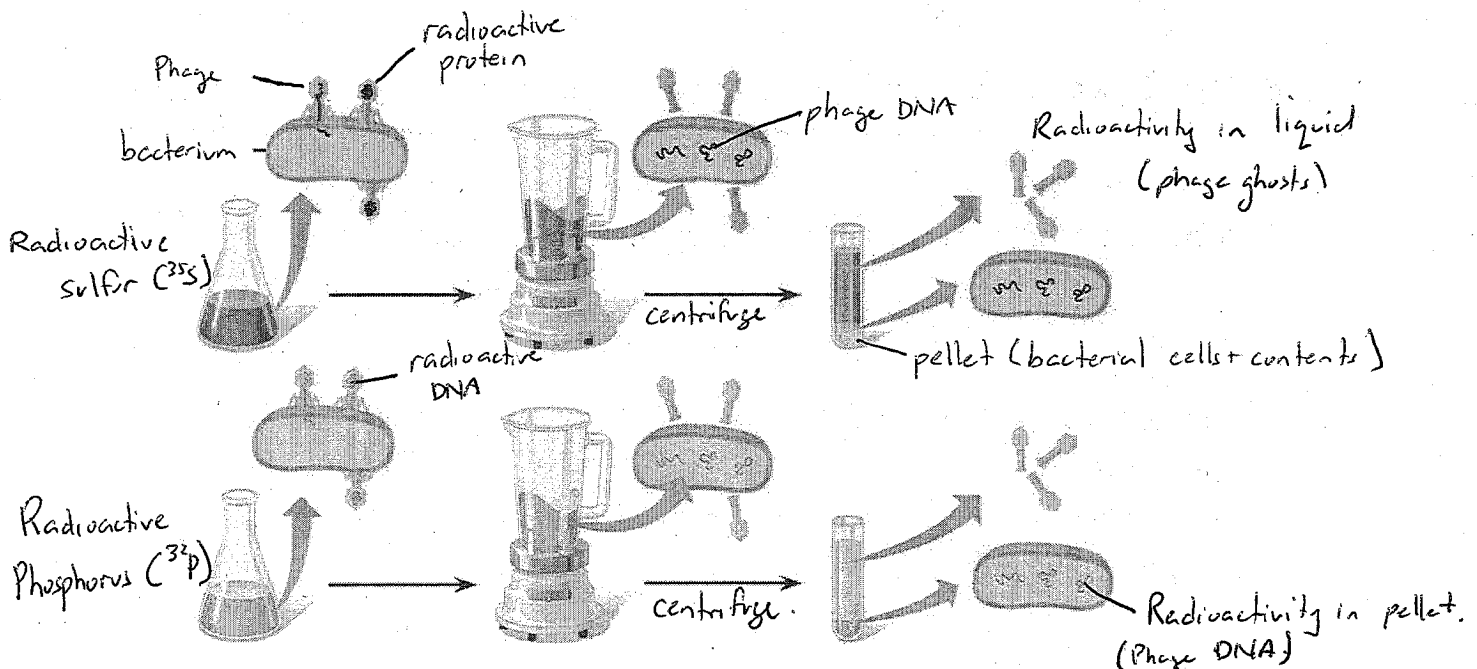
2. What did Avery, MacLeod and McCarty contribute to this line of investigation?

They announced that DNA was the transforming substance.

3. What is a bacteriophage?

A virus that infects bacteria.

4. Label the diagram below and explain the Hershey Chase experiment.



5. How did Chargraff's work contribute to understanding the structure of DNA?

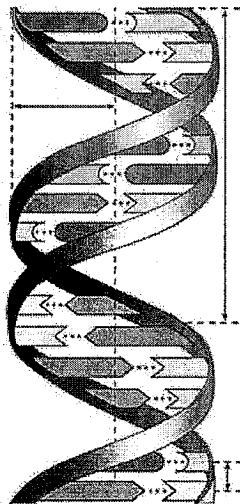
Concluded that composition of DNA varies b/w species.

② In any species, number of A & T bases are equal
" " G & C bases are equal.

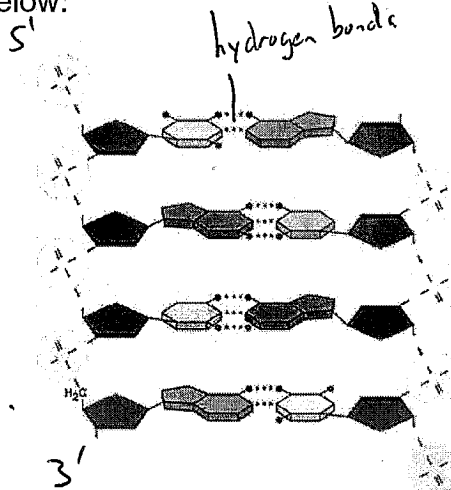
6. Why was Rosalind's Franklin's work essential to the understanding of the structure of DNA?

Franklin produced a picture of the molecule hinting at its structure.

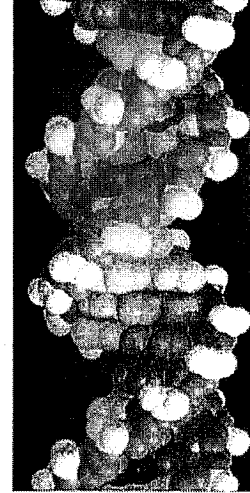
7. Label the structure below:



(a) DNA



(b) Partial Chemical Structure.



(c) Space filling Model.

8. Why does adenine always pair with thymine and guanine with cytosine in DNA?

b/c a Purine must always pair with a pyrimidine to maintain constant width of a DNA molecule.

A-T - double bond

G-C - triple bond.

9. What is meant by the term that DNA replication is semiconservative?

When DNA is copied, each new molecule consists of an original DNA strand paired with a newly synthesized strand.

10. How is bacterial DNA replication accomplished?

- As the DNA is circular, a replication bubble opens & DNA is synthesized in both directions around the molecule.

11. What are DNA polymerases?

- Main enzyme responsible for copying the DNA.

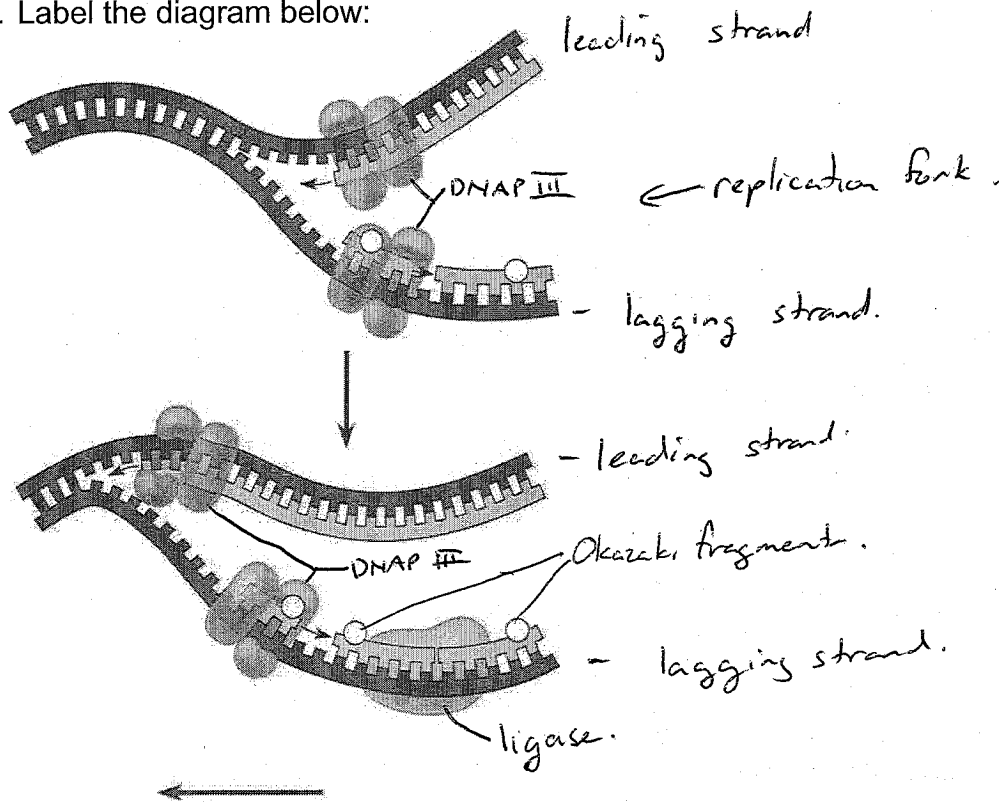
12. In your own words, what is meant by the term – DNA is antiparallel in arrangement”?

The two strands run in opposite directions.

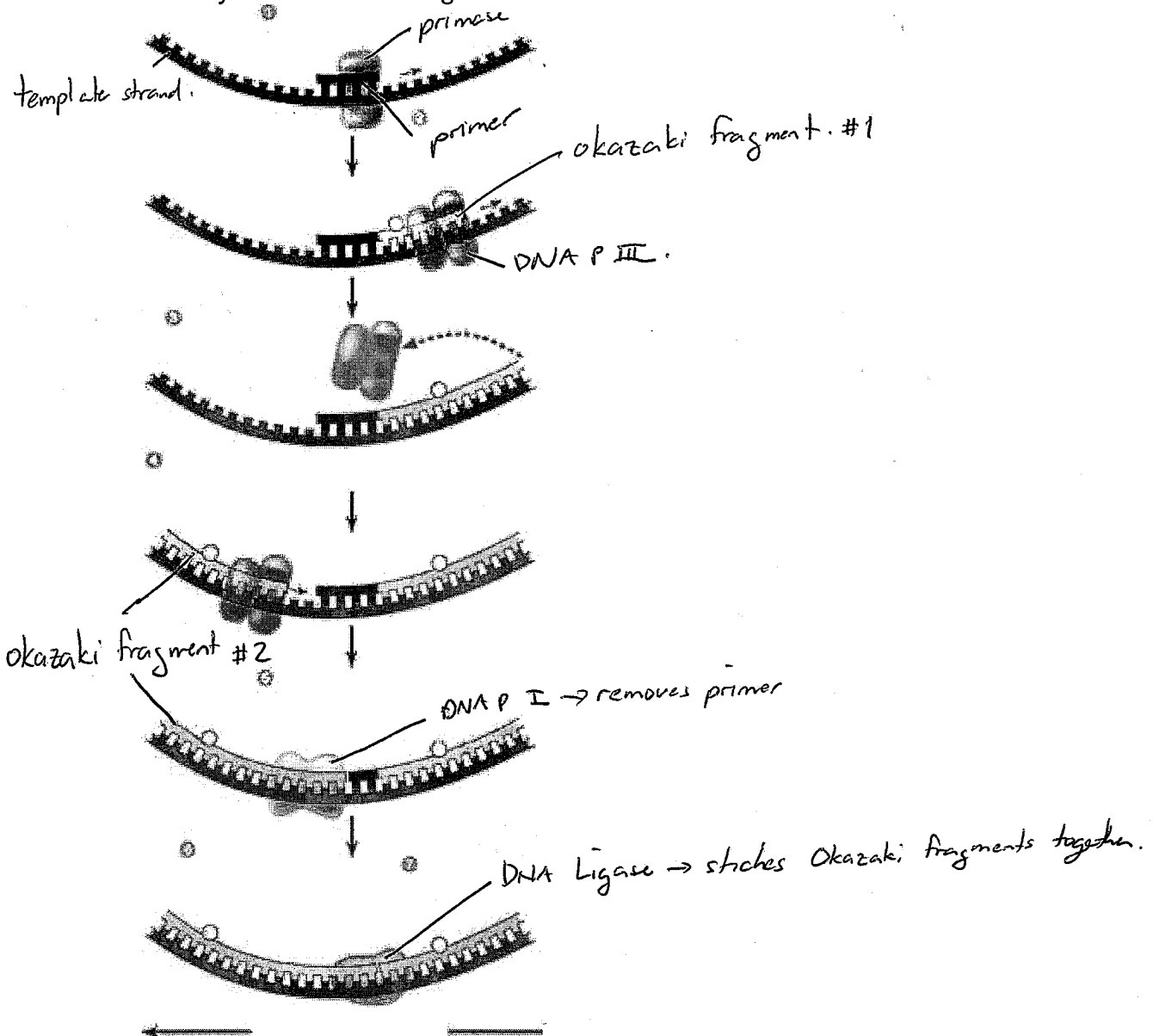
13. Define the following terms:

- a. Leading strand - the strand that is replicated continuously towards the replication fork.
- b. Lagging strand - the strand that is replicated discontinuously away from the fork.
- c. Okazaki fragments - replicated DNA segments between RNA primers found on the lagging strand.
- d. DNA ligase - stitches together Okazaki fragment / DNA fragments
- e. Primer - places an RNA primer at the start of replication point to allow DNAP to attach + build the new DNA strand.

14. Label the diagram below:



15. Identify and label the diagram below:

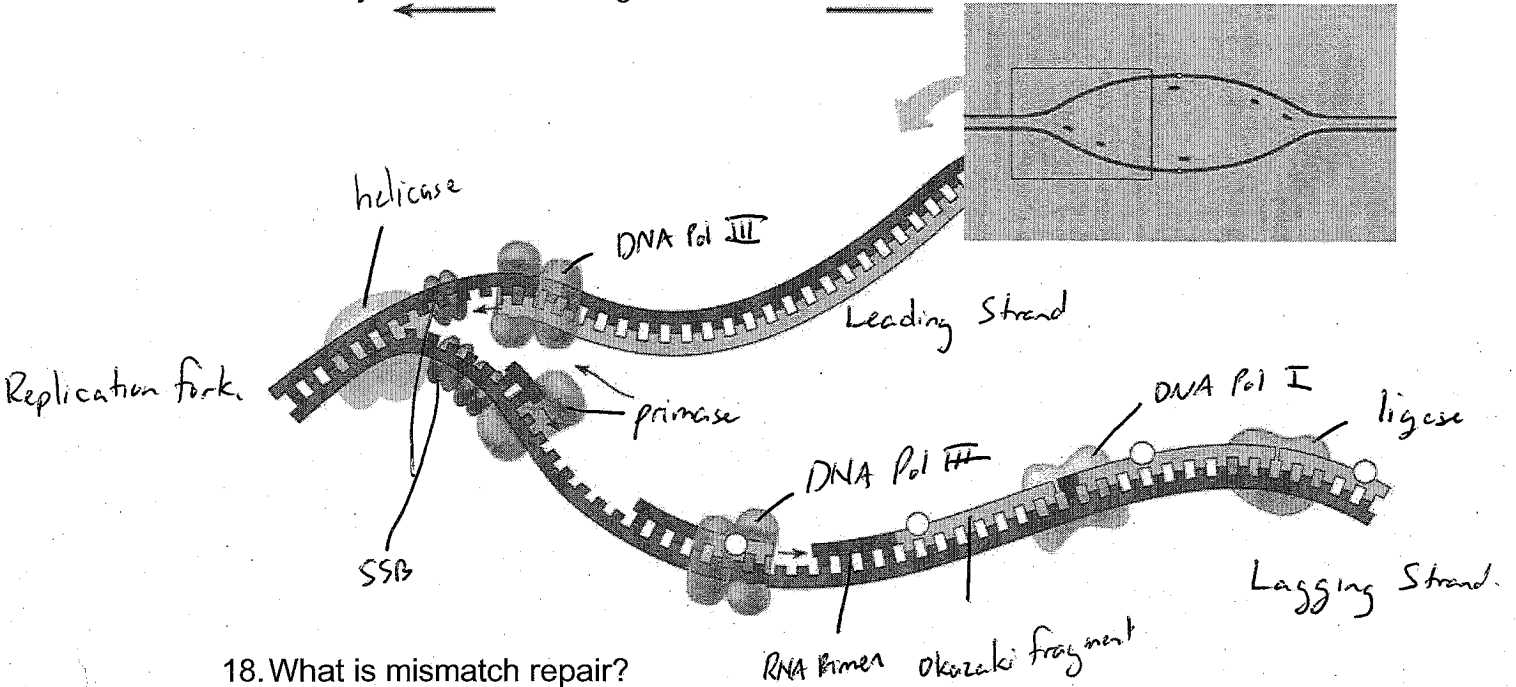


16. List the functions of the following enzymes:

- Helicase - unzips the DNA molecule.
- Single stranded binding protein - holds DNA strands apart.
- Topoisomerase - prevents over winding of DNA due to helicase unzipping.
- Primase - inserts RNA primer
- DNA Polymerase III - copy DNA template to produce complimentary strand → main enzyme of replication.

- f. DNA Polymerase I - removes primer & replaces w/ DNA nucleotides.
- g. DNA Ligase - stitches DNA fragments together.

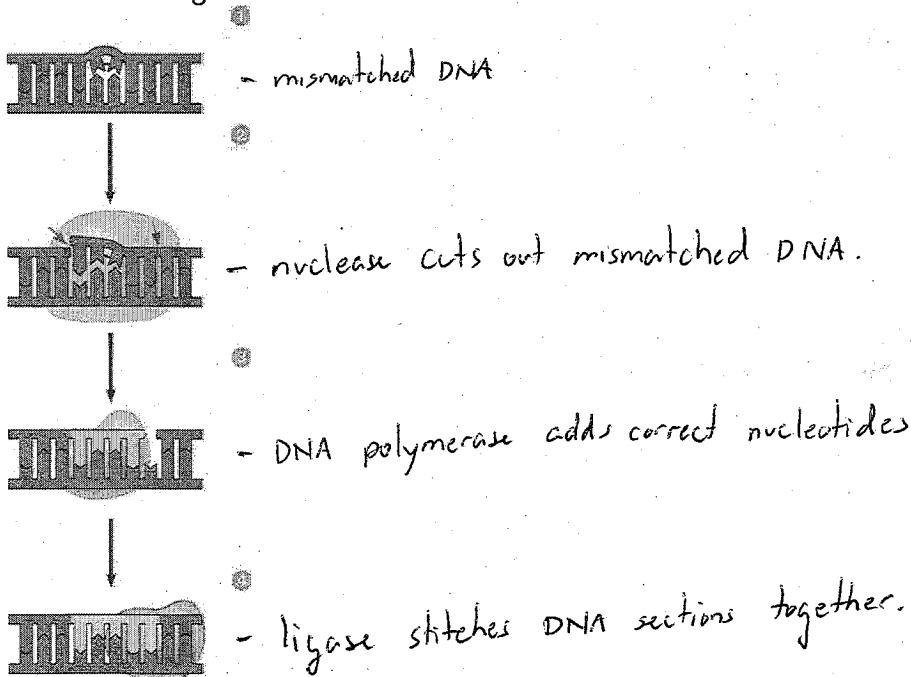
17. Identify and label the diagram below:



18. What is mismatch repair?

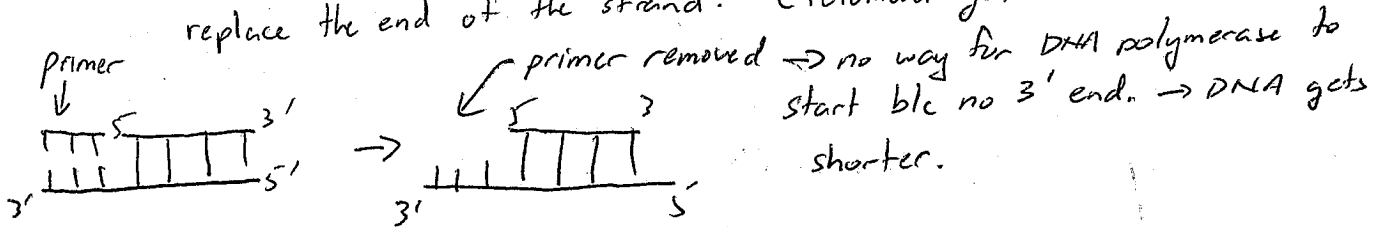
- repairing nucleotides that were mismatched by DNA polymerase.

19. Label the diagram below:



20. Why is there a short section of a cell's DNA that cannot be repaired or replaced? Draw your own diagram explaining the problem. It is very important that you understand this conceptually.

b/c every time the DNA replicates itself, the end of each chromosome gets shorter b/c there is no way for DNA Pol. to replace the end of the strand. (Telomeres get shorter)



21. What are telomeres and why are they important? How does telomerase play a role?

Telomeres are special nucleotide sequences at the end of chromosomes → postponing the erosion of genes due to successive DNA replications → ultimately leading to cell death.

Telomerase is active in germ cells, and it lengthens telomeres to prevent erosion.