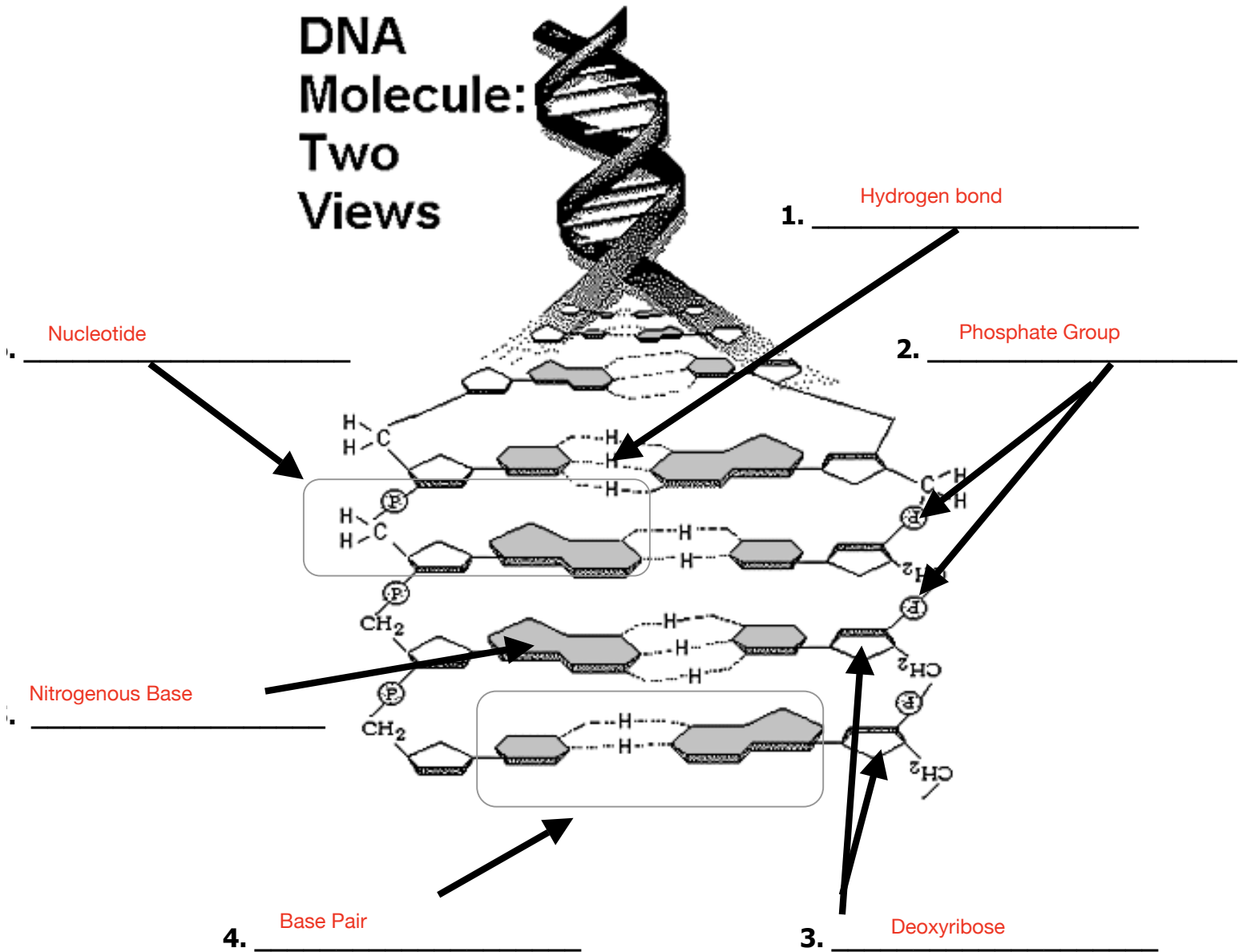


### Worksheet – Structure of DNA and Replication

Directions: Label the diagram below with the following choices:

- Nucleotide
- Deoxyribose
- Phosphate group
- Base pair
- Hydrogen bond
- Nitrogenous base

## DNA Molecule: Two Views



Directions: Complete each sentence.

7. Guanine, cytosine, thymine, and adenine are the four bases in DNA.
8. In DNA, guanine always forms hydrogen bonds with cytosine.
9. The process of replication produces a new copy of an organism's genetic information, which is passed on to a new cell.
10. The double coiled, "staircase" shape of DNA is called a helix.

Directions: Answer each question, you do not need complete sentences.

11. What do the letters DNA stand for?

Deoxyribonucleic Acid

12. Where is DNA found?

For eukaryotes, DNA is found in the nucleus.

For prokaryotes, DNA is found in the cytoplasm.

13. What is the first step in the process of DNA replication?

Helicase comes in and unzips the helix by breaking hydrogen bonds.

14. Which enzyme is responsible for "unzipping" the DNA double helix?

Helicase

15. Which enzyme is responsible for bonding the nucleotides in a new DNA molecule?

Polymerase

16. If the sequence of one single strand of DNA is C-A-A-G-T-A-G-G-C-T, what is the sequence of the complementary strand?

G-T-T-C-A-T-C-C-G-A

17. Describe the origin of each strand of the new double helices created after DNA replication.

One of the strands comes from the original strand.

The second strand is created utilizing free floating nucleotides in the cell.

18. Why is DNA replication important to the growth and development of a multi-cellular organism?

When creating new cells, each cell needs DNA. DNA are the instructions for the cell - without DNA the cell would not function.

19. Place the following terms in the correct order from smallest to largest: **Nucleus, DNA double helix, chromosome**

DNA double helix, Chromosome, Nucleus

20. List the 3 basic steps of DNA replication:

- a. Helicase opens up the helix.
- b. Polymerase adds complimentary bases to the original strand.
- c. Polymerase proofreads the strand.

21. The model of DNA below is ready to be copied. Compared to the **original** double helix, evaluate the copies made during three attempts of DNA replication. List any errors with the replication if they occurred:

**Original**

A	T
T	A
C	G
C	G
G	C
T	A
G	C

Replication #1

A	T
T	A
C	G
C	G
G	C
T	A
G	C

AND

A	T
T	A
C	G
A	G
G	C
T	A
G	C

List problems if any:

See highlighted

Replication #2

A	T
T	A
C	G
C	G
G	C
T	A
G	C

AND

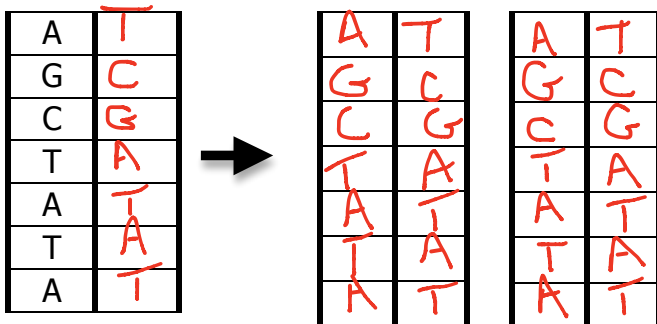
A	T
T	A
C	G
C	G
G	C
T	A
G	C

List problems if any:

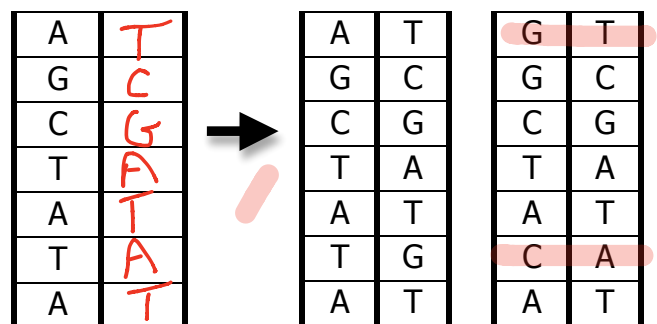
None

22. Complete the diagram on the left. Then circle the areas in the diagram on the right that show a genetic mutation.

DNA Correctly Copied



DNA Incorrectly Copied



23. Explain how the mutations might have been caused in the diagram above.

Many things may have caused the mutations above. DNA Polymerase may have missed this in its proofreading phase. Also, it could have changed after it was correctly pair due to environmental conditions.