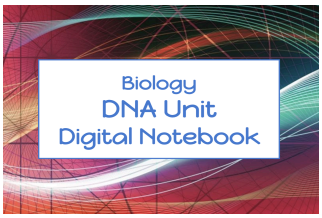
ASSIGNMENT: DNA STRUCTURE AND REPLICATION



This assignment has two parts. Use the links below to easily navigate to each section.

- Part 1: DNA Structure
- Part 2: DNA Replication

This assignment is 30 points formative assessment

OPEN NOTEBOOK

Part 1: DNA Structure Video Explanation

Recall that the nucleus is a small spherical, dense body in a cell. It is often called the "control center" because it controls all the activities of the cell including cell reproduction, and heredity. The **nucleus** contains the cell's DNA or **deoxyribonucleic acid**. DNA is called a nucleic acid because it was first found in the nucleus. In simple terms, DNA is instructions on how to build **proteins**.

1. What organelle stores the cell's DNA?

NUCLEUS

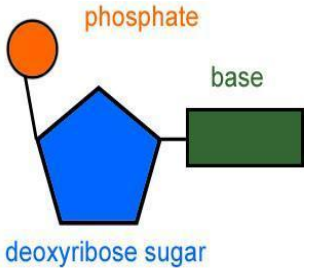
2. Write out the full name for DNA.

DEOXYRIBONUCLEIC ACID

3. DNA is the instructions for building what?

PROTEINS

In 1953, Rosalind Franklin, James Watson, and Francis Crick established the structure of DNA. The shape of DNA is a double helix, which is like a twisted ladder. The building blocks of DNA are **nucleotides**. Each nucleotide is made of **a sugar and phosphate (the sides of the ladder), and a nitrogen base** (the middle of the ladder). The sugar is A DEOXYRIBOSE SUGAR.

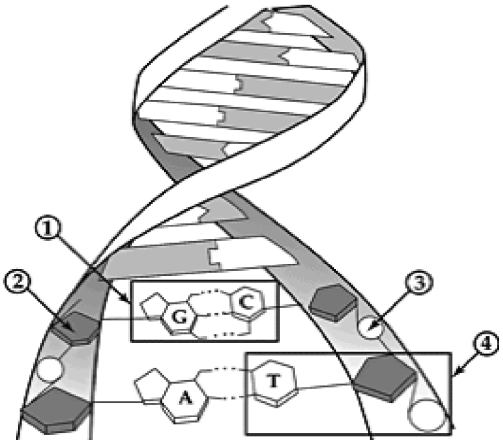


4. What is this building block of DNA called?

NUCLEOTIDES

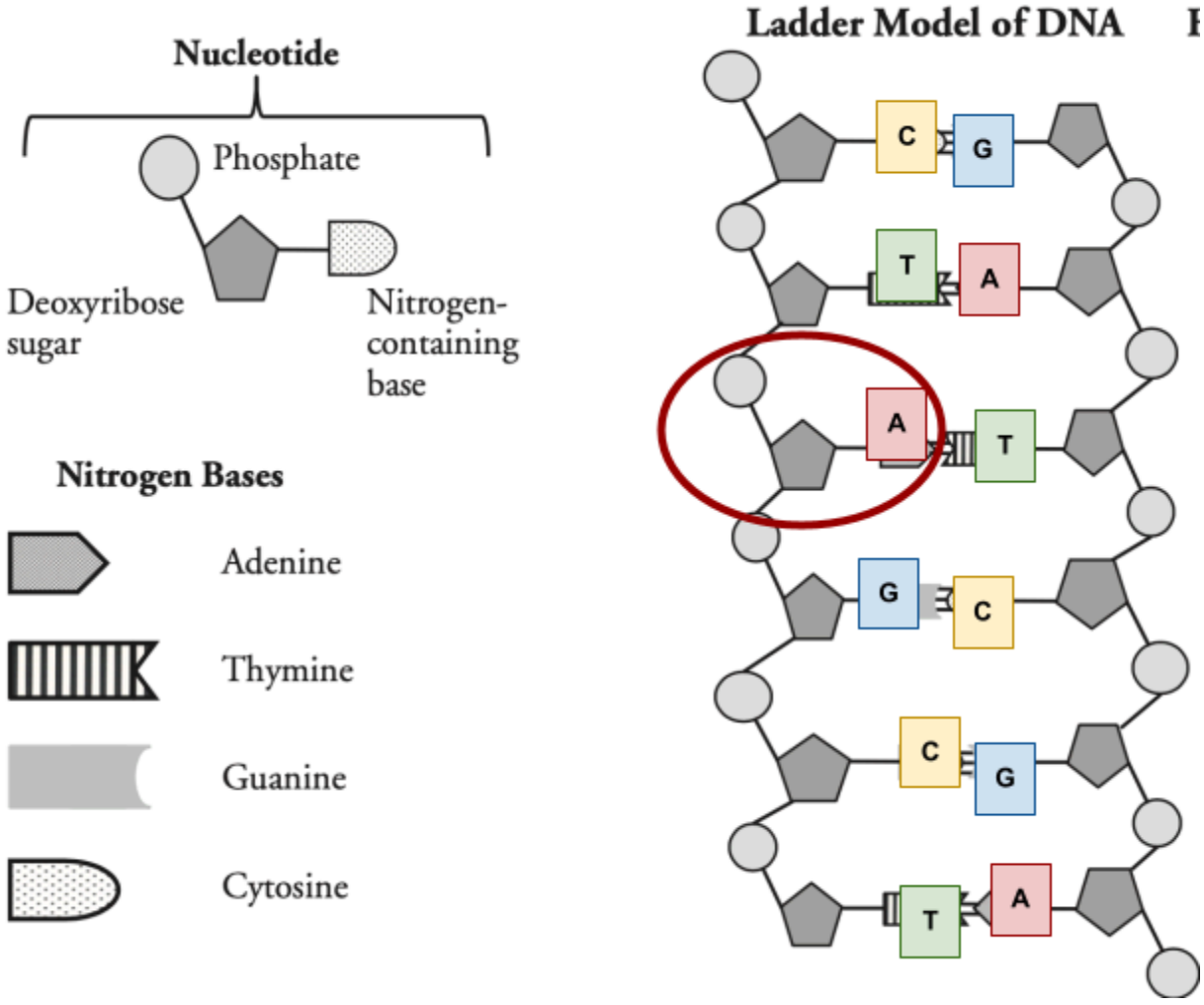
5. Using the image on the right. What part of the DNA is:

#1	BASES
#2	SUGAR
#3	PHOSPHATE GROUP
#4	NUCLEOTIDE



In the middle of the ladder are pairs of 4 types of nitrogen bases. The bases are known by their letters A, G, T, C, which stand for Adenine, Guanine, Thymine, and Cytosine. The bases can occur in any order along a strand of DNA. The order of these bases is the code for building proteins.

6. **Double click o**n the image below to edit the drawing. **Move the circle to identify one nucleotide.** Move the letters to label the bases (6 POINTS).



7. Look at the bottom and top of the "ladder" in the picture above. Are the rungs **parallel** (the ends of the strands match) or **antiparallel** (the ends of the strands are opposites)?

ANTIPARALLEL

These bases always bond in a certain way.

Adenine will only bond to thymine. Guanine will only bond with cytosine.

This is known as the "Base-Pair Rule".

Because of the base-pair rule, if you are given one side of DNA, you can tell what is on the other side (the complementary strand.) For example, if there is an A on one side, there must be a T on the other side; if there is a G on one side, there must be a C on the other side.

8. Write the complementary strand for the DNA segments below using the base-pairing rules. The first one has been done for you.

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

9. The proportions of the bases are consistent within a species; however, they do vary between species. Using the base-pair rules, complete the following table to show the percentage of each type of base in the five different organisms. The first row has been done for you. (A= T AND G= C)

Organism	**Percentage of Each Type of Base**			
	Adenine	**Guanine**	**Cytosine**	**Thymine**
Human	31	19	19	31
Cow	28	22	22	28
Salmon	29	21	21	29
Yeast	31	19	19	31

Part 2: DNA Replication

10. Why does DNA replicate before cells divide?

SO THAT EACH CELL HAS THE SAME AMOUNT OF DNA

11. When does DNA replication happen?

S- PHASE OF THE CELL CYCLE (Synthesis phase of the Interphase)

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

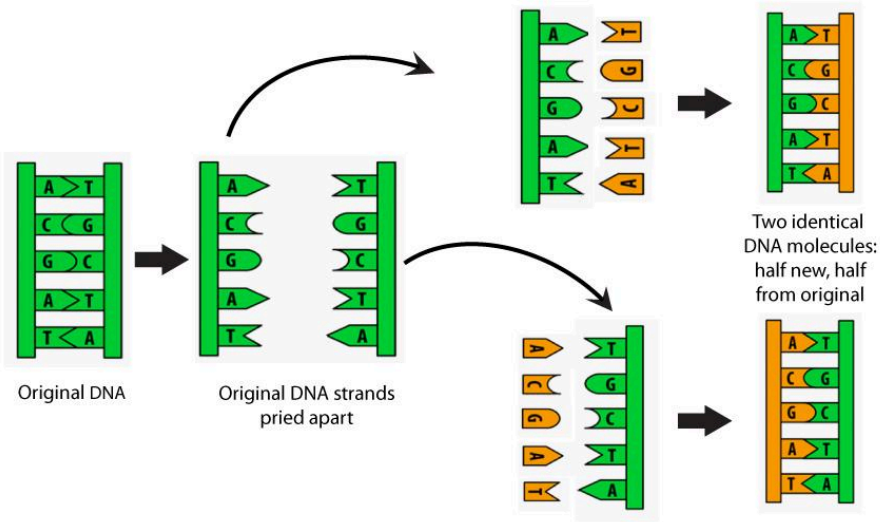
UNZIPPING THE DNA by Helicase

13. Which enzyme is responsible for “unzipping” the DNA double helix?

HELICASE (FROM “DOUBLE HELIX)

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

DNA POLYMERASE enzyme



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

TWO IDENTICAL DNA MOLECULES- HALF NEW HALF OLD

16. Why is DNA replication important to the growth and development of a multicellular organism?

AS CELLS MULTIPLY EACH HAVE THE SAME AMOUNT OF DNA AS THE ORIGINAL

17. Show the **complementary base pairing** that would occur in the replication of the short DNA molecule below. **SEE THE EXAMPLES BELOW: AND FINISH THE PAIRING (REPLICATION)**:

Original DNA Strand 1	Original DNA Strand 2		Original DNA Strand 1 (Copy from Left)	New DNA Strand		New DNA Strand	Original DNA Strand 2 (Copy from Left)
A	T	→	A	T	+	A	T
C	G	→	C	G	+	C	G
T	A	→	T	**A**	+	**T**	**A**
T	A	→	T	**A**	+	**T**	**A**
A	T	→	A	**T**	+	**A**	**T**
C	G	→	C	**G**	+	**C**	**G**
G	C	→	G	**C**	+	**G**	**C**
C	G	→	C	**G**	+	**C**	**G**
C	G	→	C	**G**	+	**C**	**G**
G	C	→	G	**C**	+	**G**	**C**
A	T	→	A	**T**	+	**A**	**T**
T	A	→	T	**A**	+	**T**	**A**

18. Watch this animation on **DNA Replication,** there is no sound. Write a summary of the steps in DNA Replication below. Make sure to mention the function of HELICASE and DNA POLYMERASE in your answer:
ANIMATION: (https://www.loom.com/share/996cf0f072644c408c7ed7c67a446f0f)

HELICASE UNZIPS DNA AND DNA POLYMERASE BRINGS THE CORRESPONDING NUCLEOTIDES AND ASSEMBLES THEM TO FORM TWO NEW STRANDS OF DNA.

DNA REPLICATION