


Complete the
DO NOW
on today's activity sheet.

Deoxyribo
nucleic
Acid

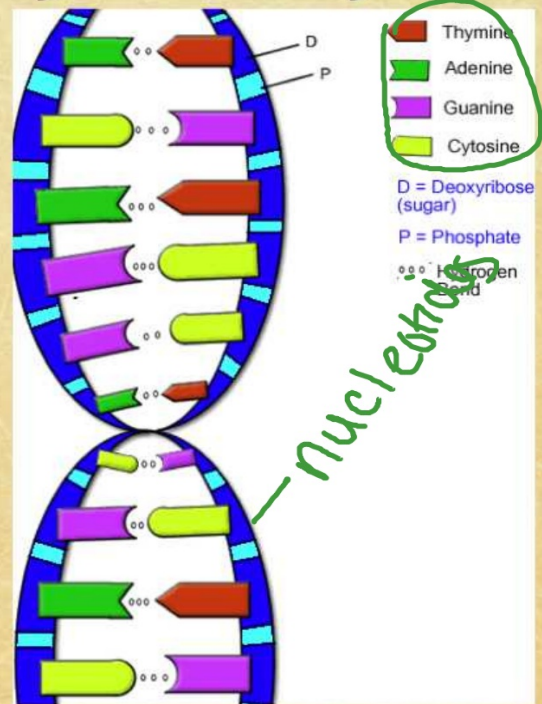
DNA Replication

Review from yesterday

- ♦ DNA is found in the NUCLEUS.
- ♦ When DNA is wound tightly around itself it is called a CHROMOSOME. Each human has 23 chromosomes.
- ♦ A section of DNA that codes for a trait is called a GENE. For example, ACGGCTAATCTAGG might code for “blue eyes”
- ♦ Remember: DNA contains the instructions that tell the ribosomes how to build PROTEINS.

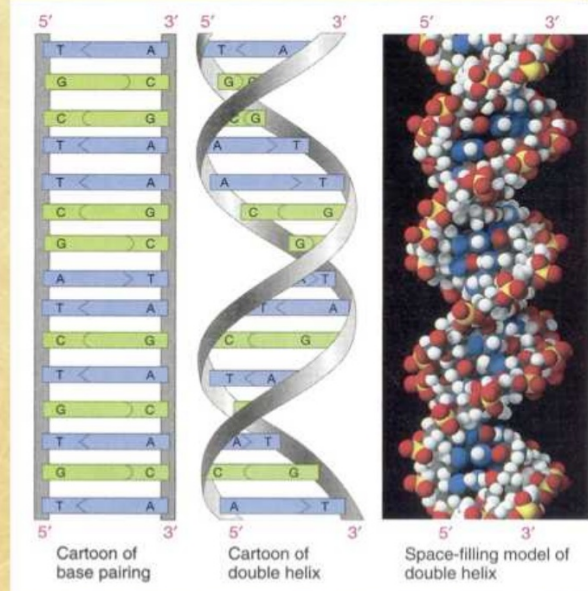
Review from yesterday

- ♦ DNA is made of NUCLEOTIDES and BASES
- ♦ The nucleotides are the “handrails” of the DNA molecule. They give DNA its structure.
- ♦ The bases are the “stairs” of the DNA molecule. They spell out the genetic code (the instructions for building proteins).



AT CG DNA has 4 bases

- ♦ They are: Adenine, Thymine, Guanine, Cytosine.
- ♦ When they are paired up, we call the BASE PAIRS.
- ♦ These are the “stairs” of the spiral staircase, and they are the letters in the genetic code.
- ♦ To form a complete stair, two bases have to pair up:
 - ♦ Adenine always pairs with Thymine
 - ♦ Guanine always pairs with Cytosine



<http://learn.genetics.utah.edu/content/begin/dna/builddna/>

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

Pairing up

- ♦ By pairing up, each side of the DNA “knows” what should be on the other side.
- ♦ For example, if I were to give you the code on one side of the DNA, you could easily figure out the other side.
- ♦ Let’s try it. Remember: Adenine pairs with Thymine, and Cytosine pairs with Guanine.
 - ♦ ACCTGTACTGAAGTGCCGA
 - ♦ Complimentary strand: TGGACATGACTTCACGGCT
- ♦ One more:
 - ♦ TCGGCATACCG
 - ♦ Complimentary strand: AGCCGTATGGC

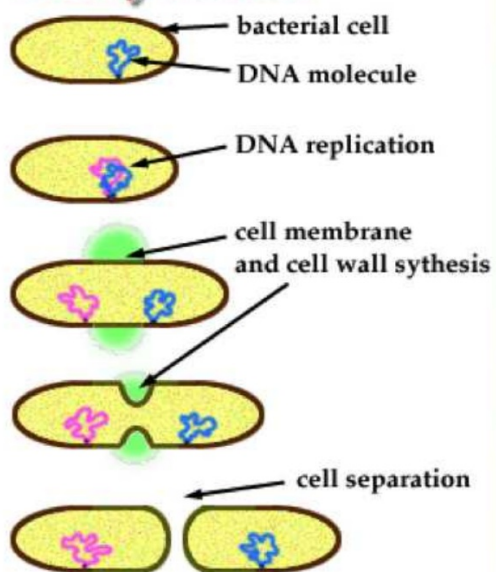
Why does DNA Replication occur?

- ♦ DNA replication makes exact copies of the DNA molecule.
- ♦ DNA Replication allows cells to grow and reproduce (make new cells).
 - ♦ In humans and animals, it is the first step of **mitosis**, which occurs when **cells in your body grow** (like your muscles).
 - ♦ It is also very important for **meiosis**, which is the first step of **sexual reproduction**.
- ♦ DNA Replication allows a cell to pass down its genetic information to the next generation.
 - ♦ The cell needs to make copies of its DNA so it can give some to it's "children" and still have some left for itself!

Why does DNA Replication occur?

- ♦ DNA replication **doubles the amount of genetic material** so that when a cell splits, both will have the same amount of DNA as the original did.
- ♦ In **bacteria**, DNA replication is how cells reproduce. In human beings and other animals, other steps are required.
- ♦ This is called **BINARY FISSION** and it is a form of asexual reproduction.

Bacterial cell: Binary Fission



How does REPLICATION work?

There are 3 main steps to DNA replication:

- ♦ **Step 1:** Hydrogen bonds break between BASE PAIRS. The DNA molecule begins to unzip and the two individual strands unwind.
- ♦ **Step 2:** Unwound strands of DNA serve as templates for new DNA. Free nucleotides and bases begin to attach themselves to the open strand of DNA.
- ♦ **Step 3:** The new strand of DNA is “proofread” for errors. There are two new molecules of DNA which are exact copies of each other. Each DNA molecule has one old strand and one new strand.

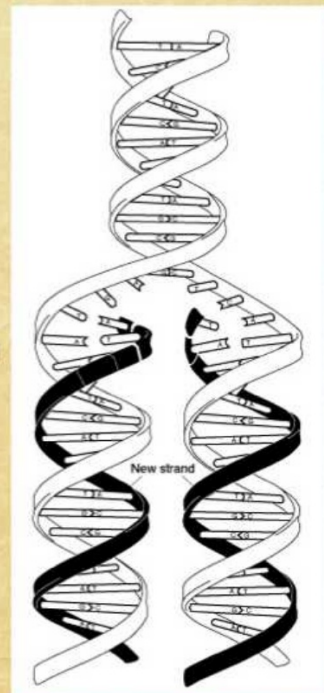
Who does the REPLICATION?

- ♦ In DNA replication, the work is done by **ENZYMES!**
- ♦ One enzyme (helicase) splits the DNA by creating a “fork”
- ♦ Another enzyme (Polymerase) adds nucleotides and bases and “proofreads” the new strand.



The New DNA

- ♦ The new strand of DNA that is produced is almost exactly the same. However, it has one important differences:
 - ♦ It is possible that the new strand of DNA will have a few “errors”. For example, maybe a G was matched up with a T, instead of a C. Or, maybe a whole section of DNA got moved to a new area.
- ♦ These are called MUTATIONS and they are one reason why you are not identical with your parents.
 - ♦ Next week, we are going to see other ways that DNA changes through generations.



Making your edible DNA molecule

- ♦ Follow the instructions on the lab sheet to complete the assignment.
- ♦ Instead of using different colors, you will write the letter of the Base on each marshmallow.

Replicating your DNA model.

- ♦ I will come around as Helicase and break the hydrogen bonds of your DNA molecule.
 - ♦ You will complete the replication to create 2 DNA molecules
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