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**DO NOW:**  
**Draw a picture of DNA  
replicating, using  
appropriate base pairs**

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Deoxyribonucleic  
Acid

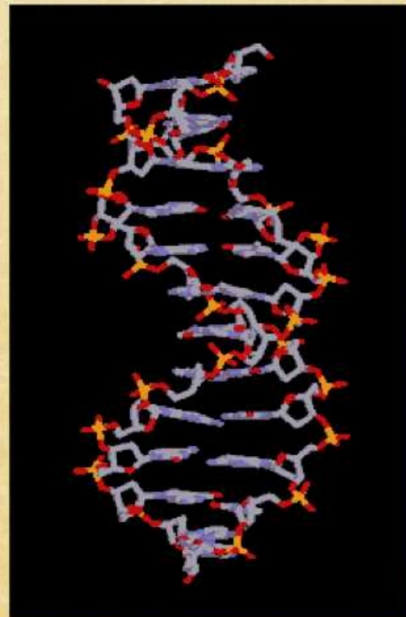
## **DNA and RNA**

Replication and Transcription

Ribonucleic  
Acid

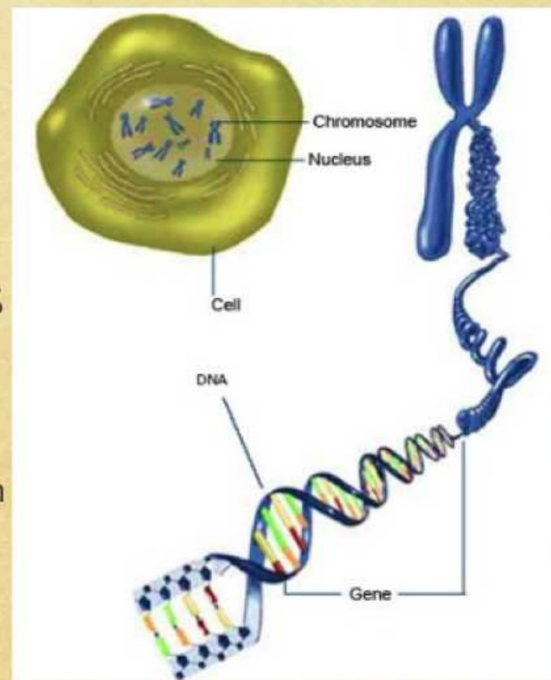
## Some Review:

- ♦ DNA is where the GENETIC CODE is stored.
- ♦ It is a set of instructions for building proteins stored in the nucleus
- ♦ Sent by the CEO (nucleus) to the WORKERS (ribosomes) as instructions for building PROTEINS



# Where is DNA?

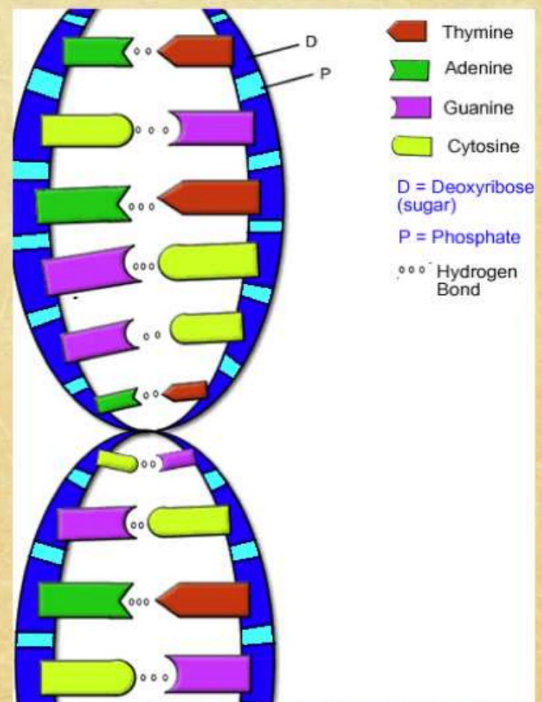
- ♦ DNA is wound tightly to form a CHROMOSOME.
- ♦ Each human nucleus contains 23 CHROMOSOMES
- ♦ A GENE is a section that codes for a specific TRAIT.
  - ♦ ACTGTTGGC may really mean MAKEHAIRYKNUCKLES

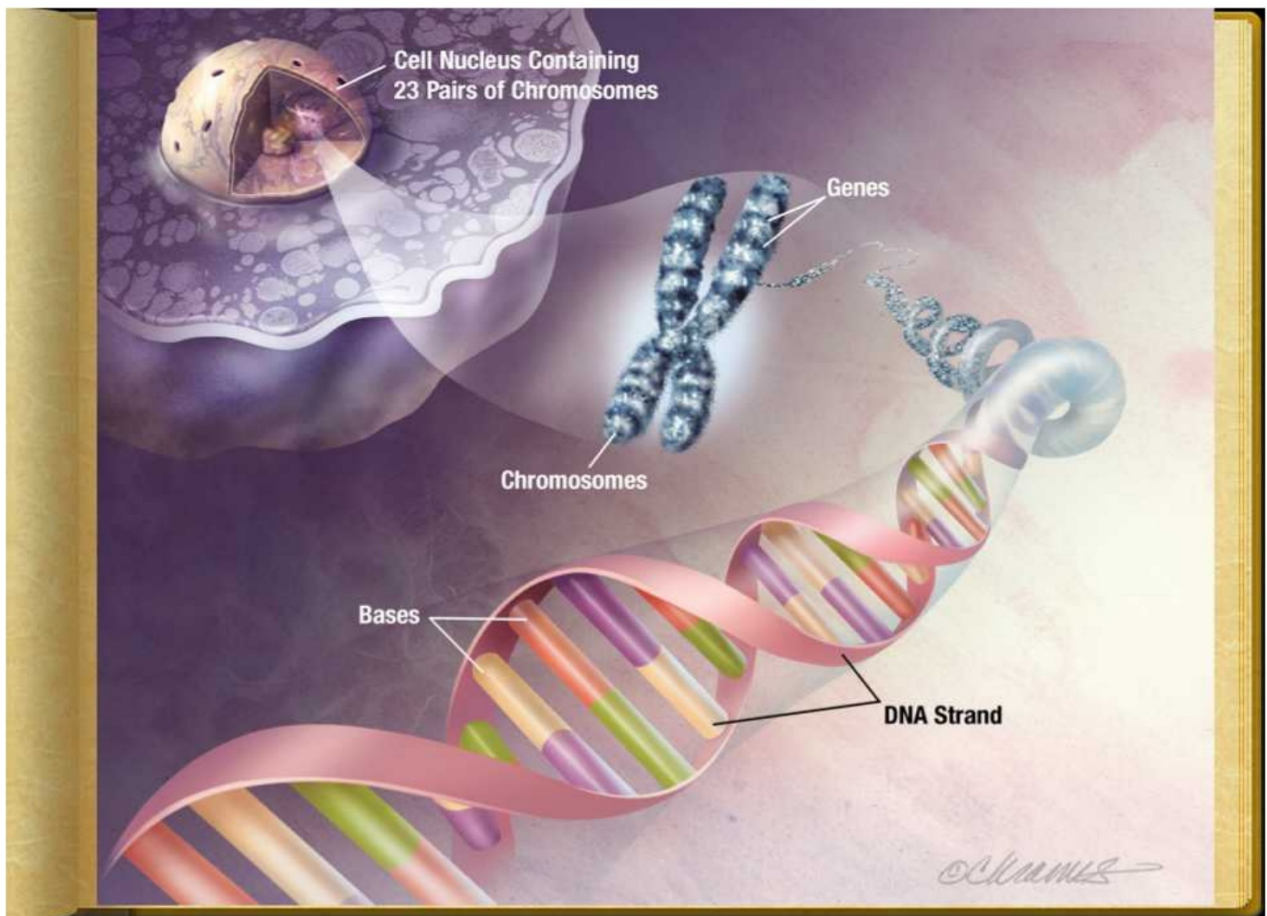




# What is DNA made of?

- ♦ DNA is shaped like a SPIRAL STAIRCASE.
- ♦ The handrails the staircase are made of NUCLEOTIDES.
- ♦ The steps of the stair case are made of BASES.
- ♦ There are 4 bases used in the DNA molecule, and each pairs with another:
  - ♦ Adenine – Thymine
  - ♦ Guanine - Cytosine





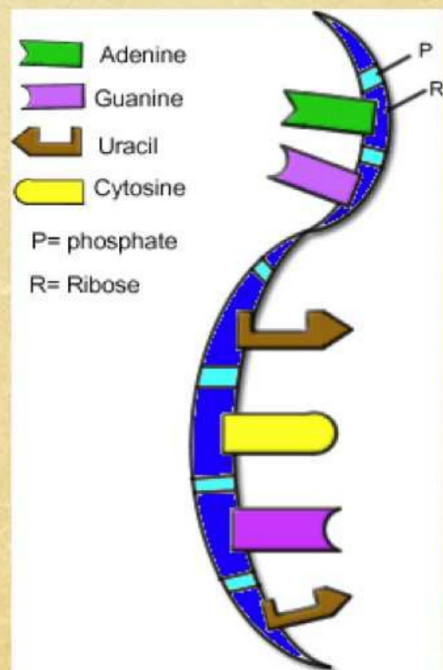
## So, what is RNA?!

- ♦ RNA is like a photocopy of the DNA. It is what actually gets sent out to the ribosomes for building proteins.
- ♦ The CEO (the nucleus) does not want to let the DNA out of his reach. It is way too valuable and **way too long!**
  - ♦ It is needed to replicate new DNA, if the cell ever needs to make a new cell or reproduce. Plus, it contains instructions for everything
- ♦ So, the CEO (nucleus) decides to make a photocopy of the DNA to send out to the WORKERS (ribosomes).
  - ♦ The RNA is specific to one protein. For example, it could just build protein, or **hemoglobin**.



# What is RNA?

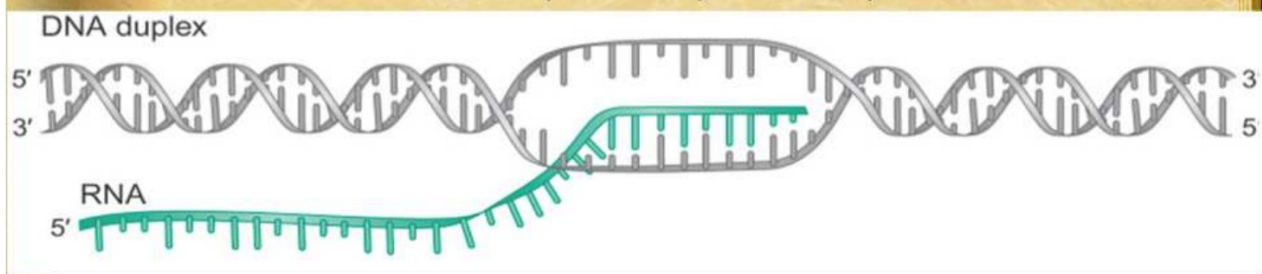
- ♦ RNA is just like DNA, except that **it is only one strand**, instead of two.
- ♦ The other difference is that RNA **replaces all of the THYMINE with URACIL**.
- ♦ So, C still pairs with G.
  - ♦ Cytosine with Gaunine
- ♦ But now, A pairs with U.
  - ♦ Adenine with Uracil





# Transcription

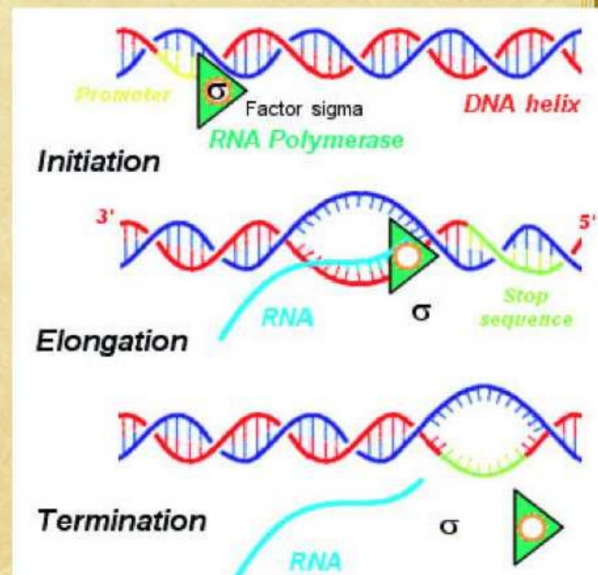
- ♦ mRNA is created through the process of transcription.
- ♦ Just like DNA replication, transcription occurs by splitting the DNA apart. However, in transcription it is only temporary.
- ♦ Then, the mRNA strand pairs up with one strand of DNA and base pairs come together.
  - ♦ The only difference is mRNA pairs A with U (it still pairs T with A).
- ♦ Finally, the DNA molecule comes back together and the mRNA head off for the ribosomes (workers) to build proteins.



DNA  
ATCG

mRNA uA GC  
**Transcription**

- ♦ Transcription creates a photocopy (mRNA) of the instructions (DNA) that can be sent out of the nucleus to the ribosomes to build protein.
- ♦ mRNA is a single strand, rather than a double helix.
- ♦  $C \rightarrow G, G \rightarrow C, T \rightarrow A, A \rightarrow U$
- ♦ Let's try it:
  - ♦ DNA: GCTGAATGCCGTA
  - ♦ mRNA: CGACUUACGGCAU
  - ♦ DNA: ATGCCGTATAAGC
  - ♦ mRNA: UACGGCAUATTCC



<http://www.youtube.com/watch?v=5MfSYnltYvg&NR=1>

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## Replication vs. Transcription

- ♦ Replication permanently splits DNA apart to make 2 exact copies of new DNA.
    - ♦ Used for cells to grow (make new cells) and for sexual reproduction
    - ♦ The final product is 2 new strands of DNA that are passed on to new cells or a new organism.
  - ♦ Transcription only temporarily splits DNA to make MESSENGER RNA.
    - ♦ Used as a photocopy of the DNA to be sent out to the workers (ribosomes) to build proteins.
    - ♦ The final product is a 1-strand section of mRNA that is not passed on to new cells or a new organism. **In fact, mRNA is only used once.**
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## One more time...

- ♦ What are some differences between DNA and RNA?
  - ♦ What is mRNA used for?
  - ♦ What are some differences between replication and transcription?
  - ♦ Why isn't DNA sent out of the nucleus?
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