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Catalyst:

How are we able to fit your entire genetic make-up into one tiny cell?

Reflection:

29L

## Discovering DNA

1/7/17

Name:

Period:

### Discovering DNA Structure

D = deoxyribo

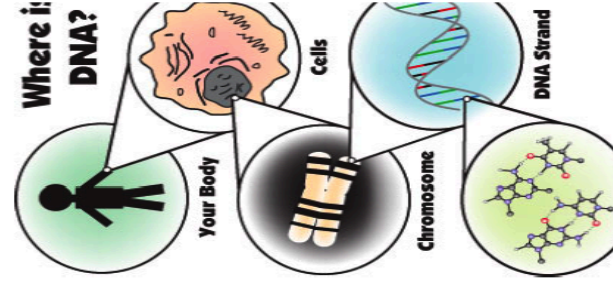
N = nucleic

A = acid

*DNA contains the information for carrying out the activities of the cell. How this information is coded or passed from cell to cell was at one time unknown. To break the code, today you will do a paper lab to determine the structure of DNA and show how the genetic code is carried. Each member of your group has a molecule called a NUCLEOTIDE. DNA is made up of repeating units of nucleotides.*

- 1.) Look at your nucleotide and the nucleotides of your partner. What are the THREE common parts of a nucleotide?

Date:



29R

# Steps for creating your DNA Strand

## Before #4 on the worksheet!

1. Cut out your nucleotide
2. Color in your nucleotide
  - Deoxyribose = Red
  - Phosphate = Blue
  - G = Purple
  - C = Yellow
  - A = Green
  - T = Orange
3. Fit your nucleotides together on the construction paper
4. Glue your nucleotides on the construction paper

Catalyst:

How are we able to fit your entire genetic make-up into one tiny cell?

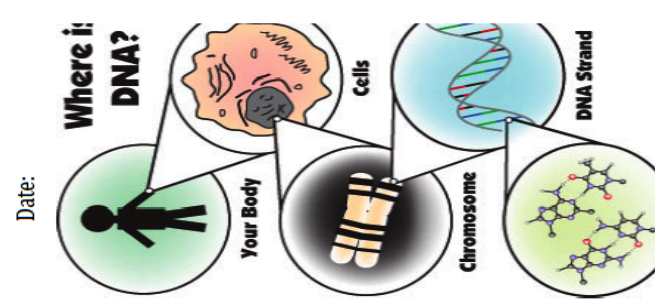
Reflection:

What is the coding system we use for DNA?  
How can 4 bases code for all of the trillions of traits that we have?

29L

## Discovering DNA

1/7/17



Name:

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### Discovering DNA Structure

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| 1/10/17     | DNA Notes                                | 30R         |

Catalyst:

Are there identical numbers of A and G OR C and T in a DNA strand? Why or why not?

Reflection:

**30L**

DNA Notes

?

1/10/17

Notes

Summary

**30R**

# DNA

**The Molecule of Life**



What does DNA stand for?

**DNA**

DeoxyriboNucleic Acid

**DNA**

The Molecule of Life



**How do you say that word?**

**Dee-oxy-ry-bo-noo-  
clay-ic Acid**

# Why is DNA important?

DNA contains the important information that makes us who we are.

# Examples:

- 1) hair color
- 2) blood type
- 3) height
- 4) disease

# Where is DNA found?

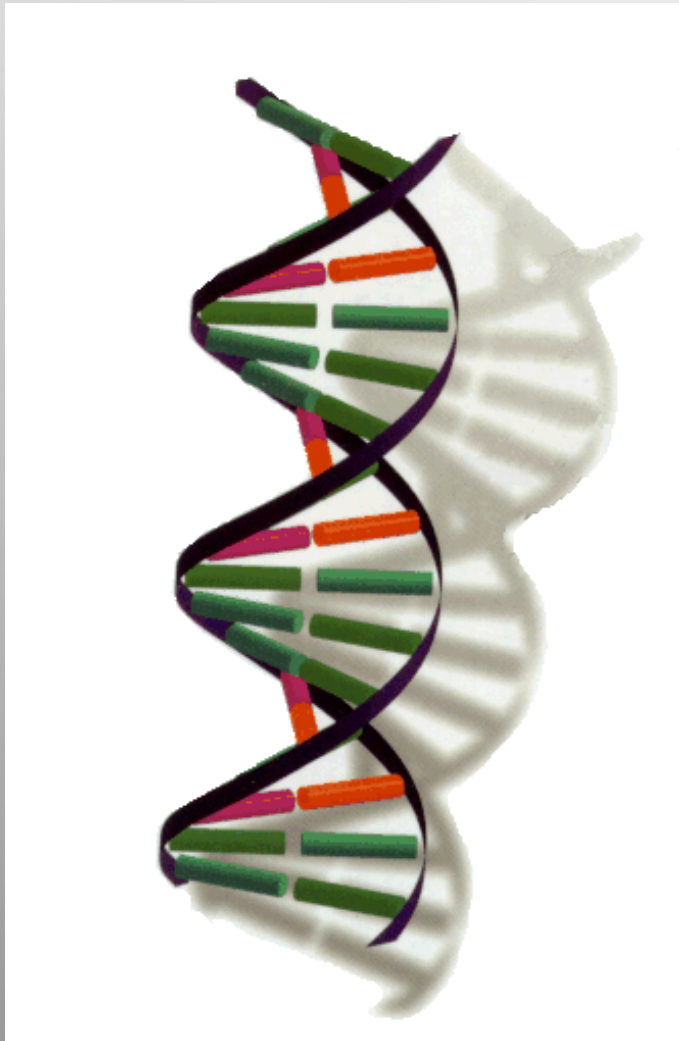
In the nucleus of every cell in our body.

# What does DNA look like?



It looks  
like a  
twisted  
ladder.

# What does DNA look like?



DNA has  
the shape  
of a  
double  
helix.

# What's a helix?

A helix is a coiled strand.



DNA

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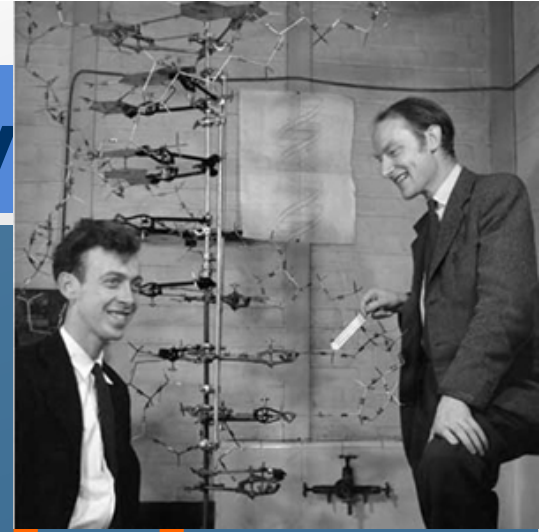
How was this shape discovered

2 scientists named

Watson and Crick

used other people's data

to put together the  
structure of DNA.

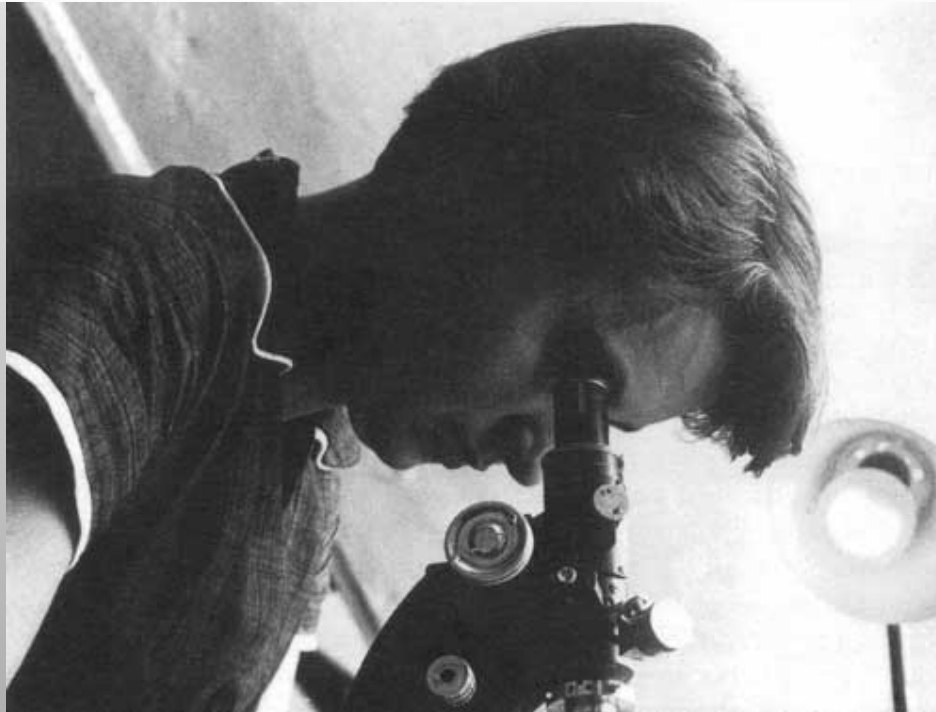


DNA

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# UH... WHOOPS.

Rosalind Franklin was a another scientist who researched DNA and figured out how to take x-ray photographs of it.

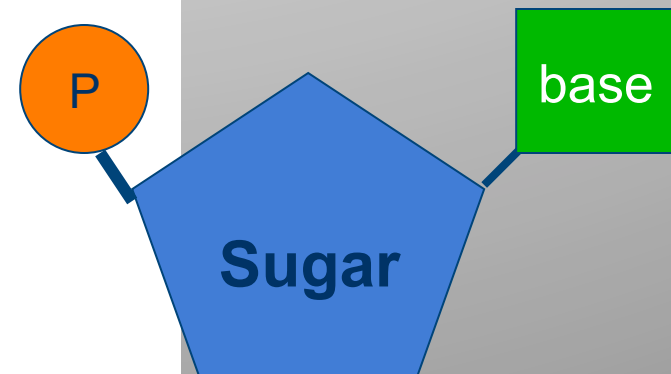
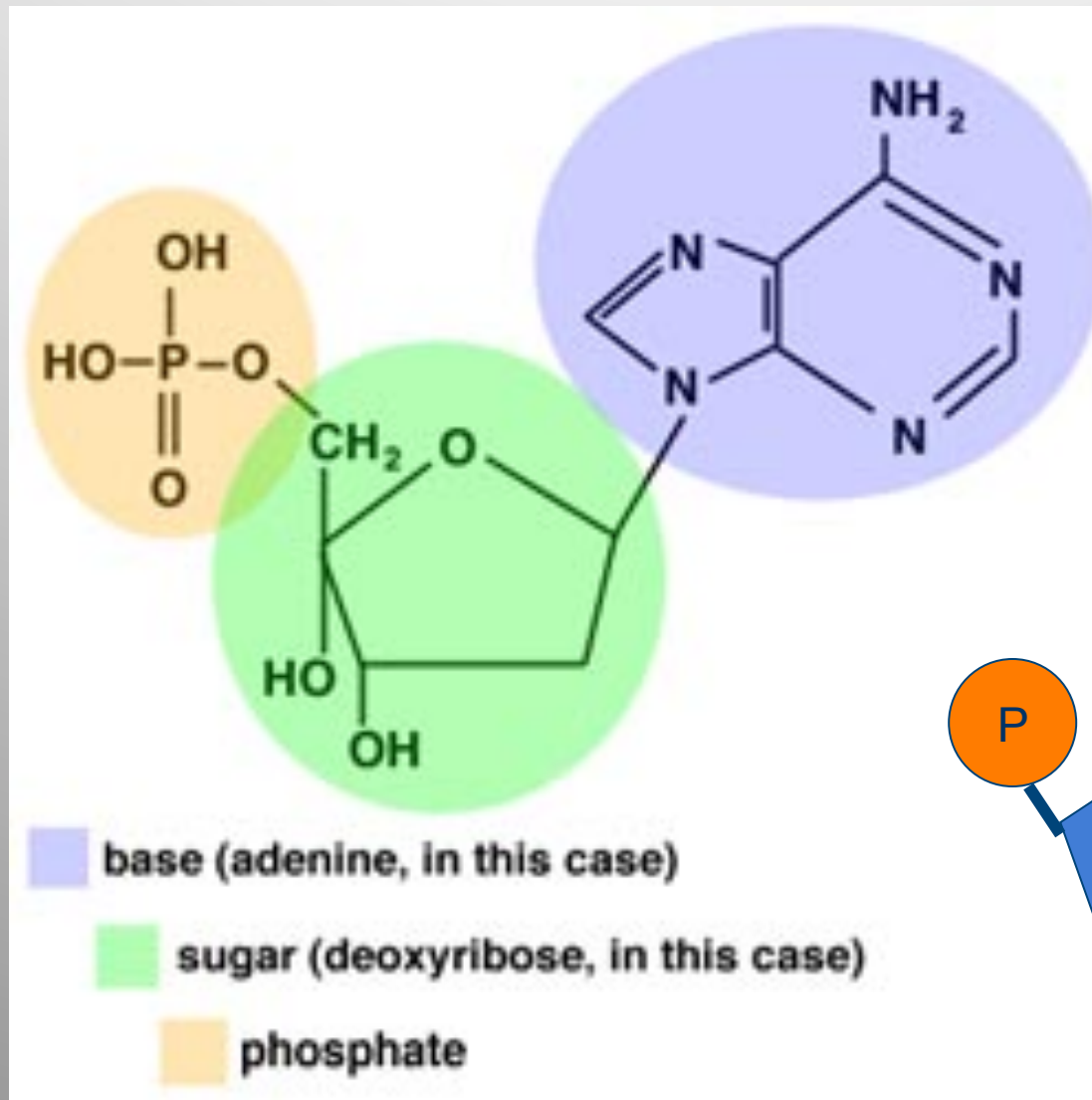


James Watson disliked her so much that he refused to take notes at one of her lectures. It took him and Crick 2 more years to learn some of the things she'd **already discovered!** That's a lesson learned the hard way!

# What is DNA made of?

DNA is made of  
smaller parts  
called  
nucleotides.

# Nucleotides



DNA

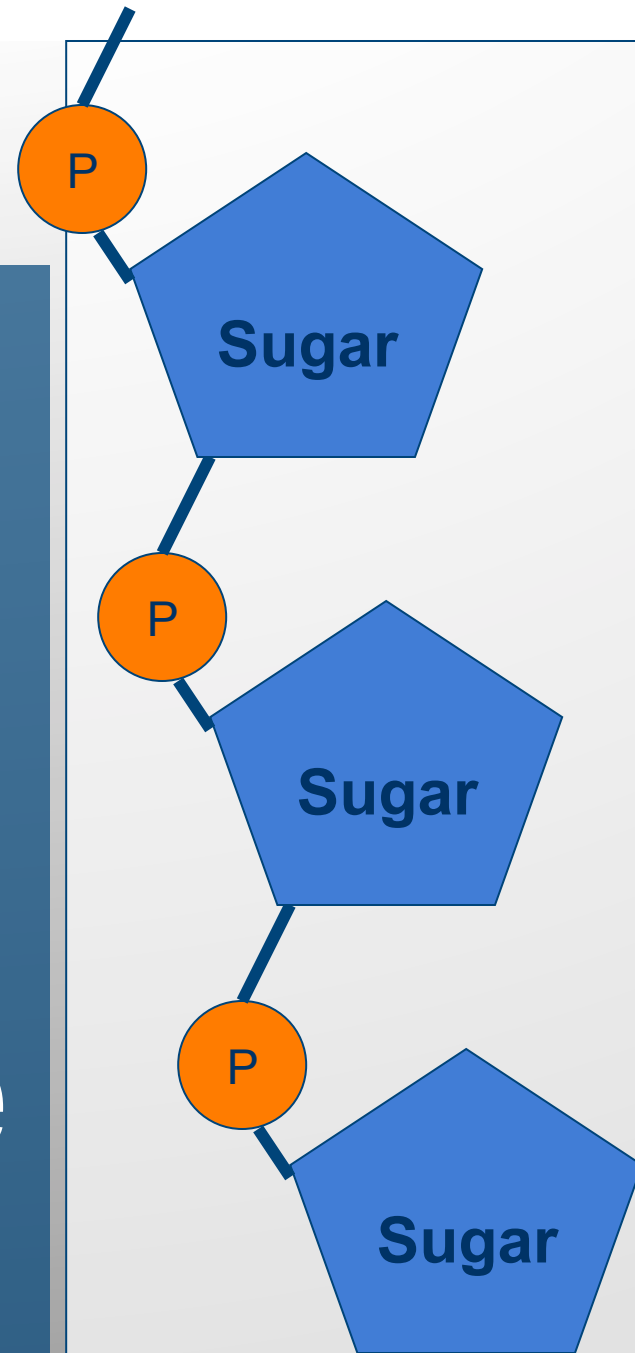
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# What are nucleotides?

Nucleotides are made up of a phosphate, a sugar, and a base.

# Nucleotides

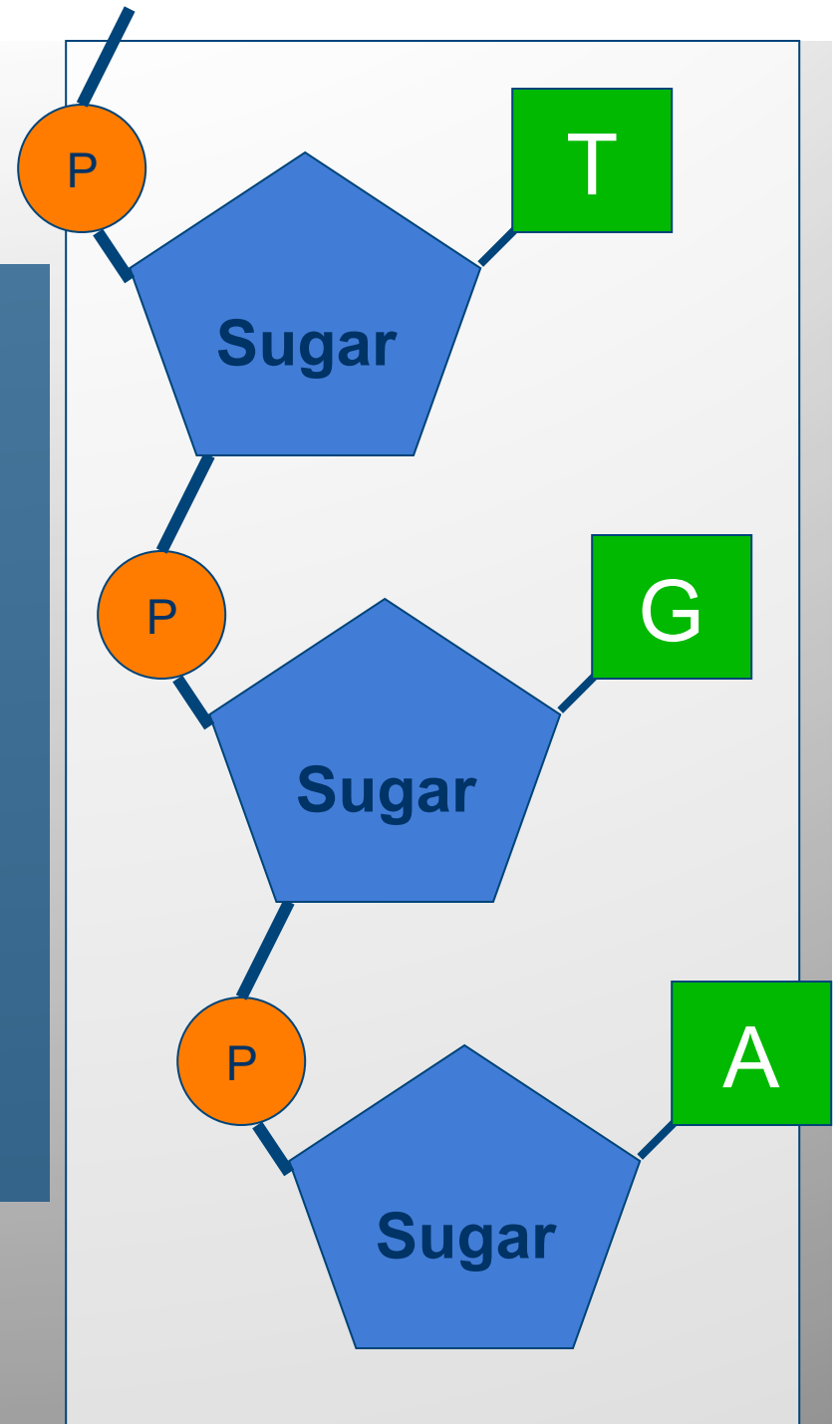
The sugar  
and  
phosphate  
make up the  
**backbone**.



DNA

# Nucleotides

The bases  
**stick out**  
of the  
backbone.



DNA

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# What kinds of bases are there?

There are 4 bases:

- 1) adenine
- 2) thymine
- 3) guanine
- 4) cytosine

## Let's make this simple:

A stands for adenine

T stands for thymine

G stands for guanine

C stands for cytosine

# Base-pairing rules:

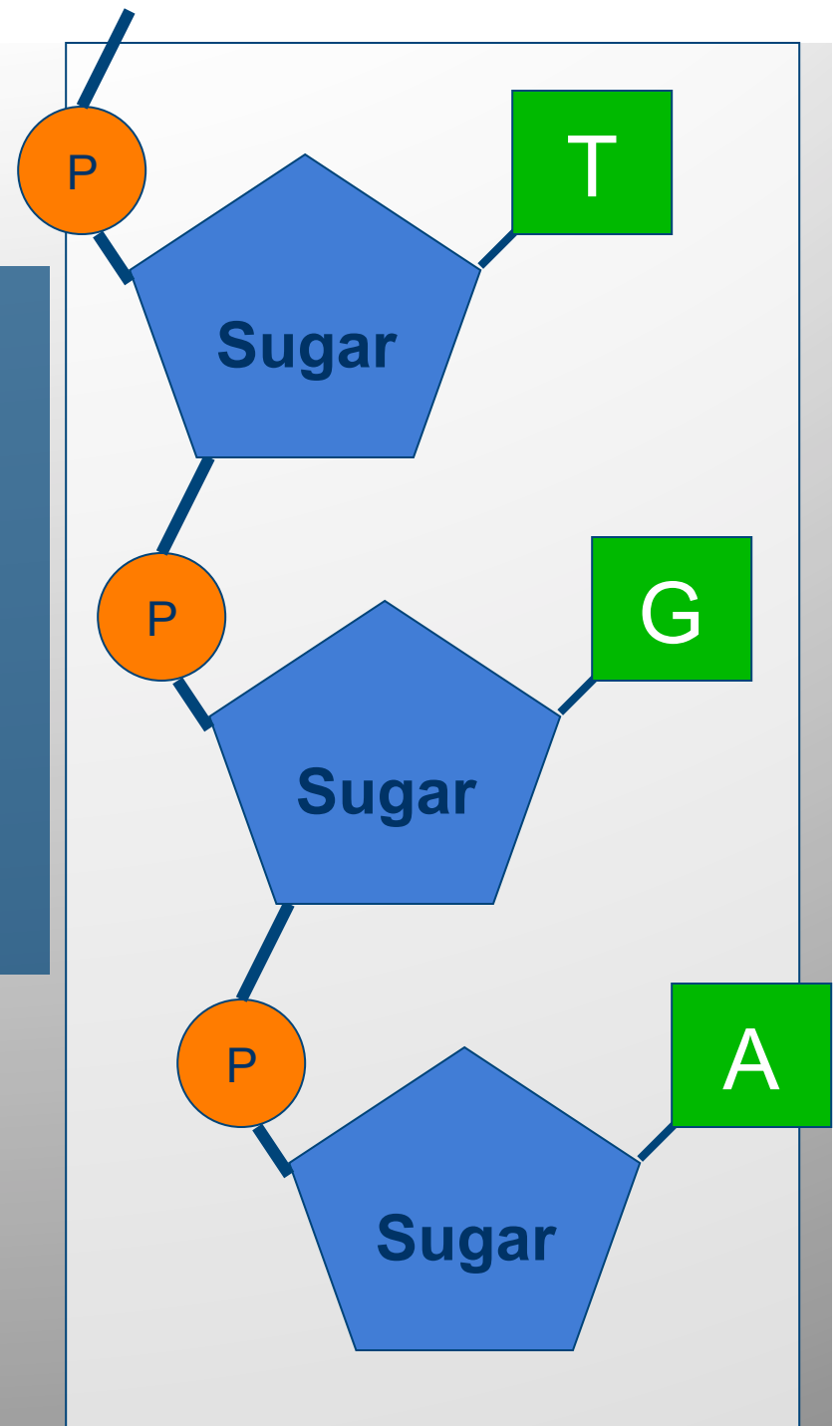
**A**'s pair with **T**'s

**G**'s pair with **C**'s

There are always an equal number of A's & T's  
and an equal number of G's & C's

# DNA

This is one  
strand of  
DNA.



DNA

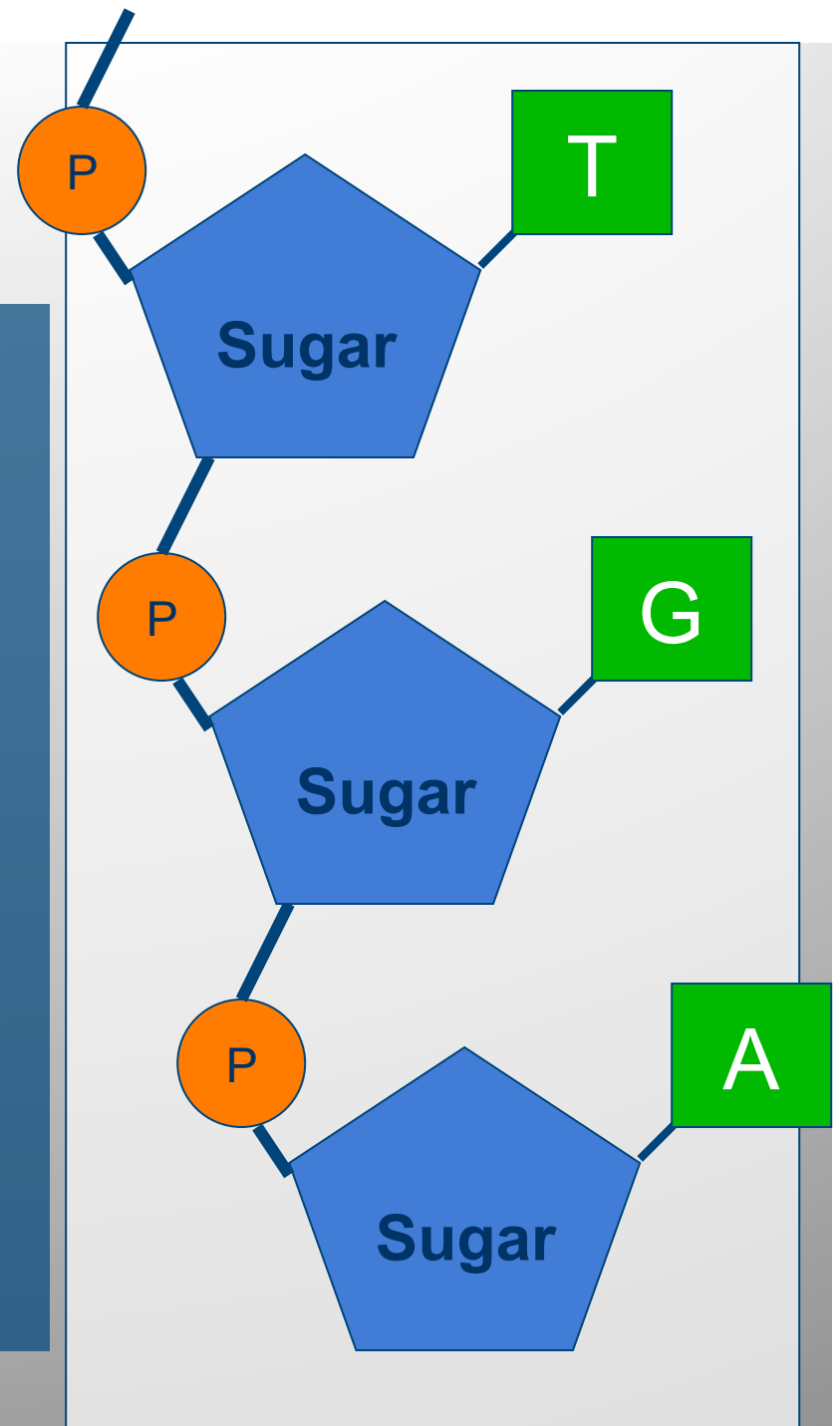
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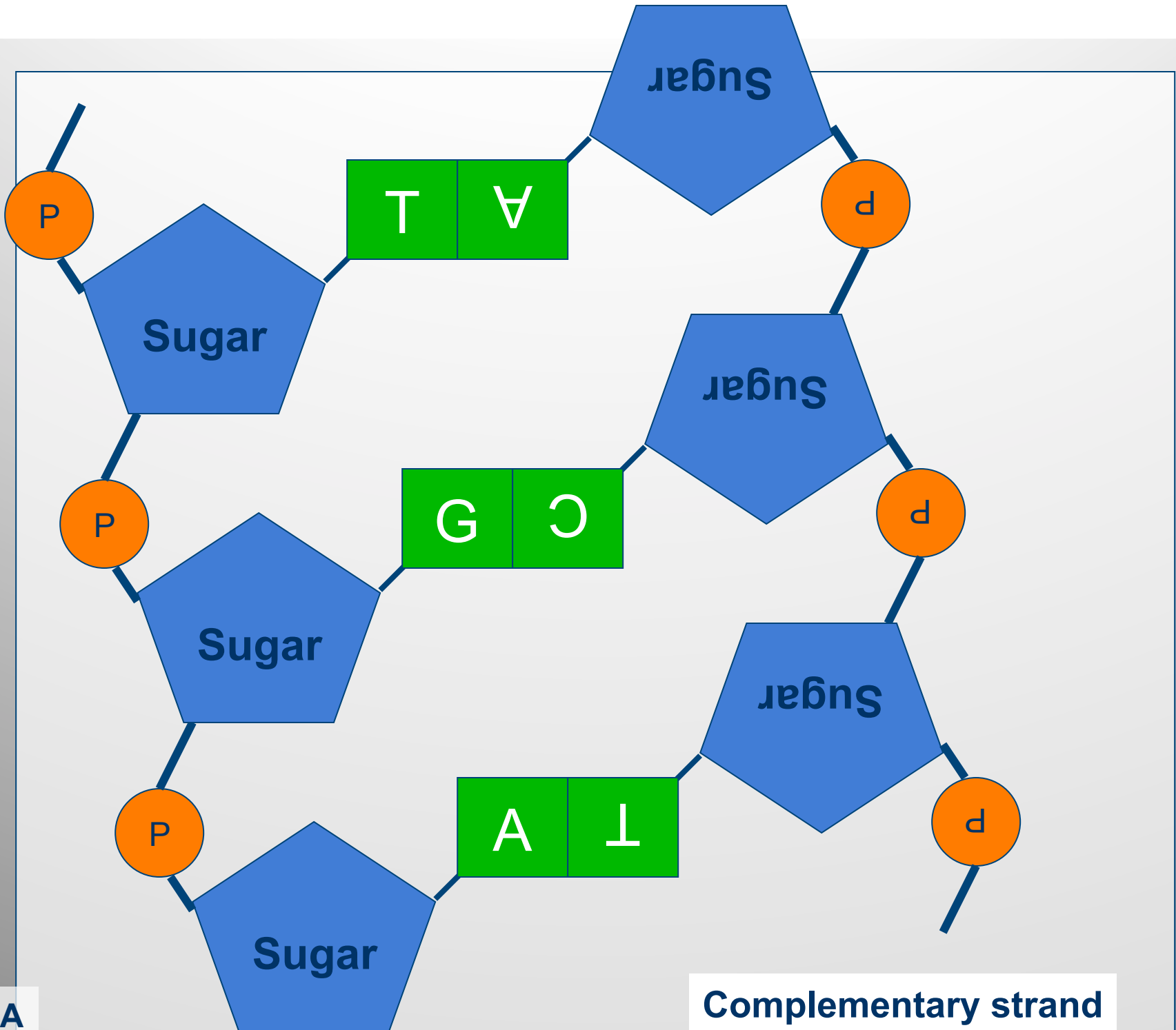
# Nucleotides

The bases pair  
with the partner  
bases of a  
complementary  
strand.  
(Complementary  
means matching.)

DNA

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DNA

Complementary strand

# DNA

This is called a  
double stranded  
DNA.

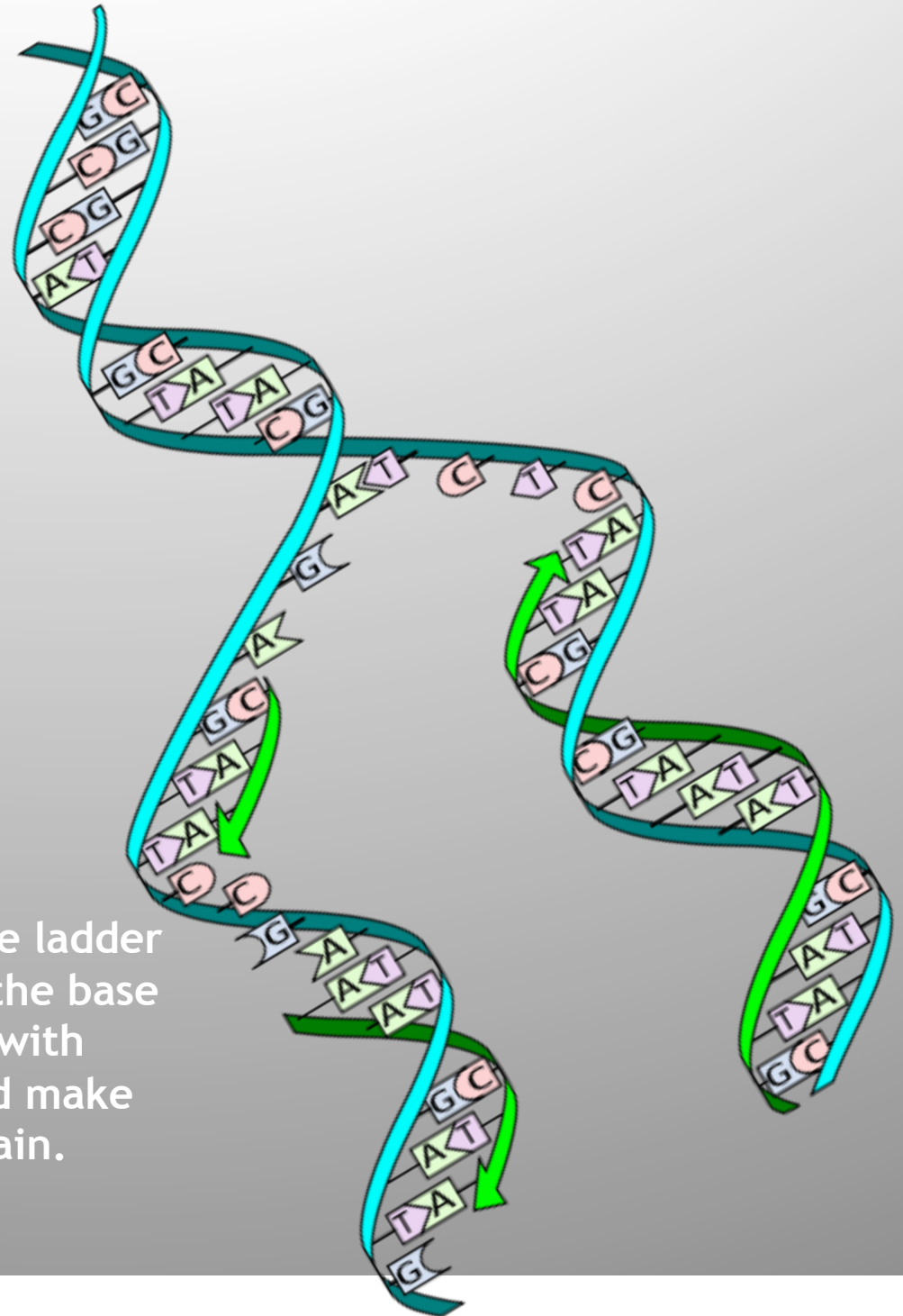
DNA

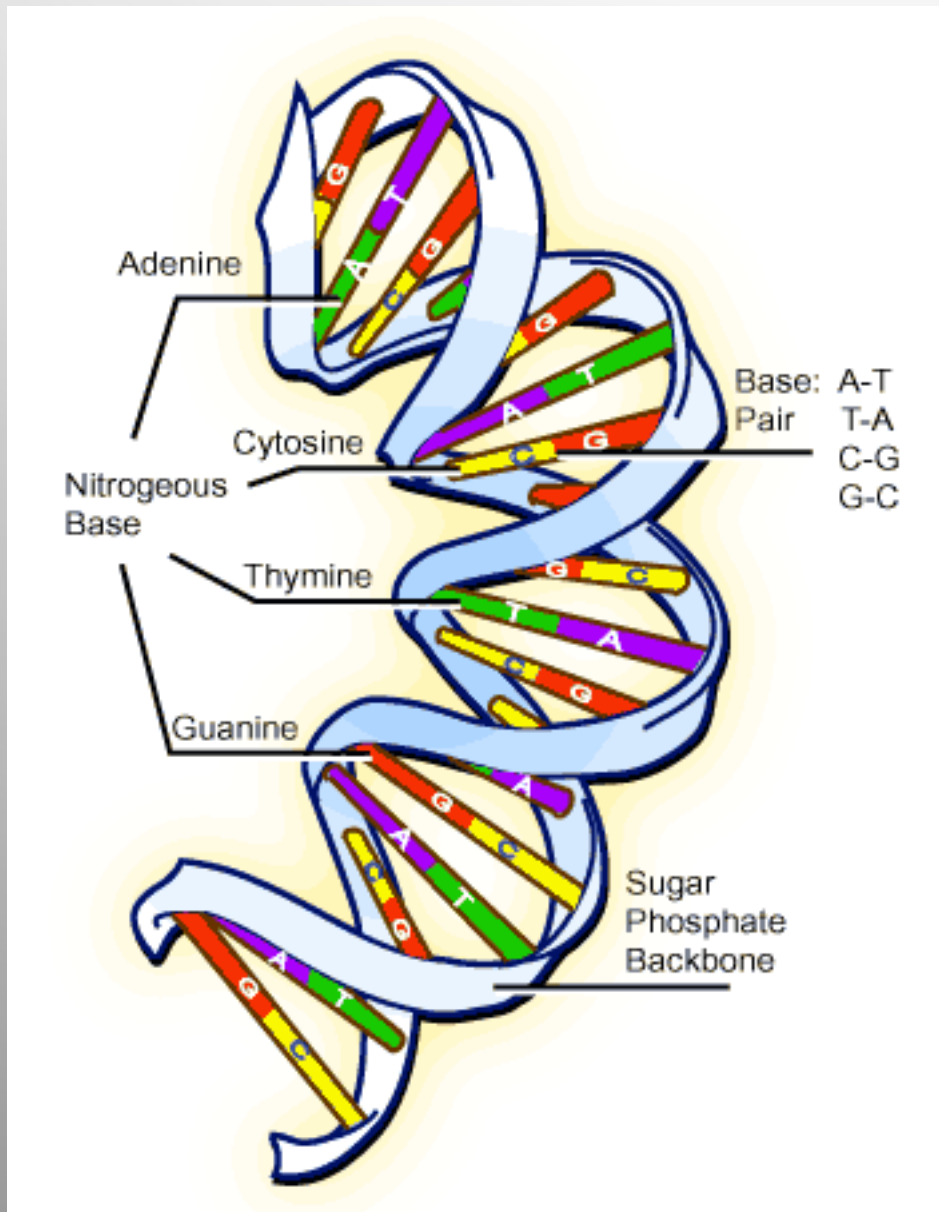
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**THE BASE PAIRS  
MAKE UP THE  
“RUNGS” OF  
THE LADDER. A  
AND T ALWAYS  
PAIR UP ON THE  
SAME RUNG,  
AND G AND C  
ALWAYS PAIR  
UP.**

When DNA needs to copy itself, the ladder splits in two lengthwise between the base pairs. Each side can then pair with nucleotides from the nucleus and make itself a complete “ladder” again.





# SO... WHAT DO BASES HAVE TO DO WITH GENES AND TRAITS?

Each gene is made up of a string of bases. The order of the bases determines the type of gene and the trait (phenotype) it will produce.

# MORE INTERESTING STUFF ABOUT TRAITS...



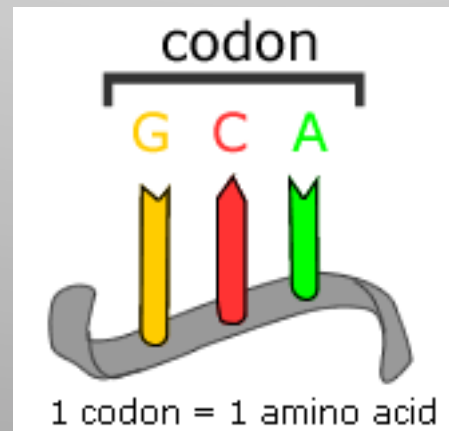
1. Sometimes **SEVERAL** genes can influence one trait. Scientists are working on the theory that the **MORE** genes you have for eye color influence how dark your eye color is.

2. Environmental factors can influence development, too. Genes for height or huge muscles aren't going to make you tall or ripped unless you get enough nutrition, for instance.

# GENES, AMINO ACIDS, AND PROTEIN

**Gene:** a section of DNA that contains instructions which tell a ribosome how to string amino acids together to make proteins

**Codon:** every three bases on a gene is a “code” that represents one amino acid. The order of these codes determine the order in which amino acids will be put together, which determines what kind of protein will be made.



**Amino acids:** subunits of proteins arranged according to the order of codons on a gene

# WHEN DNA GOES BAD...

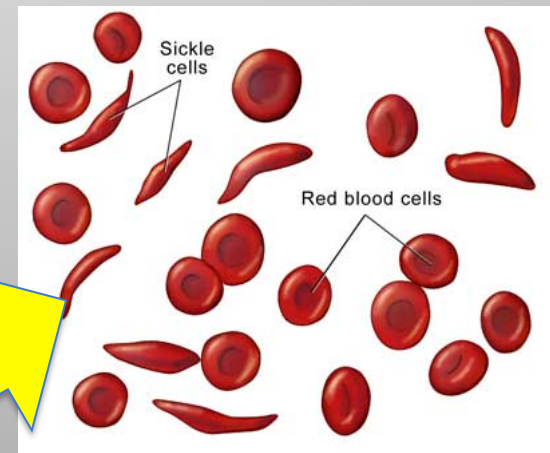
**MUTATION:** a change in the order of bases in an organism's DNA. Can be positive or negative. Usually these get fixed, but sometimes they become a permanent part of the DNA.

*deletion* – a base is left out

*insertion* – an extra base is added

*substitution* – an incorrect base replaces a correct base

Sickle cell anemia is one example of a result of base substitution.



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**MUTAGENS:** physical and chemical agents that can cause mutations in DNA (i.e. x-rays, UV rays, asbestos, nuclear agents)

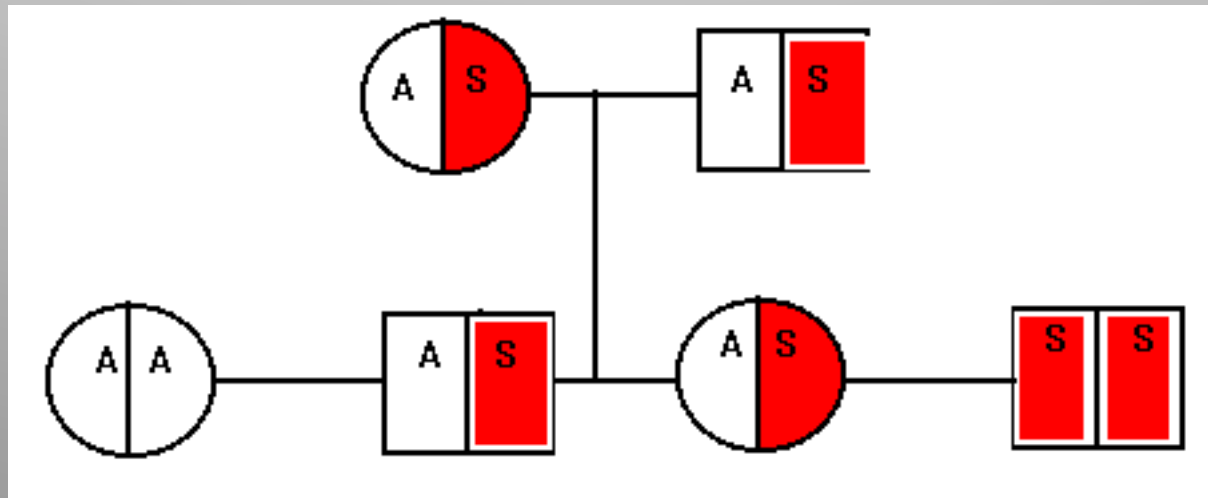
# WHAT IS A PEDIGREE?

Pedigrees help to trace traits through generations of a family.

Below is an example pedigree tracing sickle cell trait through a family.

A=normal      S=sickle cell

Circles represent females; squares represent males.  
Each half of an individual represents one allele.





Catalyst:

Are there identical numbers of A and G or C and T in a DNA strand? Why or why not?

Reflection:

Summarize the main ideas of DNA (think structure and function) in 3 or more bullet points.

**30L**

DNA Notes

1/10/17

?

Notes

Summary

**30R**