DNA and Genetics Unit

Name:

Part 1 Lesson 1 DNA Extraction

DNA Extraction Procedure
1) One class member measures out 100ml of split peas and add to blender.
2) Add 1ml of table salt to blender.
3) Add 200 ml of cold water.
4) Cover and blend on high for 15-20 seconds.
5) Pour contents through strainer into another container (plastic cup).
6) Add 30 ml of liquid detergent and mix in the container.
7) Let the mixture sit for 5-10 minutes (clean up area during this time).
8) Fill the test tubes halfway with the mixture.
9) Add a pinch of enzymes to each container.
10) "Gently" very gently swirl for 1 minute.
11) Tilt your test tube and slowly pour rubbing alcohol (70-95% isopropyl or ethyl alcohol) into the tube down the side so that it forms a layer on top of the pea mixture. Pour until you have about the same amount of alcohol in the tube as pea mixture.
12) DNA will rise into the alcohol layer from the pea layer. You can use a wooden stick (cotton swab) or other hook to draw the DNA into the alcohol.

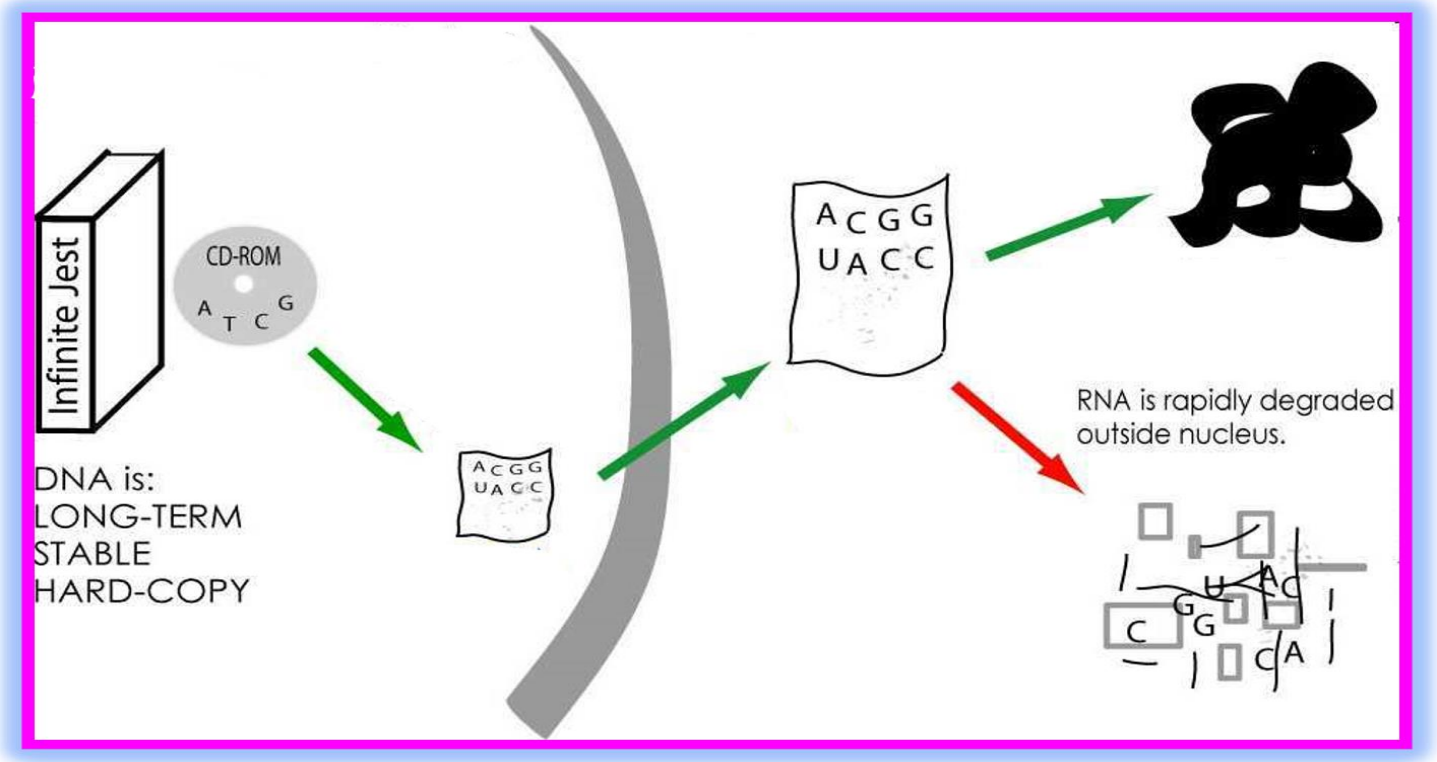
Did Student Successfully Extract DNA? Yes/NO teacher Signature_____

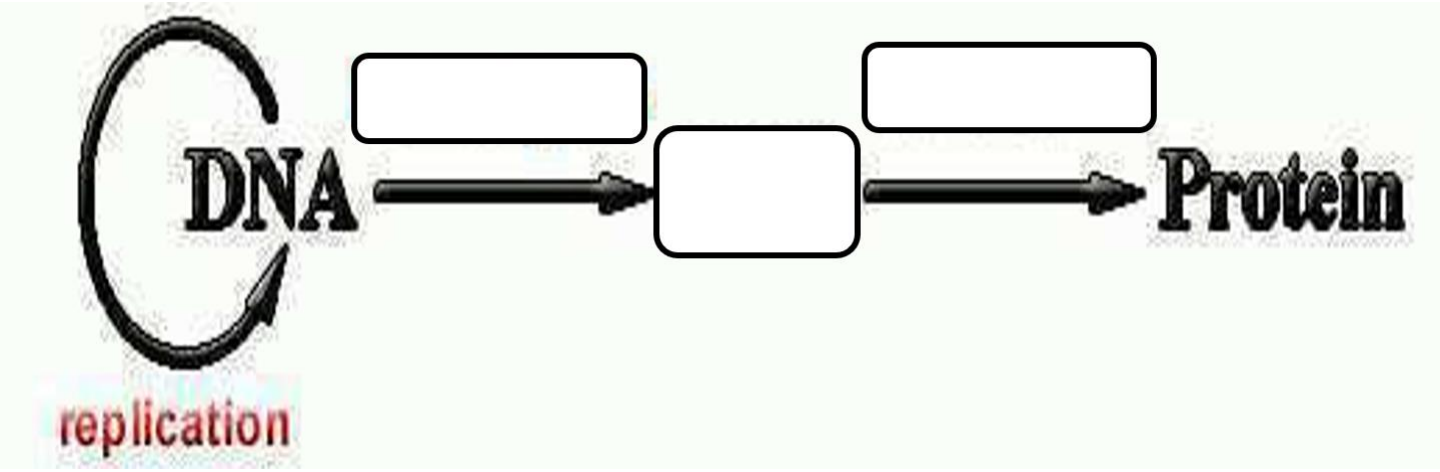
Lesson 2 DNA Introduction

DNA

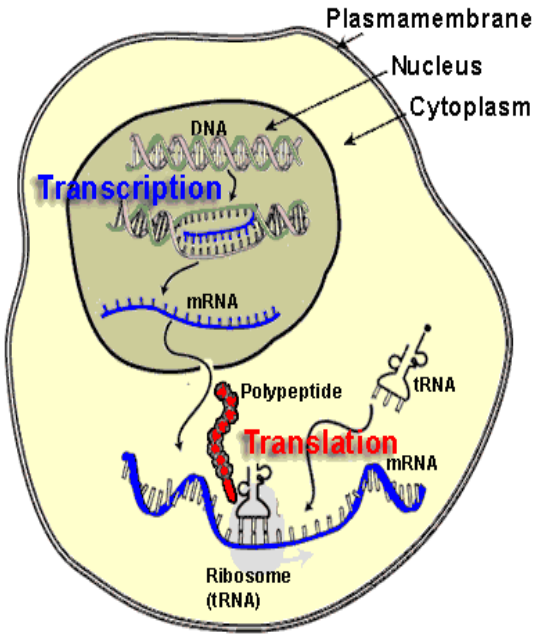
__ __ __ - Deoxyribose Nucleic Acid
Shape is called double _____
DNA has the information for our cells to make _____.
DNA through transcription makes m_____
mRNA through translation makes _____(w/ help from ribosomes)

Please fill in some of the diagram below as described in the slideshow.





Please describe the role of DNA in determining a cell's make up. Use the picture below to help you.



Lesson 3 DNA's Discovery

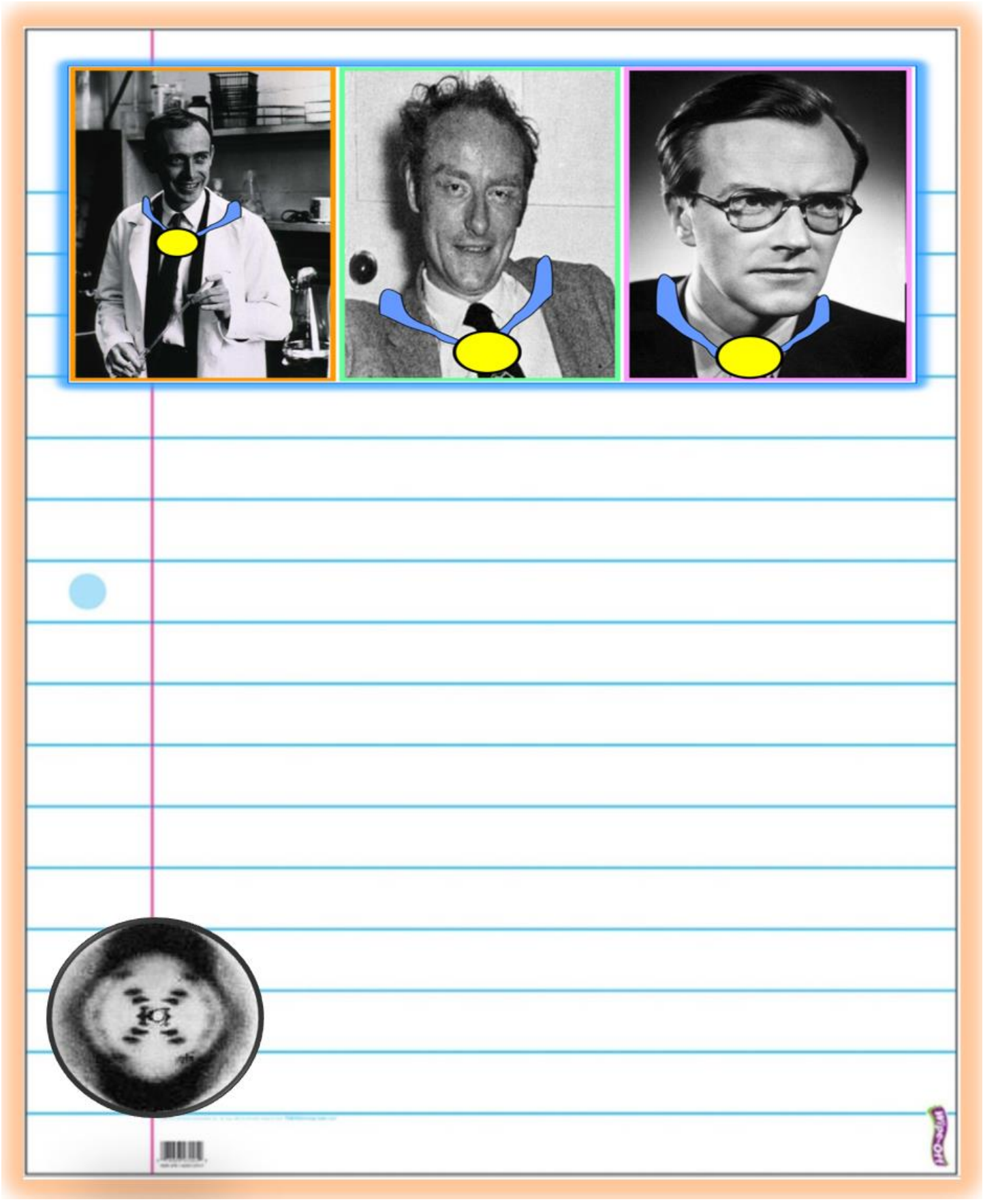
In 1869, Friedrich Miescher isolated a substance he called "nuclein," from a cell.

- He was the first to identify DNA as a distinct molecule.

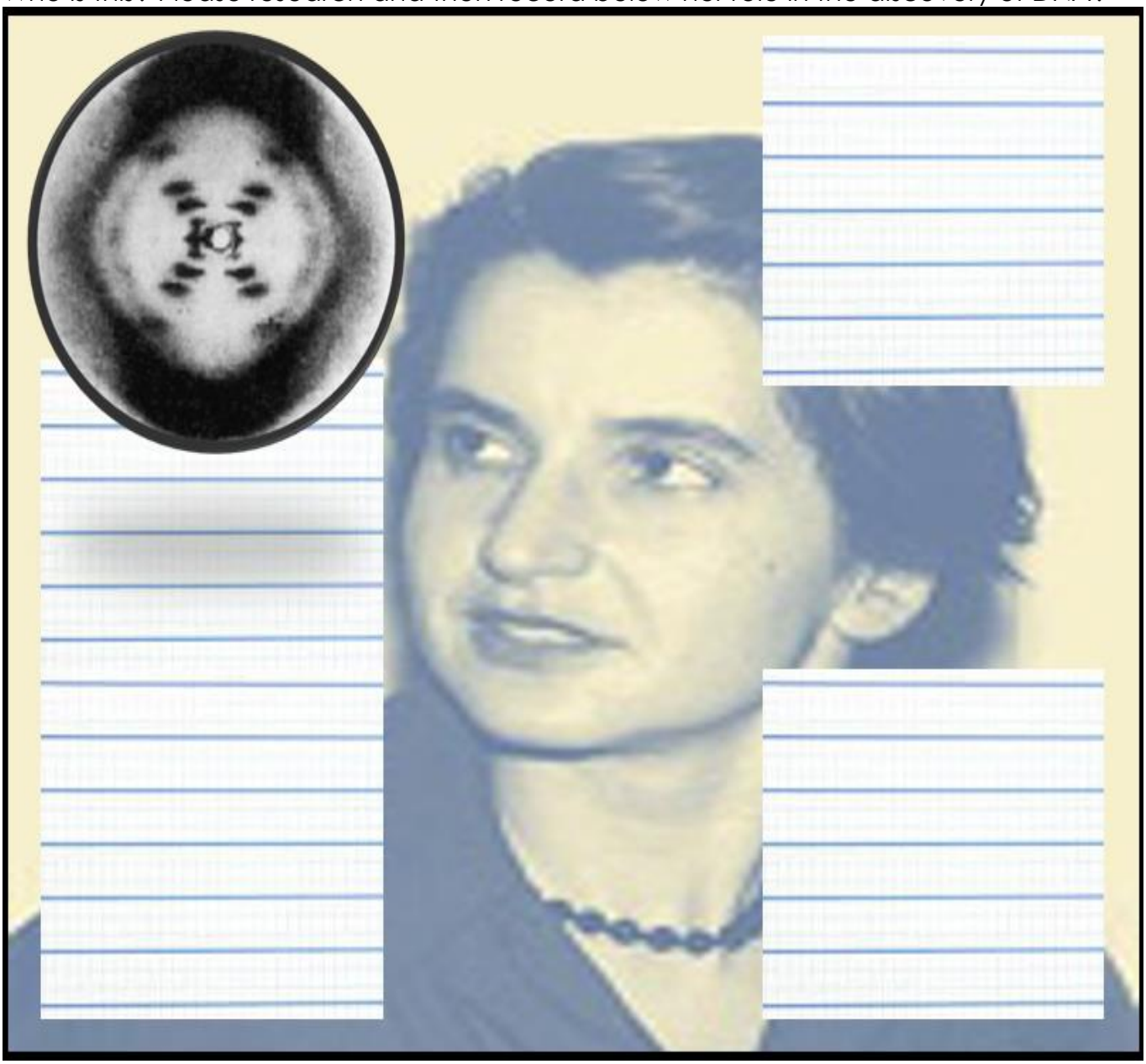
W_____ and C_____ (_____) Discovered <u>structure</u> of DNA.
One of the most important biological discoveries in the last 100 years.

Watson and Crick were able to figure out that one strand went ____ and one went _____. Watson and Crick also found that if they paired Thymine with Adenine and Guanine with Cytosine DNA would look uniform.

Please provide some insight to the photos below. Who or what are they? How are they connected?



Who is this? Please research and then record below her role in the discovery of DNA?



Watson and Crick (in_____) Discovered structure of DNA.

Rosalind _____

She discovered the density of DNA and established that the molecule existed in a _____ conformation. Her work to make clearer _____ patterns of DNA molecules laid the foundation for James Watson and Francis Crick's suggestion that DNA is a double-_____ polymer in 1953.

Please research and then answer 3 of the 5 questions below about the discovery of DNA.

1.) Name four people involved in the discovery of DNA's structure.
2.) What very important role did Rosalind Franklin play in the discovery of DNA's structure?
3.) What role did Maurice Wilkins play in the discovery of DNA's structure?
4.) What's so important about photo #51
5.) Why didn't Rosalind Franklin get a Nobel Prize for the discovery of DNA?

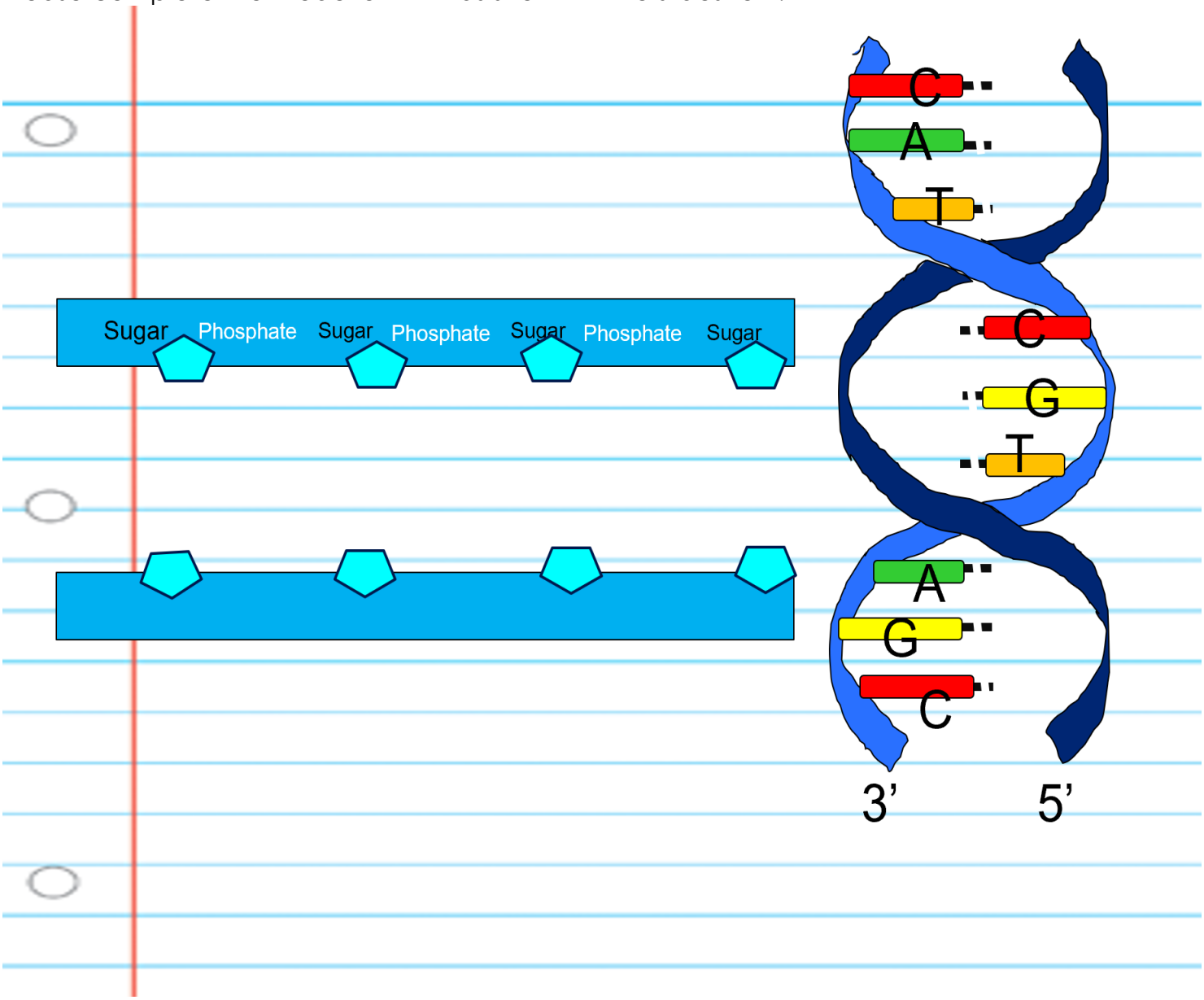
Question#

Question#

Question#

Lesson 4 DNA's Structure

Please complete the model of DNA as shown in the slideshow.



Each unit of DNA called a _____ of DNA consists of 3 parts.

Phosphate _____

A ____-carbon sugar (deoxyribose)

A _____ base attached to the sugar

There are _____ different types of nucleotides found in DNA

A is for _____

G is for _____

C is for _____

T is for _____

A goes with T

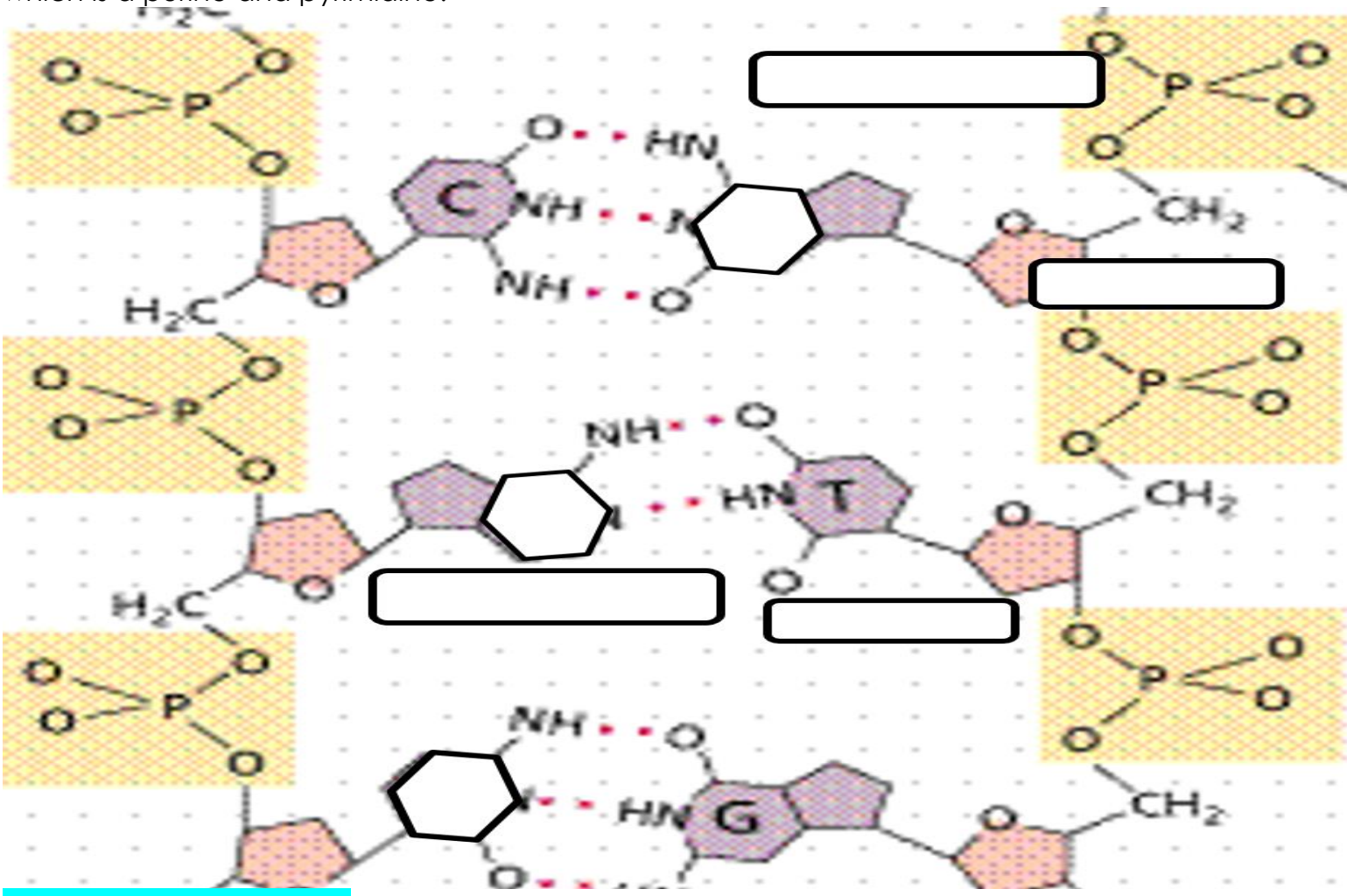
C goes with G

WRONG! T – C or G – A (Mutation)

Purines are the _____ of the two types of bases found in DNA.
It's double ring. (A and G)

Pyrimidine Bases are the _____ bases found in DNA. (T and C) Single ring

Please name the correct nitrogen base, the ribose sugar, phosphate backbone. Also name which is a purine and pyrimidine.

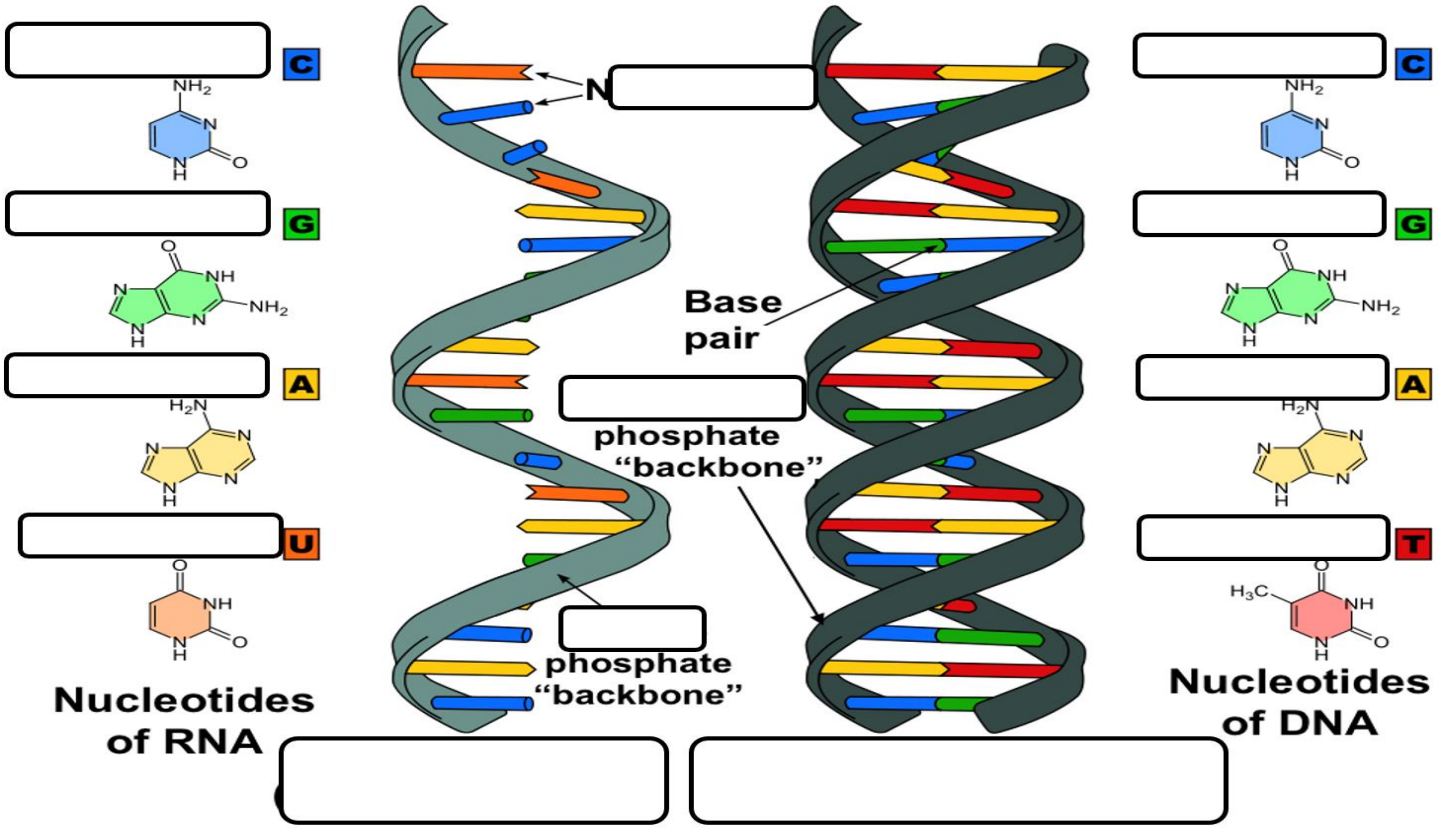


Lesson 5 Build DNA Model

RNA

- _____strand
- Uracil replaces _____

Please label the missing terms from DNA and RNA.
Word Bank: RNA / Ribose Nucleic Acid, Cytosine, Guanine, Adenine, Thymine, Deoxyribose Nucleic Acid, Ribose, Deoxyribose, Uracil, Adenine, Guanine, Cytosine, Nucleotides



Compare DNA and RNA. How are they similar and different?

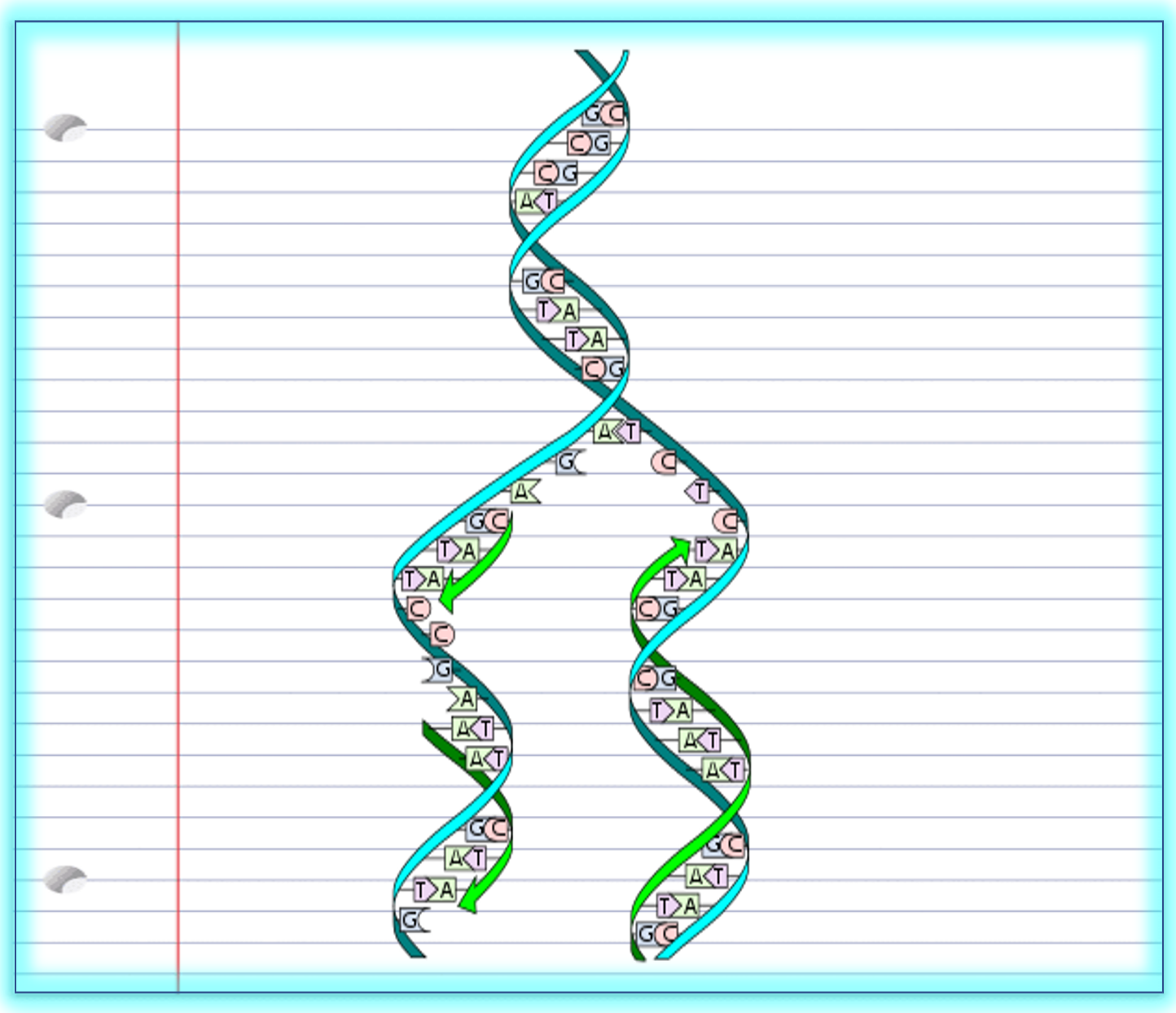
	DNA	RNA
Function		
Structure		
Sugar		
Base Pairs		

Lesson 6 DNA Replication

DNA replication: The double helix is unwound and bases are _____to create a new identical strand.

DNA replication is the biological process of producing two identical replicas of DNA from one original DNA molecule. DNA replication occurs in all living organisms acting as the most essential part for biological inheritance.

Please describe the picture below. What do you know about it?

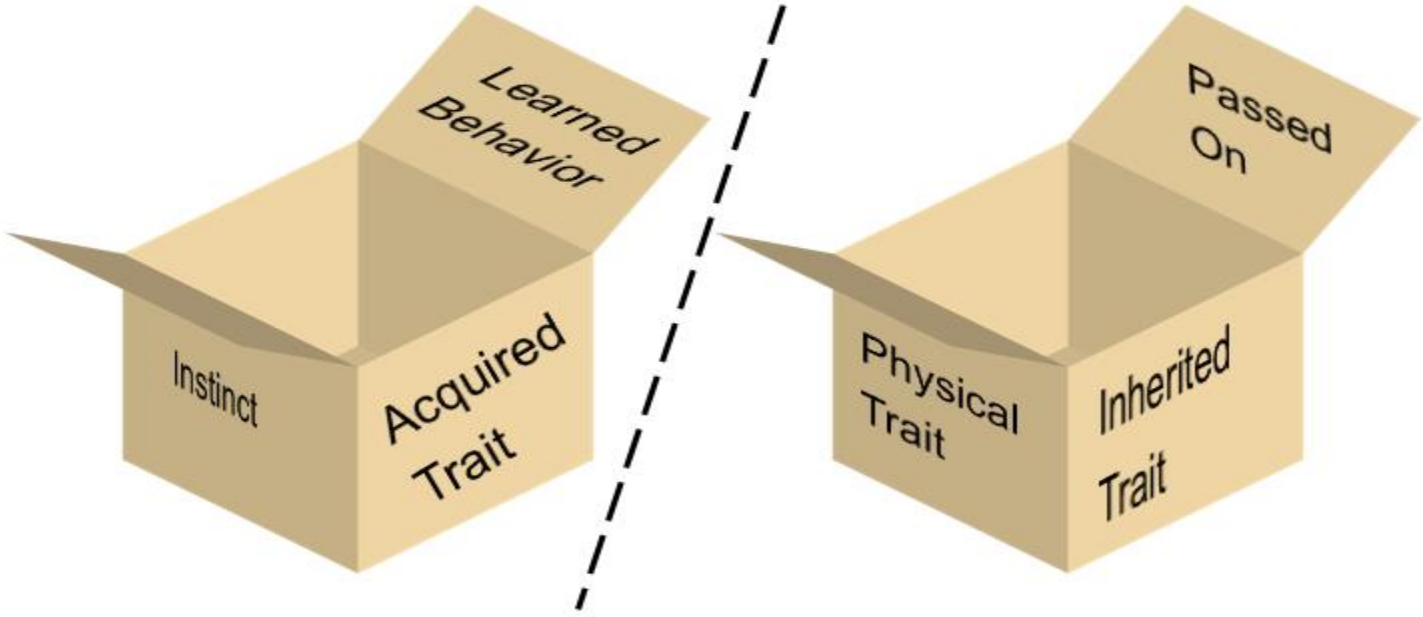


Lesson 7 Inherited vs. Acquired Traits

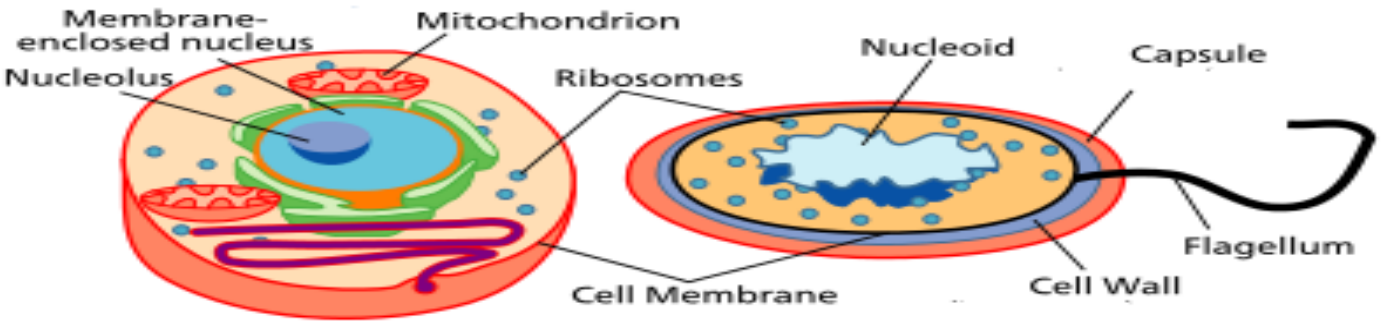
Instinct / learned Behavior. A behavior is a way of a_____. Inherited behaviors are called instincts. Learned behaviors are not in_____ traits but learned from others.

Inherited Trait: A physical characteristic that is passed from _____ to their babies (offspring).

Please provide some examples of inherited / physical traits vs. Acquired traits / learned behavior / instincts.



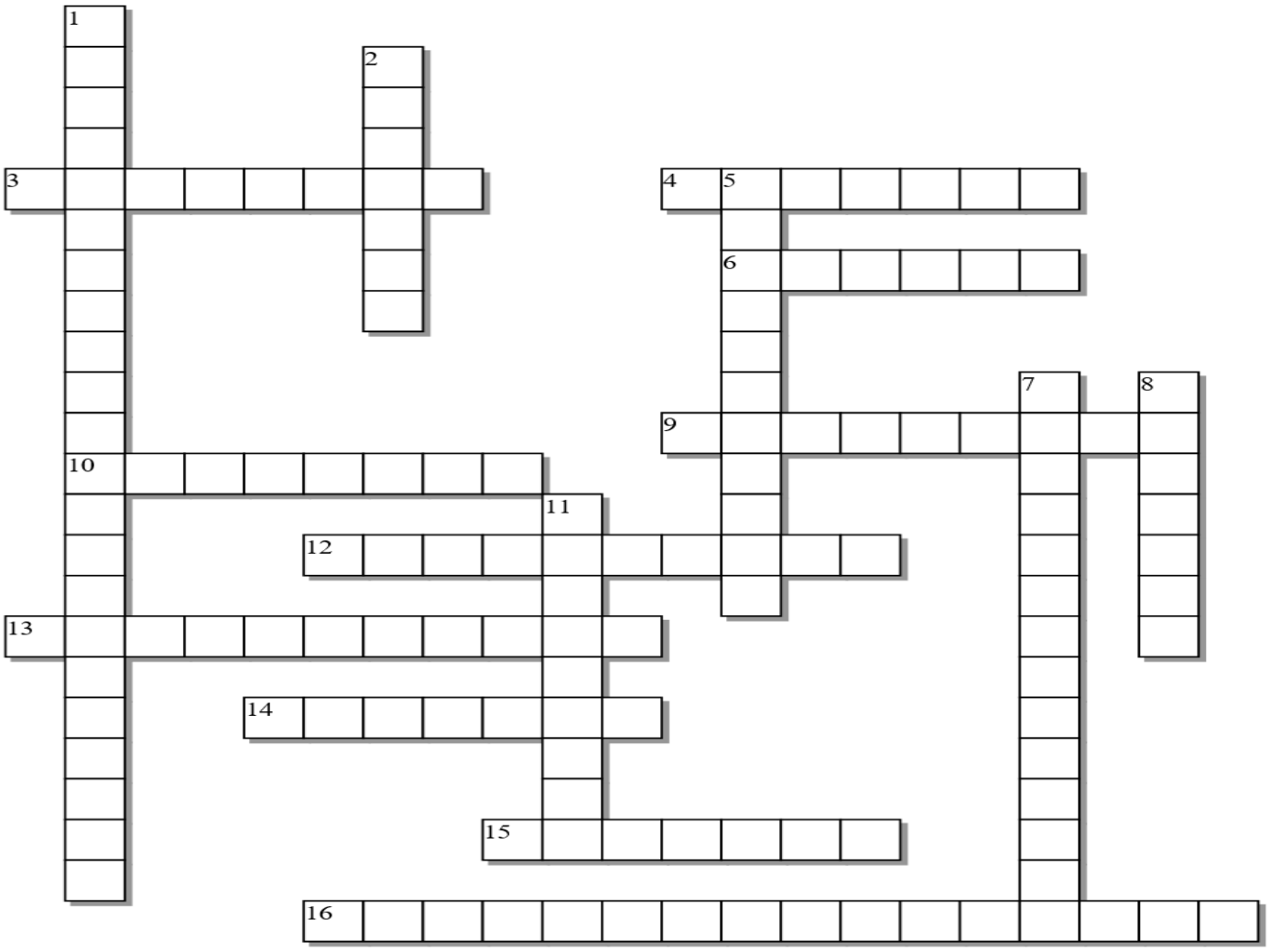
Which one is Prokaryotic and which one is Eukaryotic?



_____ _____

How do you know? Which one evolved first?

DNA Crossword Puzzle



Across:

3 - Guanine pairs with this nucleotide
4 - T - Pairs with this nucleotide
6 - This replaces Thymine on RNA
9 - _____ backbone
10 - _____ base attaches to the 5 carbon sugar.
12 - Each unit of DNA is called a _____
13 - This is the 5-carbon sugar
14 - A - Pairs with this nucleotide
15 - DNA has the information for our cells to make _____
16 - Used X-Rays to take a picture of DNA

Down:

1 - This is the acronym for DNA
2 - Cytosine pairs with this nucleotide
5 - The shape of DNA is called the _____
7 - These two (1953) discovered the structure of DNA (_____and_____)
8 - DNA is a molecule that contains _____ information
11 - This is the m in mRNA that through translation has makes proteins

Adenine, Cytosine, Deoxyribose, Deoxyribose Nucleic Acid, Double Helix, Genetic, Guanine, messenger, Nitrogen, Nucleotide, Phosphate, Protein, RosalindFranklin, Thymine, Uracil, WatsonandCrick

DNA REVIEW GAME
1-20 = 5 pts Lesson 8 Review Game
*20-*25 * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt) Score ____ / 100
Final Question = 5 pt wager

HIP HIP HOORAY FOR DNA	SPIRAL SPIRAL	SHAPE-UP	LIFE-LINE	FAMILY JEANS Bonus round 1 pt each
1)	6)	11)	16)	*21)
2)	7)	12)	17)	*22)
3)	8)	13)	18)	*23)
4)	9)	14)	19)	*24)
5)	10)	15)	20)	*25)

F
inal Question Wager ___ /5 Answer: _____

DNA and Genetics Unit

Name:

Part 1 Lesson 1 DNA Extraction

DNA Extraction Procedure
1) One class member measures out 100ml of split peas and add to blender.
2) Add 1ml of table salt to blender.
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8) Fill the test tubes halfway with the mixture.
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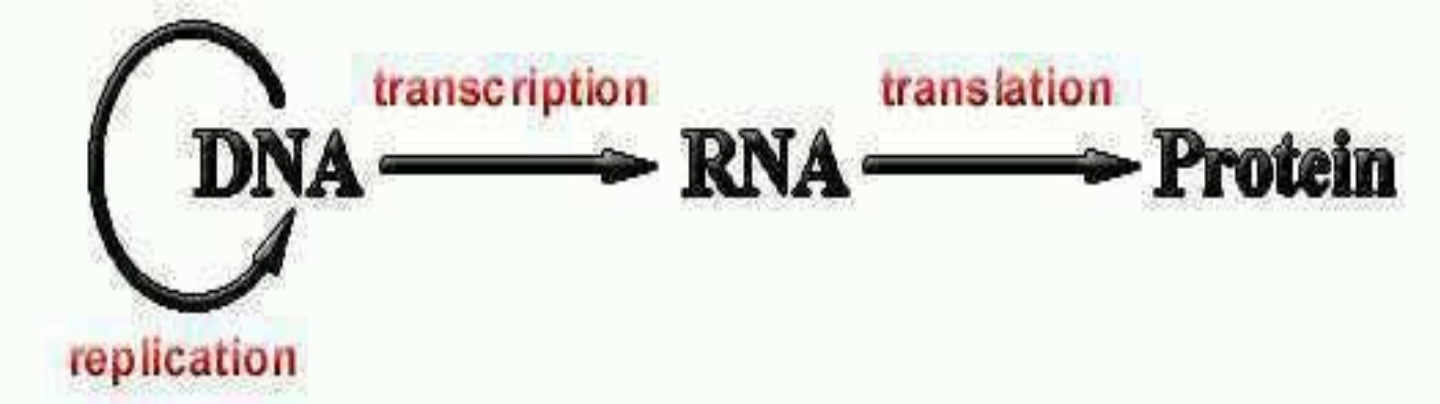
10) "Gently" very gently swirl for 1 minute.
11) Tilt your test tube and slowly pour rubbing alcohol (70-95% isopropyl or ethyl alcohol) into the tube down the side so that it forms a layer on top of the pea mixture. Pour until you have about the same amount of alcohol in the tube as pea mixture.
12) DNA will rise into the alcohol layer from the pea layer. You can use a wooden stick (cotton swab) or other hook to draw the DNA into the alcohol.

Did Student Successfully Extract DNA? Yes/NO teacher Signature_____

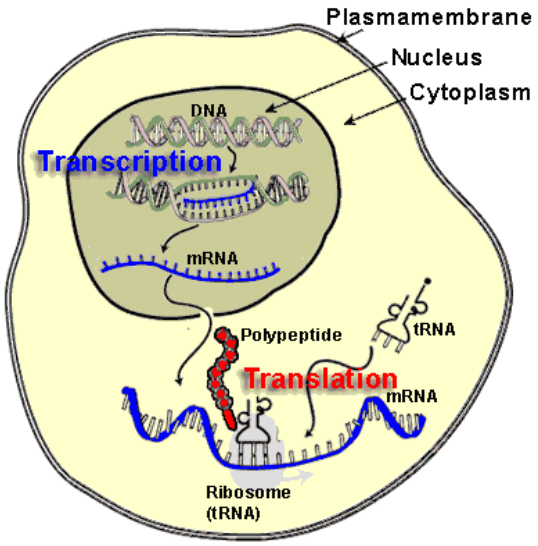
Lesson 2 DNA Introduction

DNA

- DNA - Deoxyribose Nucleic Acid
- Shape is called double Helix
- DNA has the information for our cells to make proteins.
- DNA through transcription makes mRNA
- mRNA through translation makes proteins (w/ help from ribosomes)



Please describe the role of DNA in determining a cell's make up. Use the picture below to help you.

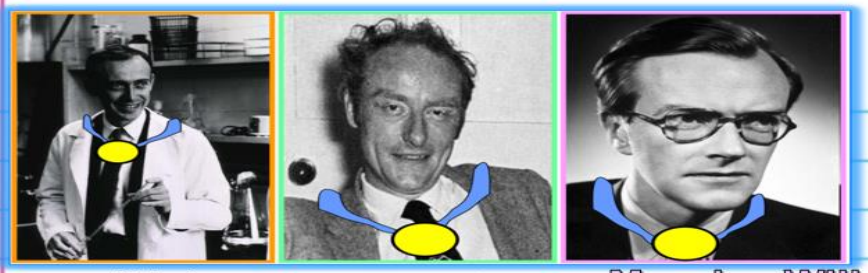


DNA through transcription makes mRNA.

- mRNA = Messenger RNA.
- mRNA travels out of the Nucleus and has the information for the cell to make proteins in a process called translation with the help of organelles called ribosomes.

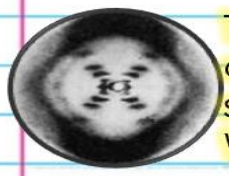
Lesson 3 DNA's Discovery

Please provide some insight to the photos below. Who or what are they? How are they connected?



James Watson Francis Crick Maurice Wilkins

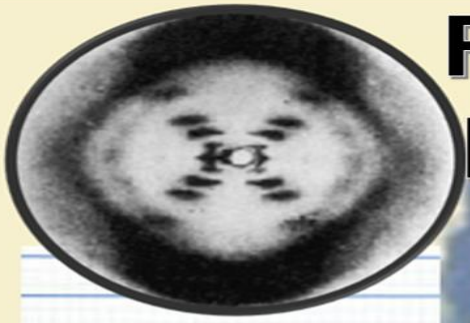
Watson and Crick discovered the structure of DNA, called the Double Helix. Also working with Maurice Wilkins, they published the news of their discovery (in 1953), a molecular structure of DNA based on all its known features - the double helix.



This is a X-ray photograph (photo #51) of the double helix taken by Rosalind Franklin / grad student. It used X-Ray diffraction and helped Watson and Crick create their DNA model

Who is this? Please research and then record below her role in the discovery of DNA?

Rosalind Franklin



Rosalind Franklin was an English Chemist and discovered the density of DNA. Also lectured how phosphate was a part of the backbone.

She also took X-Ray diffraction photos and noted that the molecule existed in a helical shape. This is photo #51 that Maurice Wilkins showed Watson which assisted him and determining the structure of DNA.

Her work helped paint a picture for James Watson and Francis Crick's suggestion that DNA is a double-helix polymer in 1953. She did of Ovarian cancer. Although not proven, likely from using X-Rays.

Watson and Crick (in 1953) Discovered structure of DNA.
Rosalind Franklin

> She discovered the density of DNA and established that the molecule existed in a helical conformation. Her work to make clearer X-ray patterns of DNA molecules laid the foundation for James Watson and Francis Crick's suggestion that DNA is a double-helix polymer in 1953.

Please research and then answer 3 of the 6 questions below about the discovery of DNA.

1.) Name four people involved in the discovery of DNA's structure?

James Watson, Francis Crick, Maurice Wilkins, Rosalind Franklin

2.) What very important role did Rosalind Franklin play in the discovery of DNA's structure?

She discovered the density of DNA and established that the molecule existed in a helical conformation. Her work to make clearer X-ray patterns of DNA molecules laid the foundation for James Watson and Francis Crick's suggestion that DNA is a double-helix polymer in 1953.

3.) What role did Maurice Wilkins play in the discovery of DNA's structure?

Maurice Wilkins shared the 1962 Nobel Prize in physiology or medicine with James Watson and Francis Crick, his name is not as commonly known as one of the discoverers of the structure of DNA. Also shared some of Rosalind Franklins research with James Watson

4.) What's so important about photo #51

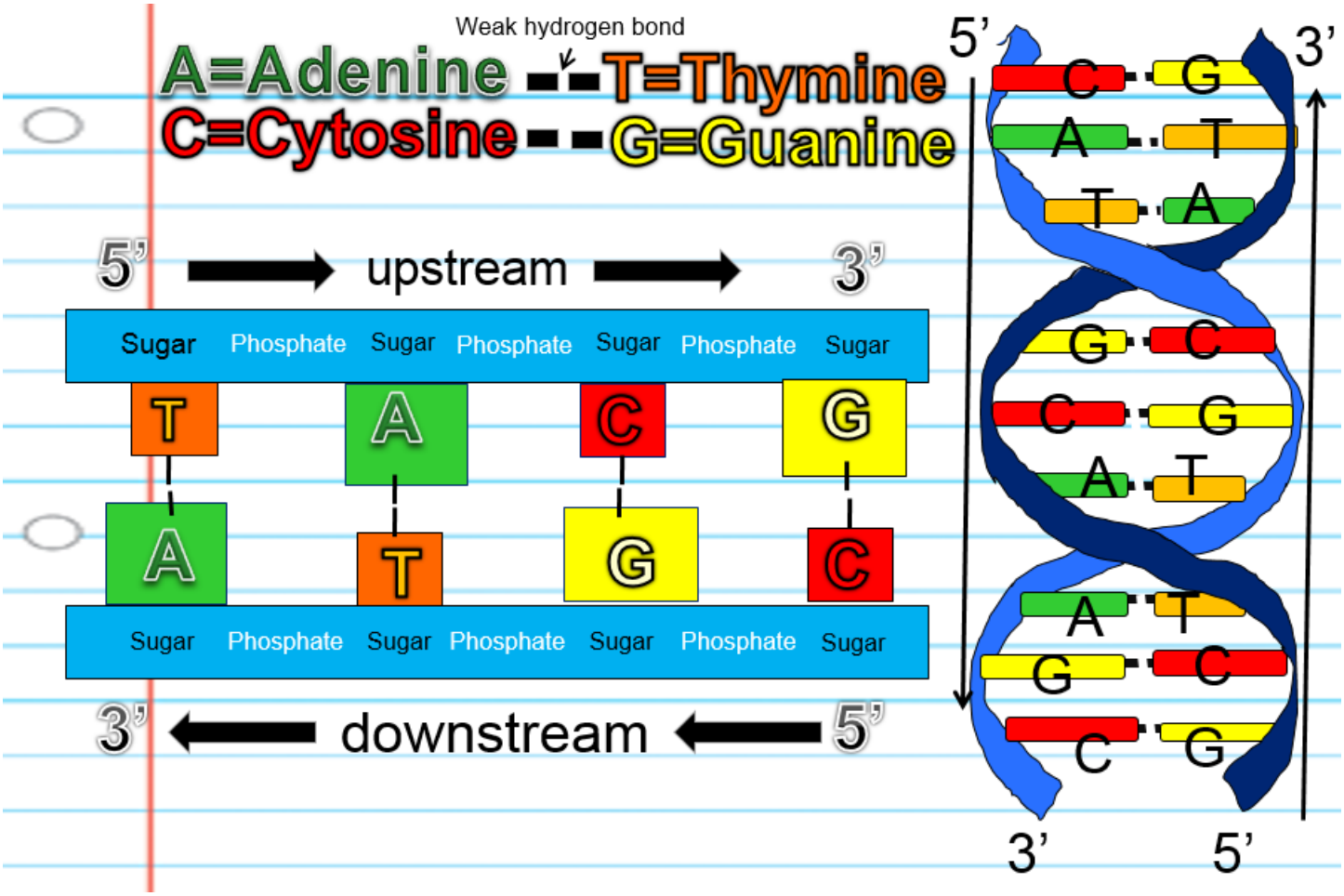
Photo 51 is an X-ray diffraction image of a paracrystalline gel composed of DNA fiber taken by Raymond Gosling, a graduate student working under the supervision of Rosalind Franklin in May 1952 at King's College London, while working in Sir John Randall's group

5.) Why didn't Rosalind Franklin win a Nobel Prize for the discovery of DNA?

Franklin could not share in the prize as it cannot be granted to someone who has passed away. She had died from ovarian cancer at the age of 37 on April 16, 1958, in London. She had a family history of cancer, but her exposure to X-rays may have contributed to her death. And in any case, she may not have had the chance for the award had she been alive. Crick and Watson never told Franklin that they had used her images

Lesson 4 DNA's Structure

Please complete the model of DNA as shown in the slideshow.



Each unit of DNA called a nucleotide of DNA consists of 3 parts.

- Phosphate backbone
- A 5-carbon sugar (deoxyribose)
- A nitrogen base attached to the sugar

There are four different types of nucleotides found in DNA

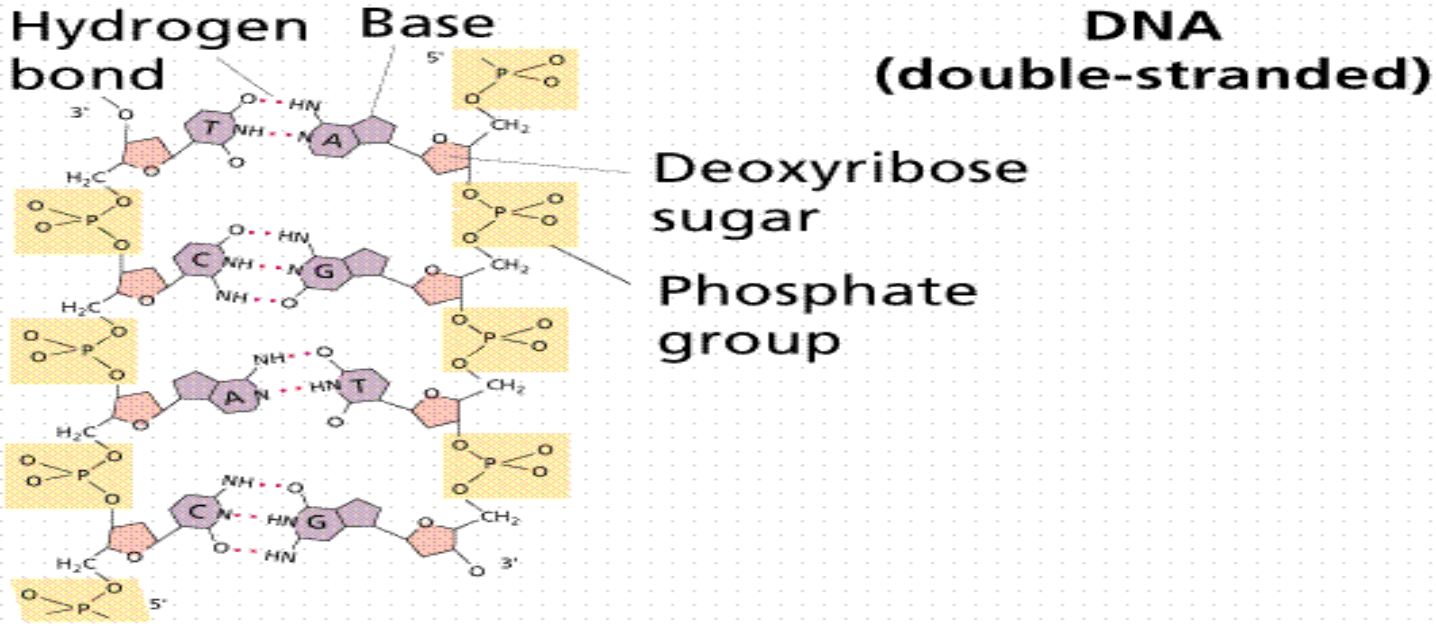
- A is for adenine
- G is for guanine
- C is for cytosine
- T is for thymine

- A goes with T
- C goes with G
- WRONG! T – C or G – A

Purines are the larger of the two types of bases found in DNA. It's double ring. (A and G)

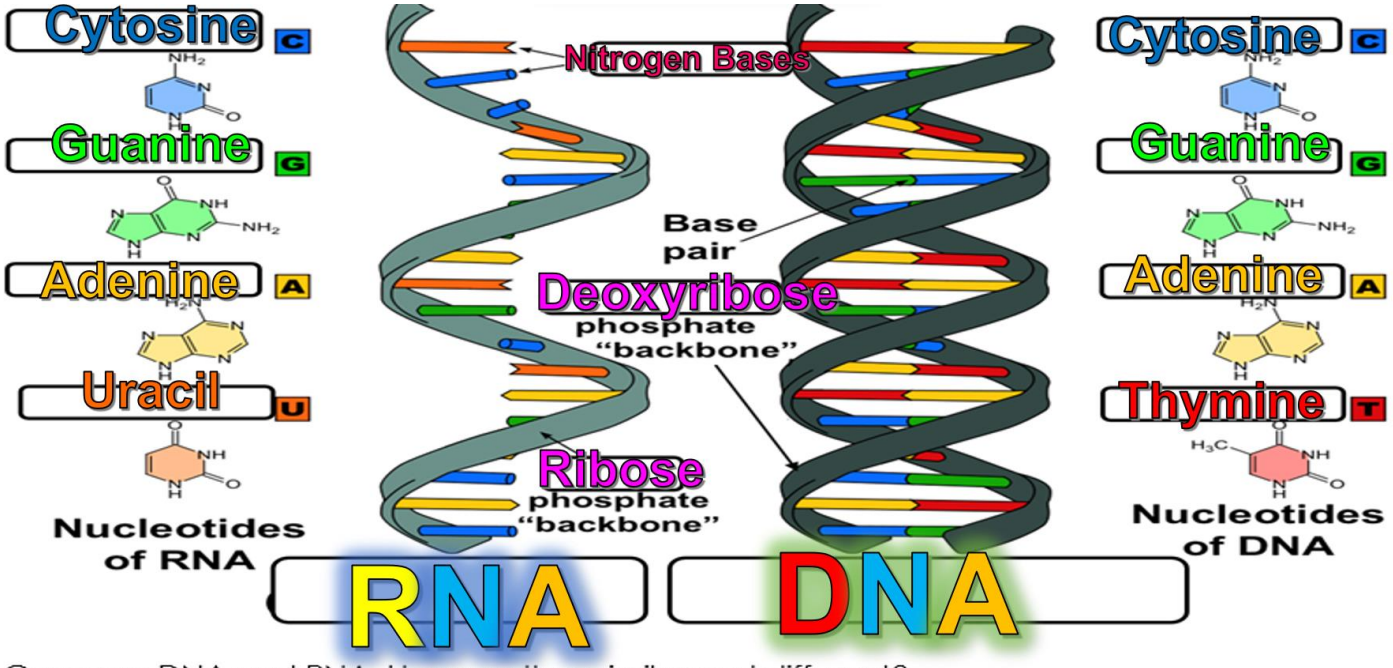
Pyrimidine Bases are the smaller bases found in DNA. (T and C) Single ring

Please name the correct nitrogen base, the ribose sugar, phosphate backbone. Also name which is a purine and pyrimidine.



RNA

- - Single strand
- - Uracil replaces thymine



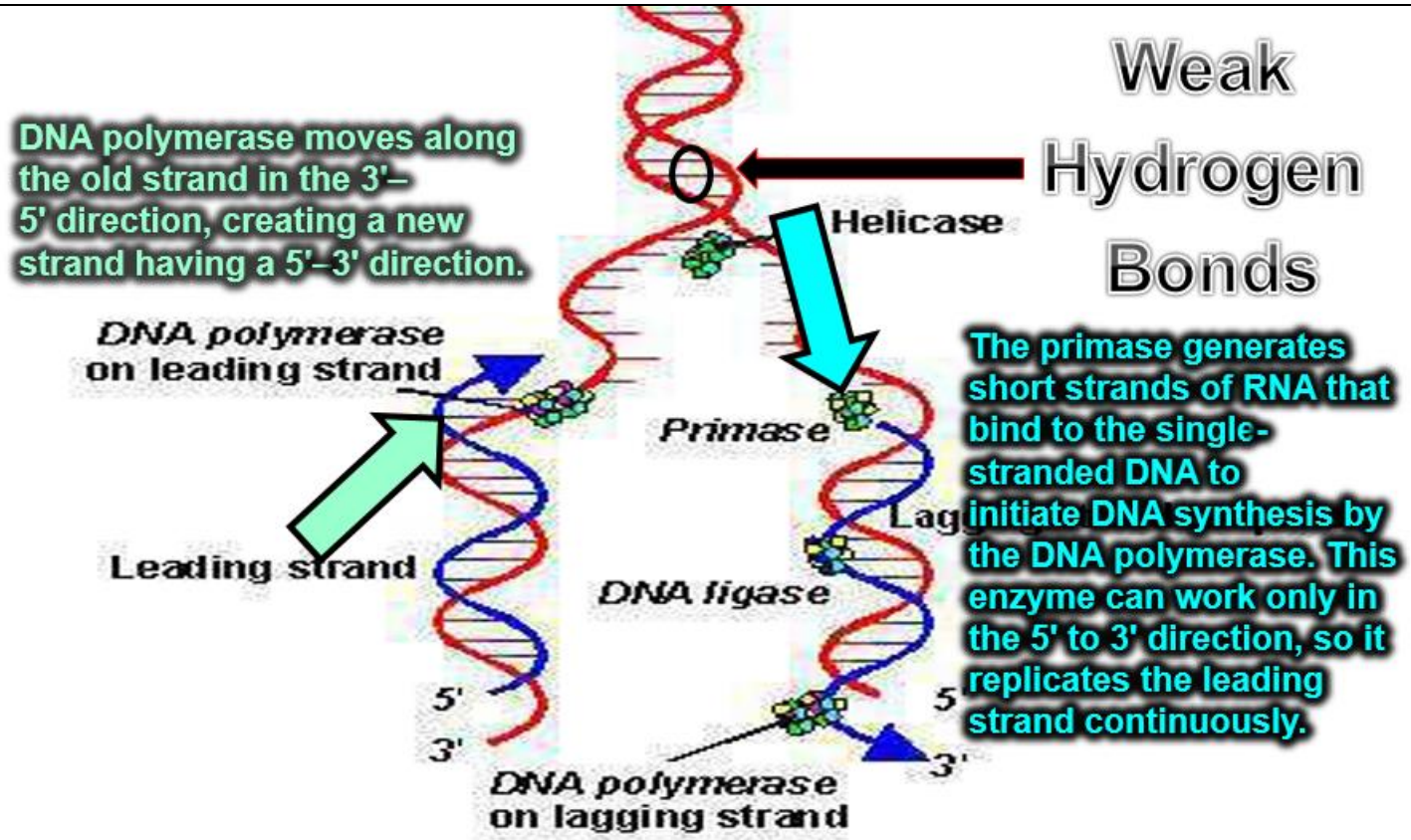
Compare DNA and RNA. How are they similar and different?

	DNA	RNA
Function	Replicates and stores genetic Info	Carry Out Instructions encoded n the DNA
Structure	Two Strands	One Strand
Sugar	Deoxyribose	Ribose
Base Pairs	A-T, C-G	Uracil Replaces Thymine U-A

Please label the missing terms from DNA and RNA. Lesson 5 Build DNA Model
Word Bank: RNA / Ribose Nucleic Acid, Cytosine, Guanine, Adenine, Thymine, Deoxyribose Nucleic Acid, Ribose, Deoxyribose, Uracil, Adenine, Guanine, Cytosine, Nucleotides

DNA replication: The double helix is unwound and bases are matched to create a new identical strand.

Please describe the picture below. What do you know about it? Lesson 6 DNA Replication



DNA replication is the biological process of producing two identical replicas of DNA from one original DNA molecule. DNA replication occurs in all living organisms acting as the most essential part for biological inheritance.

DNA makes a copy of itself during cell division. The first step in DNA replication is to 'unzip' the double helix structure of the DNA molecule. ... The two separated strands will act as templates for making the new strands of DNA.

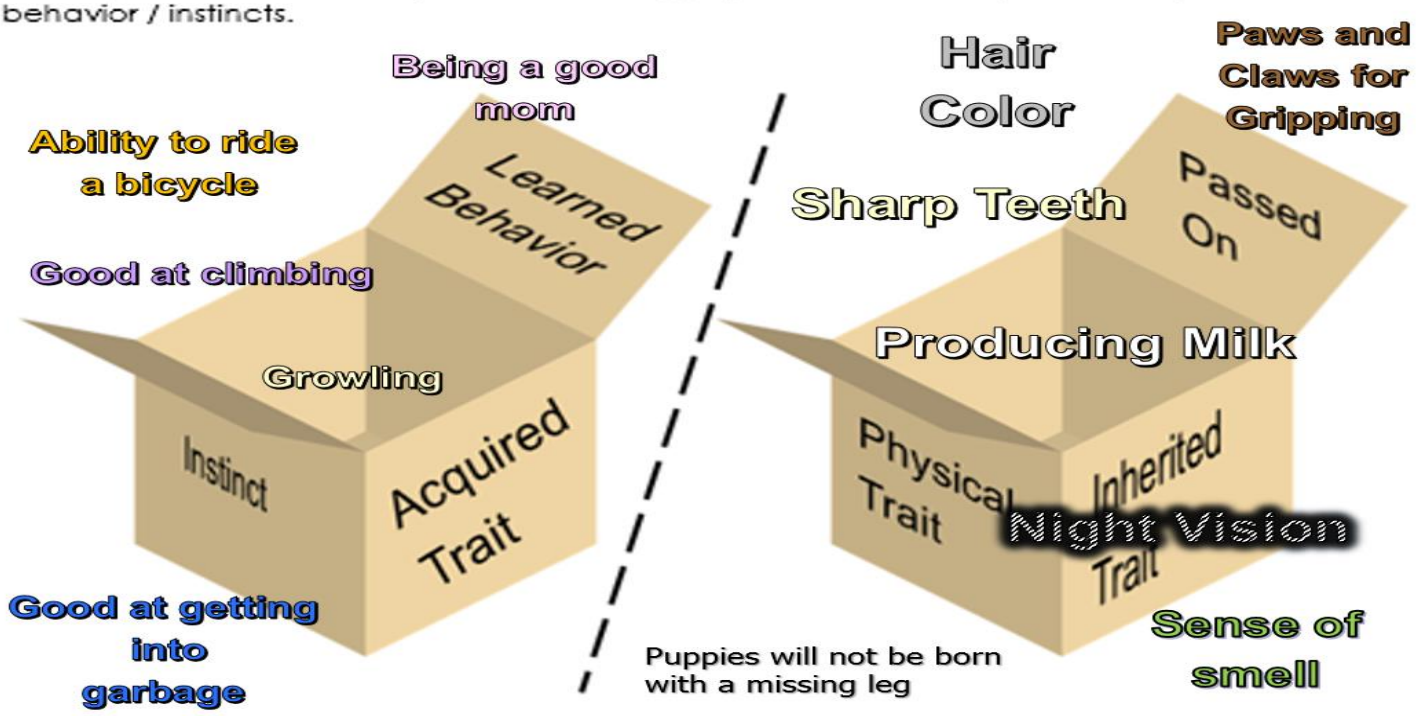
Lesson 7 Inherited vs. Acquired Traits

Instinct / learned Behavior. A behavior is a way of acting. Inherited behaviors are called instincts. Learned behaviors are not inherited traits but learned from others.

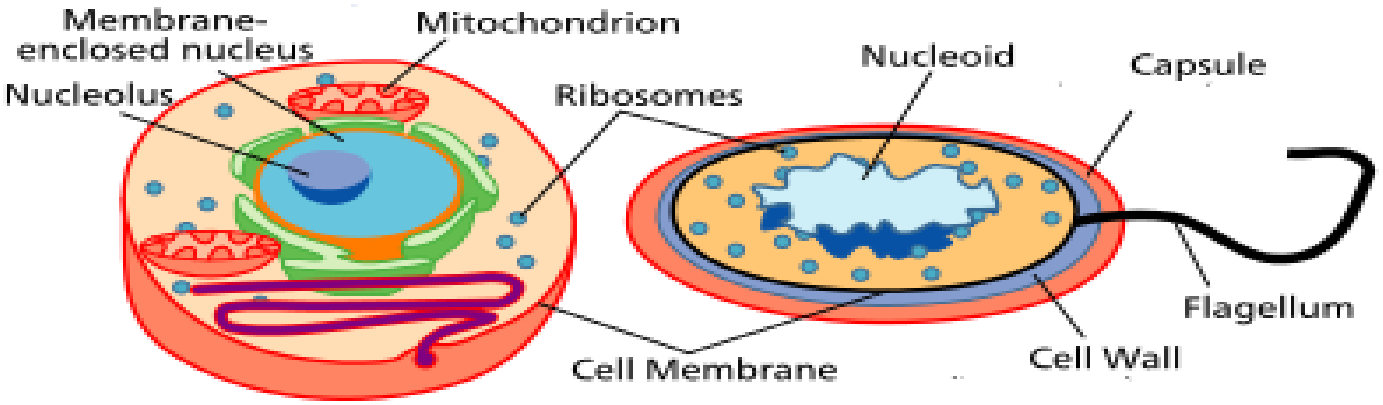
Inherited Trait: A physical characteristic that is passed from parents to their babies (offspring).

Please provide some examples of inherited / physical traits vs. Acquired traits / learned behavior / instincts.

Please provide some examples of inherited / physical traits vs. Acquired traits / learned behavior / instincts.



Which one is Prokaryotic and which one is Eukaryotic?

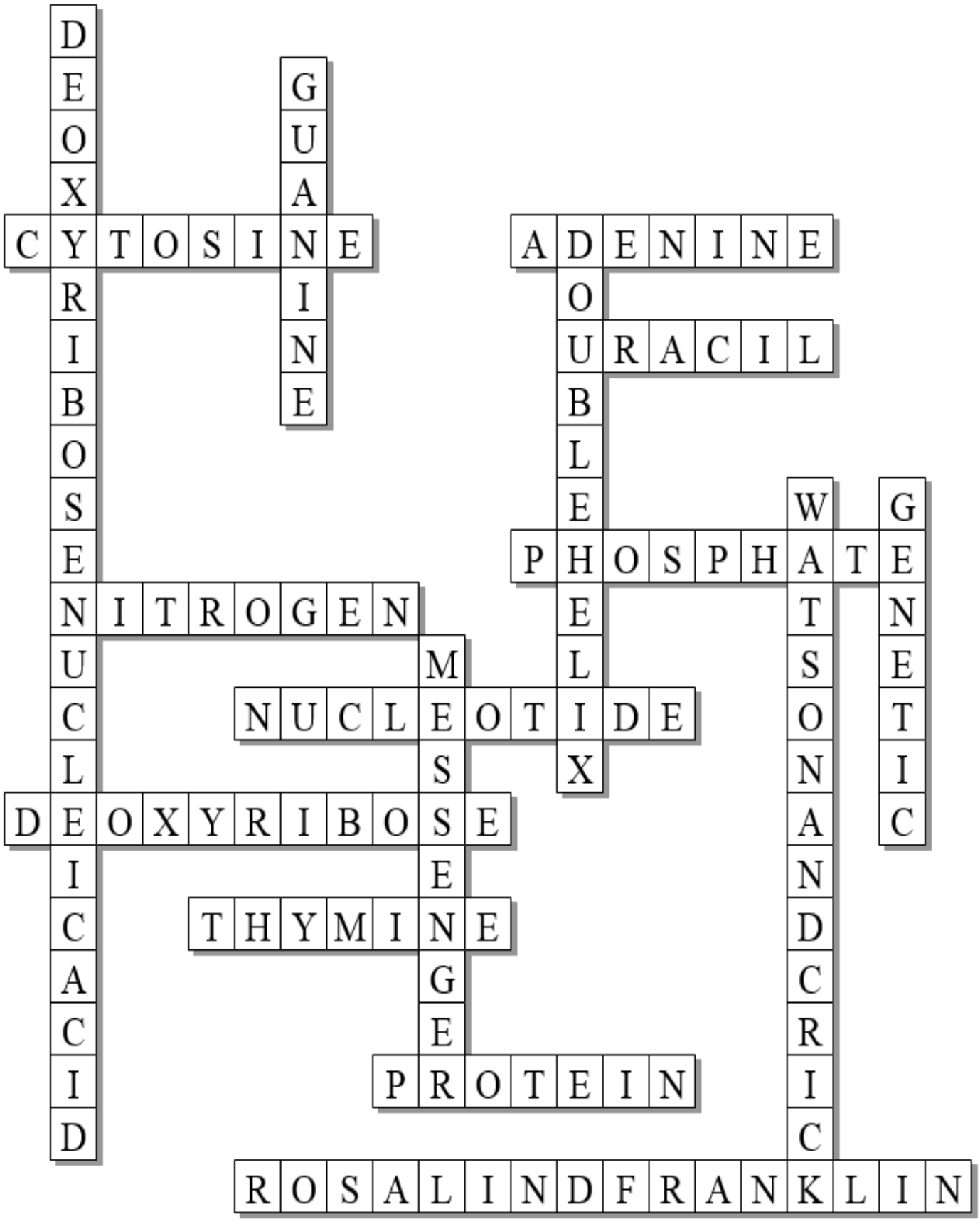


_____EUKARYOTIC_____ _____PROKARYOTIC_____

How do you know? Which one evolved first?

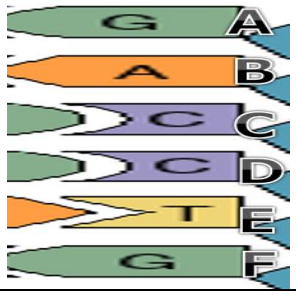
The primary distinction between these two types of organisms is that eukaryotic cells have a membrane-bound nucleus and prokaryotic cells do not. The nucleus is where eukaryotes store their genetic information. ... Prokaryotes, on the other hand, have no membrane-bound organelles. Scientists believe that eukaryotes evolved from prokaryotes around 2.7 billion years ago.

DNA Crossword Puzzle



1-20 = 5 pts Lesson 8 Review Game

*20-*25 * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt) Score ____ / 100
Final Question = 5 pt wager

HIP HIP HOORAY FOR DNA	SPIRAL SPIRAL	SHAPE-UP	LIFE LINE	FAMILY JEANS Bonus round 1 pt each
1) B.) DNA stands for Deoxyribose Nucleic Acid	6) C.) Phosphate Group, 5 Carbon Sugar, Nitrogen Base	11) mRNA	16) A=Phosphate Backbone B=Ribose Sugar C=Adenine D=Guanine	*21) Indiana Jones
2) C.) 1.8 meters	7) PONCH Elements Phosphorus Oxygen Nitrogen Carbon Hydrogen	12) Uracil replaces Thymine	17) Deoxyribose Nucleic Acid	*22) The Addams Family
3) A.) Transcription B.) Translation	8) A is for adenine G is for guanine C is for cytosine T is for thymine	13) D.) DNA Replication	18) Proteins	*23) The Olson Twins
4) Watson, Crick, and Wilkins	9) 	14) Helicase And Ligase Were Switched	19) Chromosomes	*24) The Manning Family
5) Rosalind Franklin	10) Adenine and Guanine Are Purines	15) GATTACA	20) DNA=Hard ?long term Copy RNA=Short term Copy	*25) Family Matters

Final Question Wager ___/5_ Answer: Protiens – "Histones"