Protein Synthesis

Transcription Practice p. 69NB

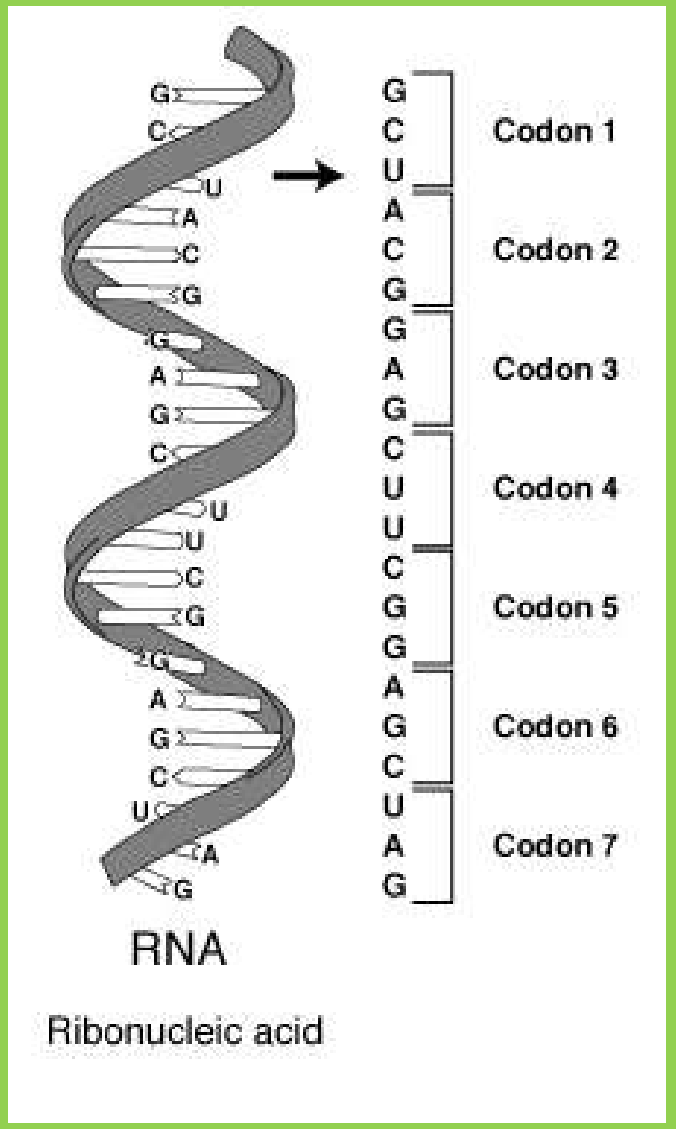
- **Directions:** Using the DNA strand as a template, transcribe mRNA. Make sure to use the correct Nitrogen bases.

1. ATA CCT TAA CGC GTC
2. TAT TAG GCA AAA TTC
3. GTG TGA TTA ATA GCC
4. CTA AAG GAA TAG GAT
5. GAT GAA TAC CCA CGA
6. TAA TAT GCA CAT TAC
7. GAA CCT TAC GGG GTG
8. TAT AAC CAG GAG TTT
9. ATC CGT AGT GTA AAT
10. GGA TTA CCC TTA CCA

10/5 **Protein Synthesis: Transcription** 11.2

Obj. TSW explain the process of Protein Synthesis by transcribing and translating DNA sequences from their Mini Lab 11.1 P.68 NB

Learn.genetics.utah.edu/



1. What is transcription?
2. Where does Transcription happen?
3. Why is a codon important to making a protein?

HW – Study for the DNA Quiz tomorrow

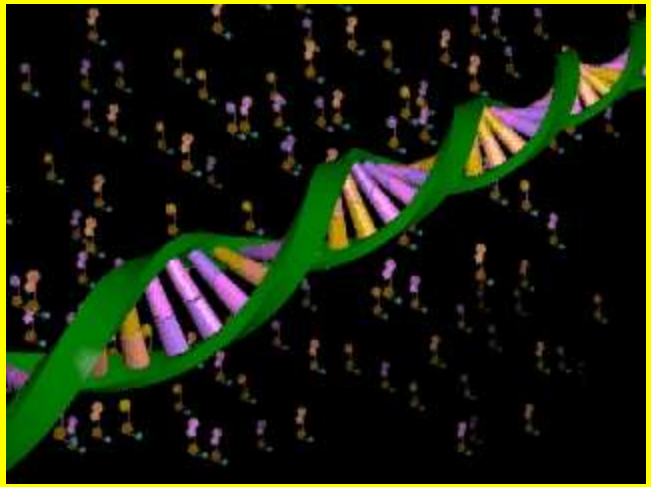
Cell Lab is due Thursday/ friday

Cracking the Code

- Students will take a page of notes on Notebook Paper and tape into their NB page 69NB

Transcription

In the nucleus, enzymes make an RNA copy of a portion of a DNA strand in a process called transcription.

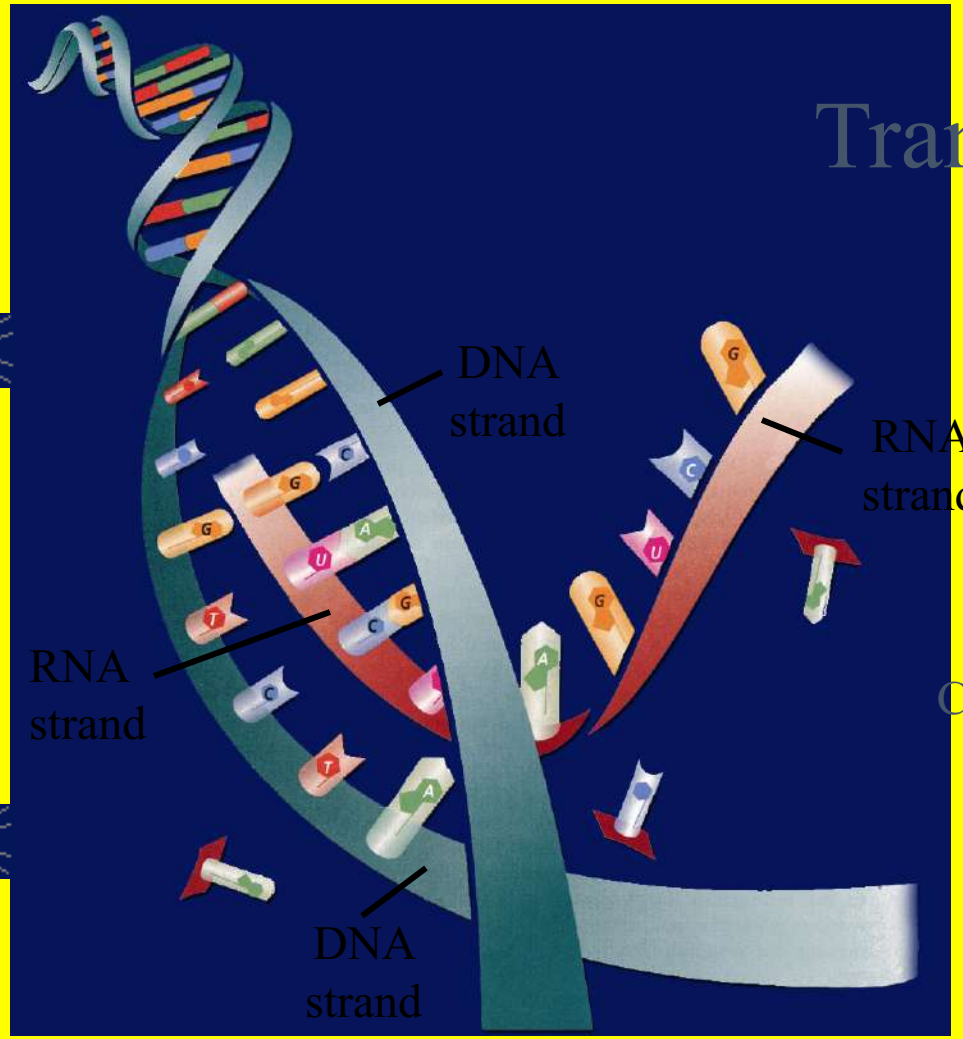


Click image to view movie

From DNA to Protein

Transcription

A



B

C

END OF SLIDE

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RESOURCES

Transcription

The main difference between transcription and DNA replication is that transcription results in the formation of one single-stranded RNA molecule rather than a double-stranded DNA molecule.

RNA Processing = Gene Expression

Not all the nucleotides in the DNA of eukaryotic cells carry instructions—or code—for making proteins.

Genes usually contain many long noncoding nucleotide sequences, called introns, that are scattered among the coding sequences.

Protein Synthesis Honors Biology

- 1 large bag M &M's – Maria
- 1 large bag of Gummy Bears – Yanna
- 4 Bags of Marshmallows – Claudia, Sarahi, Fabio, Aisha
- 1 Box of Rice Krispies Cereal – Abby
- 1 stick of Butter – Dru & Sopear

How does DNA control the structures and functions of a cell?

DNA determines the structure of proteins. Some proteins become important cell structures. Other proteins, such as enzymes, control chemical reactions that perform key life functions.

HW CH 11 DNA & Genes p.41 NB

1. Deoxyribose
2. Nitrogenous Base
3. Nucleotide
4. Base Pair
5. Hydrogen Bond
6. Phosphate
7. Adenine (A) & Nitrogen Bases
8. Cytosine
9. *Nucleotides
10. DNA Replication
11. Double Helix

HW CH 11 DNA &Genes*

1. DNA – Double RNA – single
2. DNA – Deoxyribose RNA – Ribose
3. DNA – ATCG RNA – AUCG
4. Amino Acids
5. Amino Acids
6. Proteins
7. Codon*
8. Threonine

QUIZ

8. What is DNA Replication?
9. What are the two functions of DNA?
10. What are three differences of RNA from DNA?
11. What RNA has stop codons, and what is their function?
12. How are codons and anticodons different?
13. Write the equation for Protein Synthesis.
14. Transcribe & Translate the DNA sequence:ATC, TCA, TAC

DNA Quiz

7. What is the backbone of the molecule made of?

8. What is a gene?

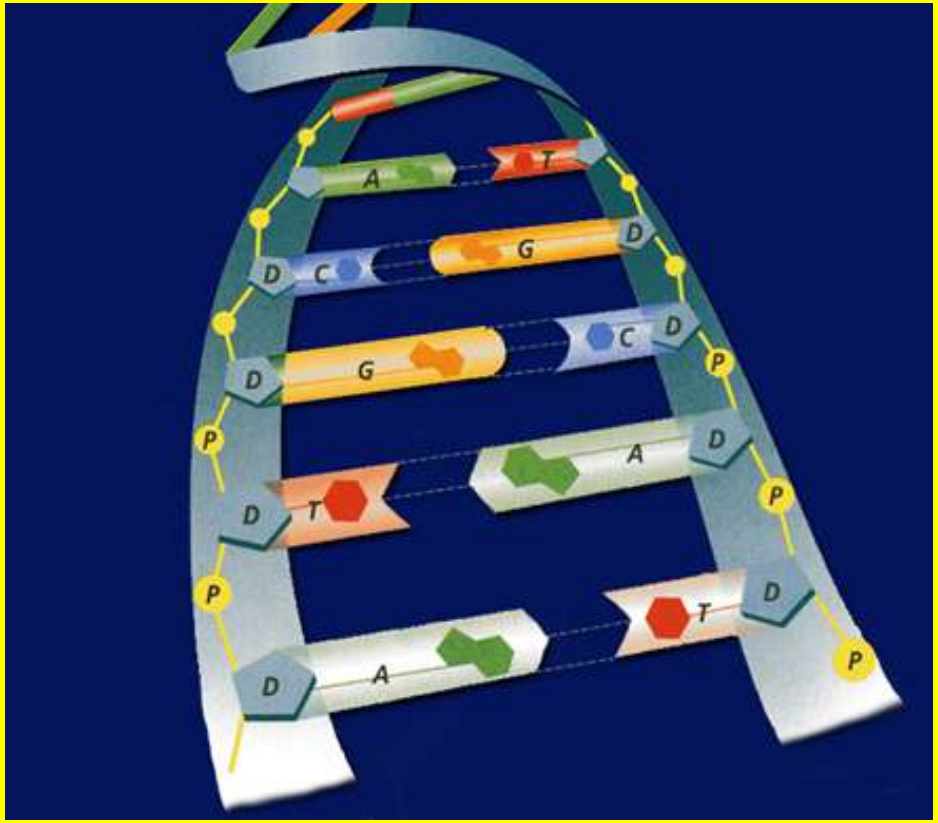
9. What does DNA code for? What is it's purpose?

10. Write the formula for Protein Synthesis

When you are finished turn you paper upside down and wait quietly to have me pick it up.

POP QUIZ Write your name on your binder paper.

1. What is this molecule? Spell it out.
2. What is the shape of the molecule?
3. What are the two purposes/ functions of this molecule?
4. Write the three names for the parts of a nucleotide. Be specific.
5. The Nitrogen bases are: Adenine, Cytosine, Guanine, & Thymine – Base Pair them together correctly.
6. What holds the Nitrogen bases together?
7. DNA is a Nucleic Acid, write an example of another one.
8. Can a Nucleic Acid leave the nucleus?
9. What is DNA Replication?
10. What is the name for how DNA Replications?



The process through which the order of bases in messenger RNA codes for the order of amino acids in a protein is:

A. transcription

B. translation

C. replication

D. point mutation

The answer is B.

Why would scientists use nucleotide sequences to identify bodies of crime victims?

In comparing nucleotide sequences in the DNA of a crime victim with nucleotide sequences from a possible close relative of the crime victim, scientists can determine if the two are related.

HW CH 11

9.Phenylalanine Codon are (UUU) (UUC)

10. Codon

11. Amino Acid

12. Amino Acid

13. Stop codons = UGA, UAG, UAA

14. Tryptophan & Methionine

10/6 **Protein Synthesis: Translation** 11.2

Obj. TSW explain the process of Protein Synthesis by drawing it in their notebooks. p.70NB

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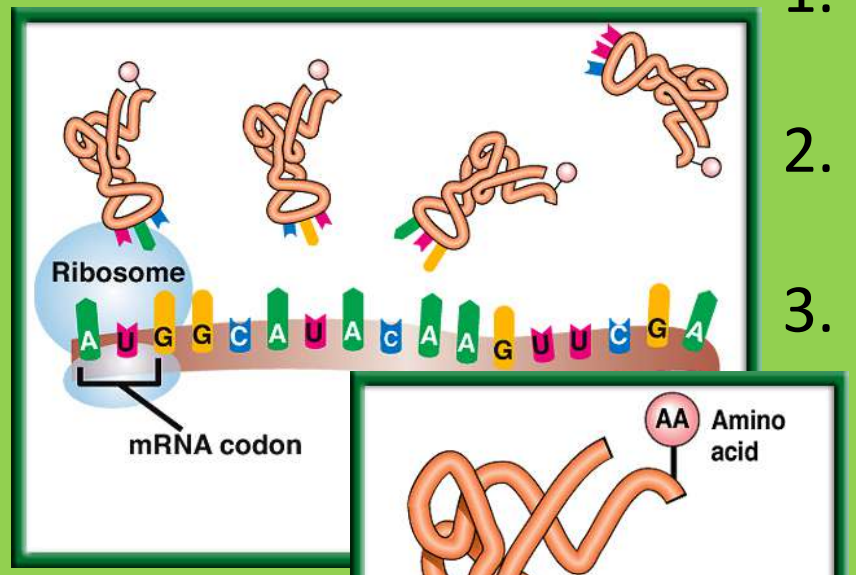
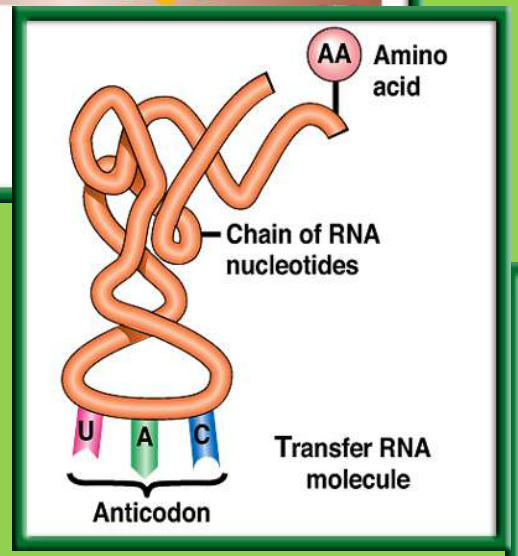
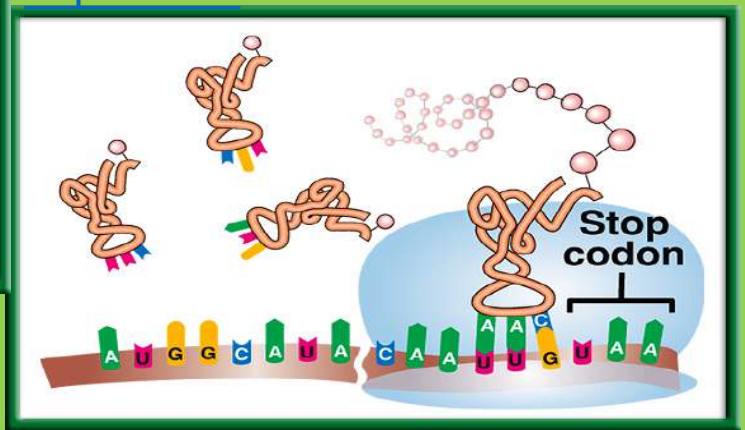


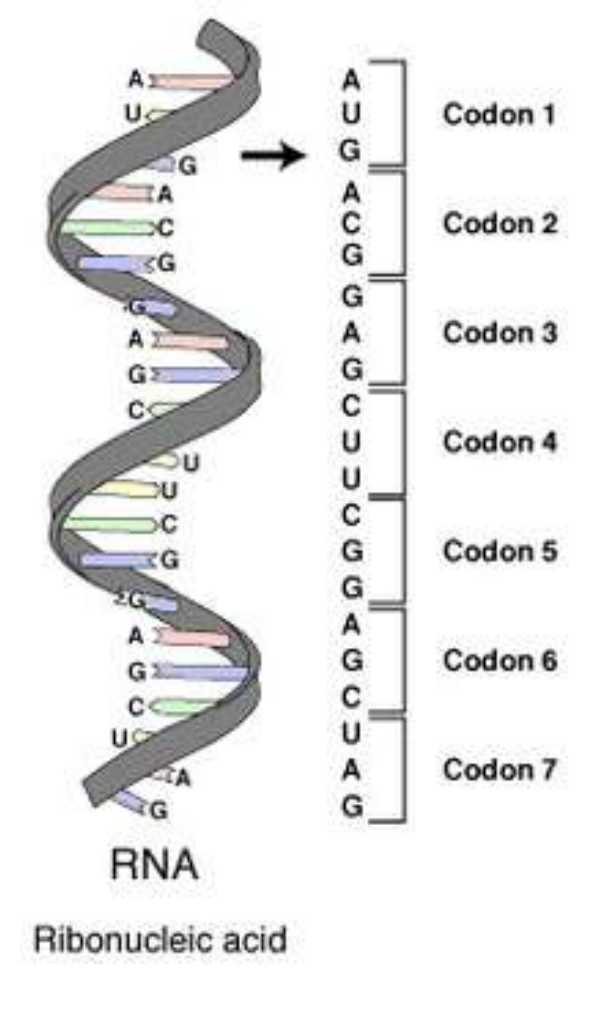


1. Compare & Contrast Codon and Anticodon.
2. What is the role of tRNA in Protein Synthesis?
3. Why are Stop Codons important in Translation?

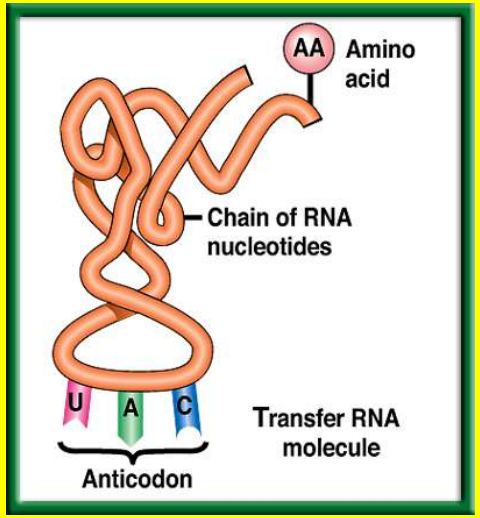
http://www.dnatube.com/video/3448/DNA-Replication



#1. Codon & Anticodon



- A **Codon** is a nucleotide triplet sequence on mRNA, it codes for an amino acid.
  - AUG ACG GAG
- An **Anticodon** is a nucleotide triplet sequence on tRNA that carries the Amino acid
  - UAC
- Both are RNA & Each triplet pairs to code for a particular Amino acid to form a protein.

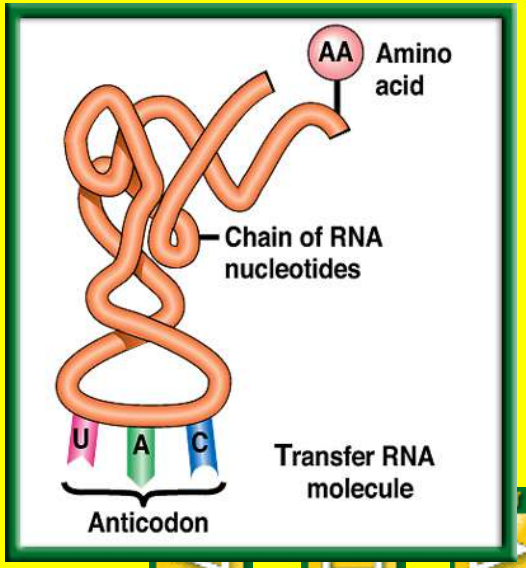


#2. The role of transfer RNA - tRNA

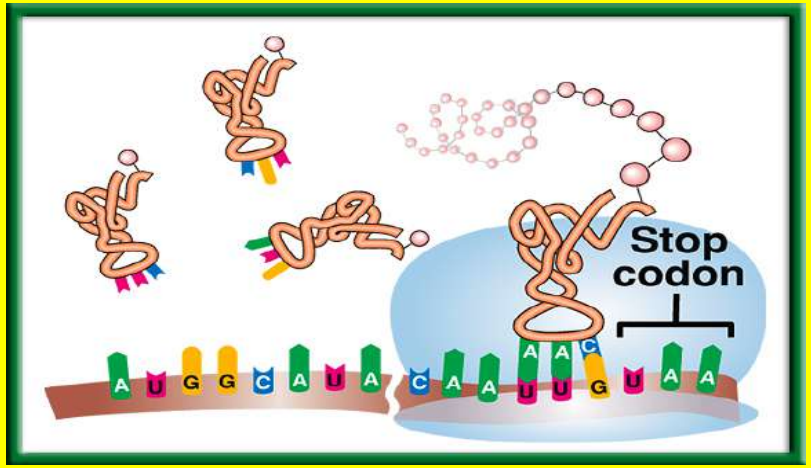
As **translation** begins, a ribosome attaches to the starting end of the mRNA strand. Then, **tRNA** molecules, each **carrying a specific amino acid**, approach the ribosome.

When a **tRNA anticodon pairs with the first mRNA codon**, the two molecules temporarily join together.

Usually, the first codon on mRNA is AUG, which codes for the amino acid methionine.



#3. Stop Codons



- Without the stop codon, the protein would continuously be made.
- More Protein is not necessarily better.
- Name the 3 codons for STOP:
  - UAA, UAG, UGA

From DNA to Protein

The Genetic Code P.292 BB

The Messenger RNA Genetic Code

First Letter	Second Letter				Third Letter
	U	C	A	G	
U	Phenylalanine (UUU)	Serine (UCU)	Tyrosine (UAU)	Cysteine (UGU)	U
	Phenylalanine (UUC)	Serine (UCC)	Tyrosine (UAC)	Cysteine (UGC)	C
	Leucine (UUA)	Serine (UCA)	Stop (UAA)	Stop (UGA)	A
	Leucine (UUG)	Serine (UCG)	Stop (UAG)	Tryptophan (UGG)	G
C	Leucine (CUU)	Proline (CCU)	Histadine (CAU)	Arginine (CGU)	U
	Leucine (CUC)	Proline (CCC)	Histadine (CAC)	Arginine (CGC)	C
	Leucine (CUA)	Proline (CCA)	Glutamine (CAA)	Arginine (CGA)	A
	Leucine (CUG)	Proline (CCG)	Glutamine (CAG)	Arginine (CGG)	G
A	Isoleucine (AUU)	Threonine (ACU)	Asparagine (AAU)	Serine (AGU)	U
	Isoleucine (AUC)	Threonine (ACC)	Asparagine (AAC)	Serine (AGC)	C
	Isoleucine (AUA)	Threonine (ACA)	Lysine (AAA)	Arginine (AGA)	A
	Methionine; Start (AUG)	Threonine (ACG)	Lysine (AAG)	Arginine (AGG)	G
G	Valine (GUU)	Alanine (GCU)	Aspartate (GAU)	Glycine (GGU)	U
	Valine (GUC)	Alanine (GCC)	Aspartate (GAC)	Glycine (GGC)	C
	Valine (GUA)	Alanine (GCA)	Glutamate (GAA)	Glycine (GGA)	A
	Valine (GUG)	Alanine (GCG)	Glutamate (GAG)	Glycine (GGG)	G

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PREVIOUS SLIDE

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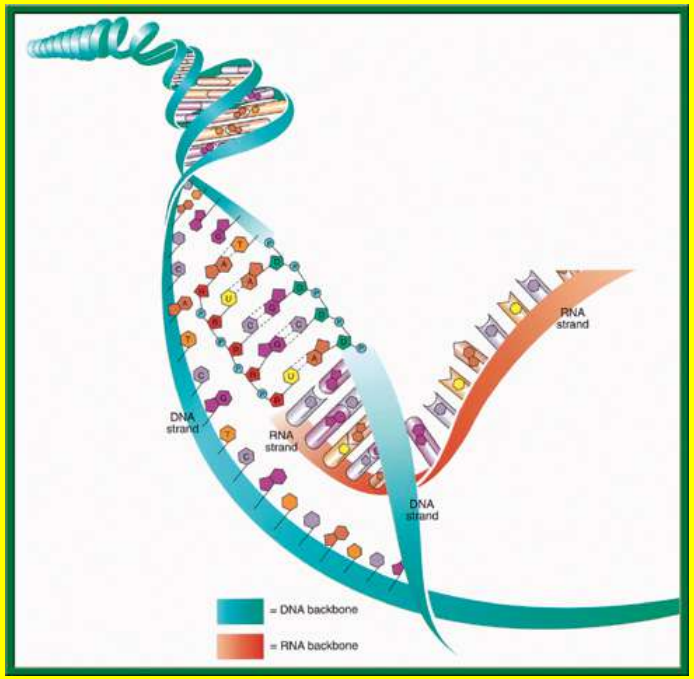
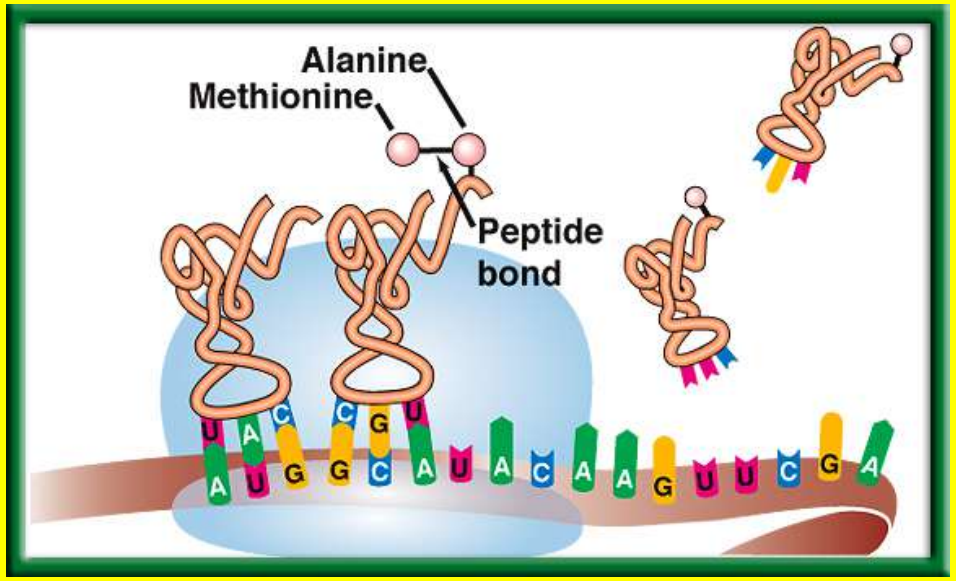
RESOURCES

Protein Synthesis p. 71 NB

DNA -> **transcription** -> RNA -> **translation** -> Proteins





Molecular Genetics p. 71NB

DNA Replication – make more DNA for more cells to replace other cells.

DNA-DNA

A = T

T = A

C = G

G = C

Protein Synthesis – to make proteins

DNA RNA

A = U

T = A

C = G

G = C

Protein Synthesis

DNA: TAC CAC AAC

Transcription (nucleus)

mRNA: AUG GUG UUG

Translation (ribosome)

Protein: Methionine, _____, _____ Amino Acid Sequence

Protein Synthesis – Gene Expression Practice P. 71NB

1. DNA: ATA CCT TAA CGC GTC

2. DNA: TAT TAG GCA AAA TTC

10/7 **Protein Synthesis: Translation** 11.2

Obj. TSW explain the process of Protein Synthesis by making Rice Krispie treats through the process of Protein Synthesis. P. 72NB

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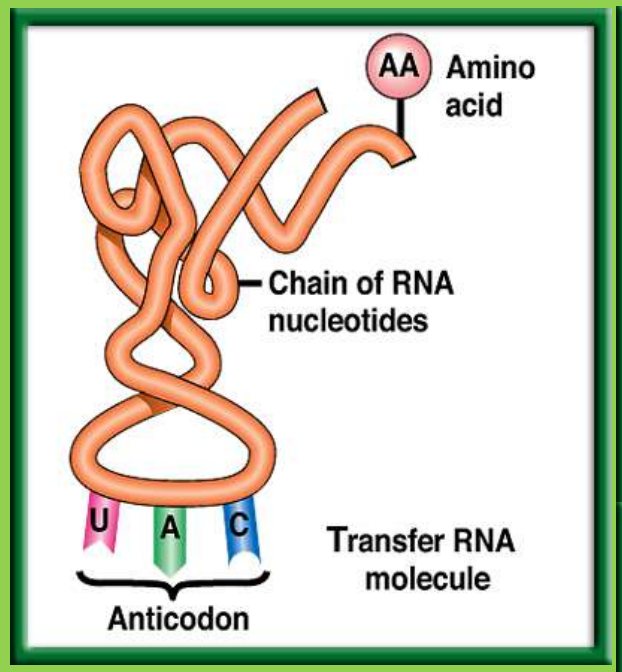
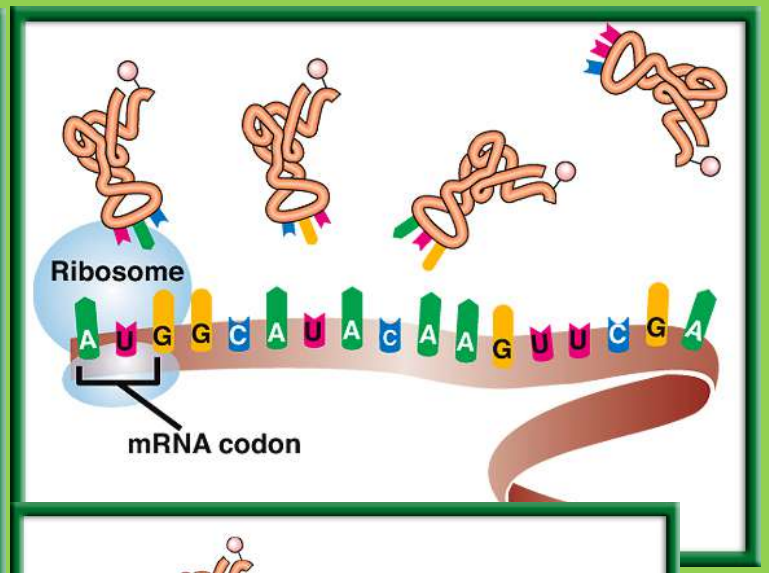
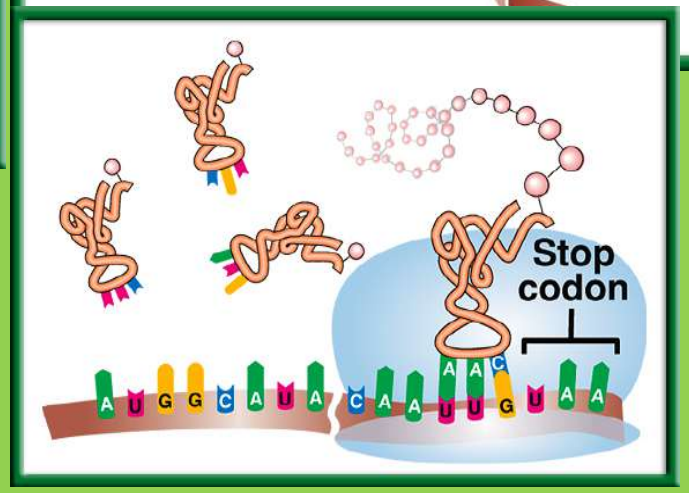






1. When making proteins, If a template DNA strand read TAC GGT, AGT what would a complementary strand of mRNA be?
2. What Amino Acids would the 3 codons code for?
3. Do the same for: GCA, TGC, ATC (DNA).

HW – Cell Lab is due tomorrow/ Friday.

Mini Lab 11.1 P. 75NB P. 293 BB

DNA → transcription →RNA →translation → Protein

	A	B	C	D	E
DNA Base Sequence	Process	mRNA Codon	Process	tRNA Anticodon	Amino Acid
AAT					
GGG					
ATA					
AAA					
GTT					

Mini Lab 11.1 P. 75NB P. 293 BB

DNA → transcription →RNA →translation → Protein

	A	B	C	D	E
DNA Base Sequence	Process	mRNA Codon	Process	tRNA Anticodon	Amino Acid
AAT	Transcription	UUA	Translation	AAU	Leucine
GGG		CCC		GGG	Proline
ATA		UAU		AUA	Tyrosine
AAA		UUU		AAA	Phenylalanine
GTT		CAA		GUU	Glutamine

Answer Analysis Questions 1 – 3

1. A.DNA instructions are located in the nucleus.

b. Transcription happens in the nucleus.

c. Translation happens in the Ribosome.

4. tRNA looks like a triangle with an Amino Acid on the end, and the other side has the Anticodon that base pairs with the codon on the mRNA.
5. Mutations would be more common, if the sequence of DNA was not strictly adhered to.

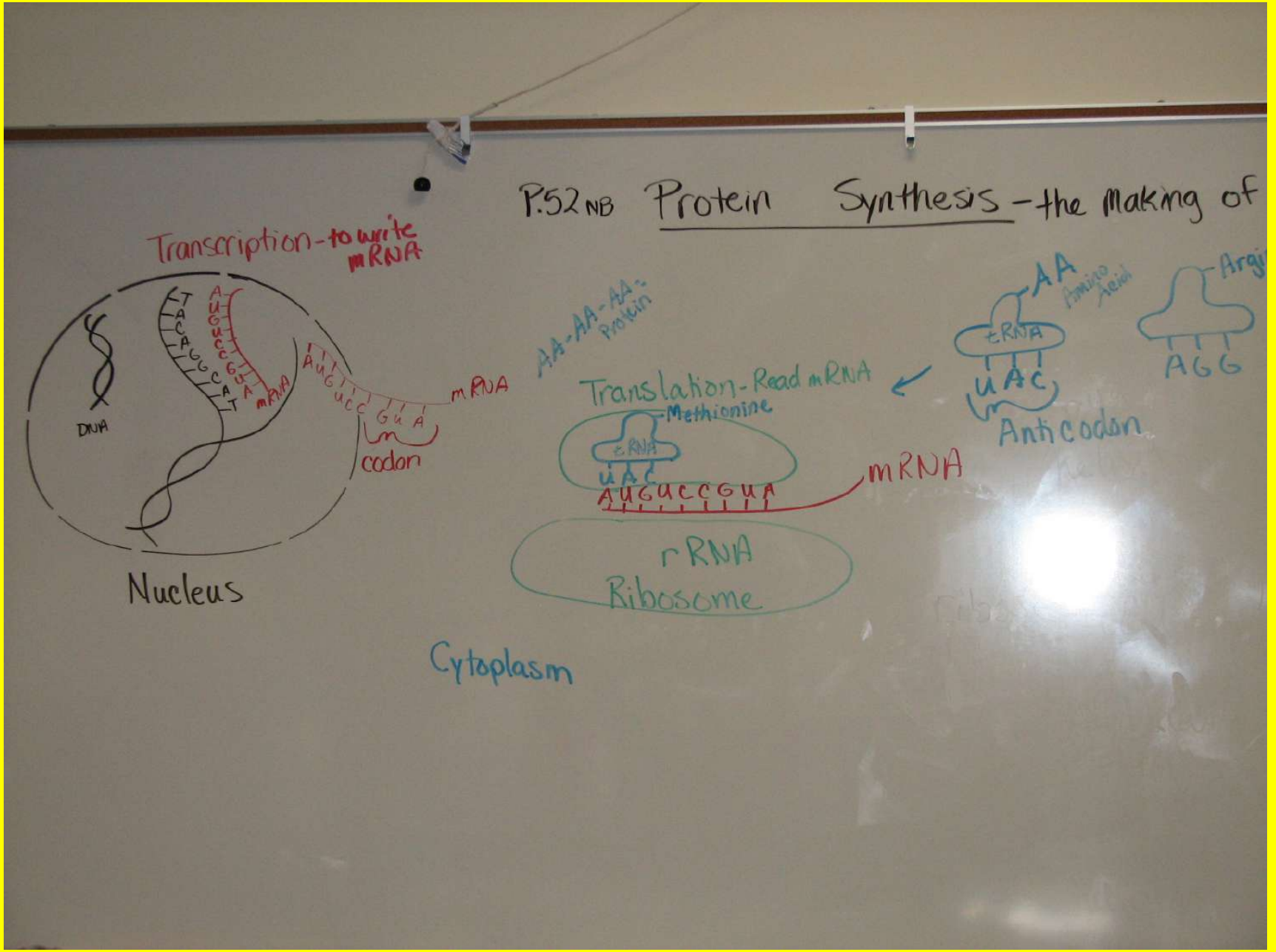
Page 292 Biology Book

The Genetic Code

	U	C	A	G	
U	UUU Phenyl alanine UUC UUG Leucine UUA	UCU UCC UCA Serine UCG	UAU Tyrosine UAC UAA Stop UAG	UGU Cysteine UGC UGA Stop UGG Tryptophan	U C A G
C	CUU CUC CUA Leucine CUG	CCU CCC CCA Proline CCG	CAU Histidine CAC CAA Glutamine CAG	CGU CGC CGA Arginine CGG	U C A G
A	AUU AUC Isoleucine AUA AUG Methionine	ACU ACC ACA Threonine ACG	AAU Asparagine AAC AAA Lysine AAG	AGU Serine AGC AGA Arginine AGG	U C A G
G	GUU GUC GUA Valine GUG	GCU GCC GCA Alanine GCG	GAU Aspartic acid GAC GAA Glutamic acid GAG	GGU GGC GGA Glycine GGG	U C A G

Rice Krispie Treat
Protein Synthesis Lab – Thursday

- 1 Boxes of **Rice Krispies**
- 4 Bags of **LARGE MARSHMELLOWS**
- 1 large bag of Mini **M&M's**
- 1 large bag of **Gummy Bears**
- 1 stick of **Butter**
- **1 Microwave**?


P.52 NB Protein Synthesis - the making of
Transcription - to write mRNA
DNA
mRNA
codon
Nucleus
AA-AA-AA = Protein
Translation - Read mRNA
Methionine
tRNA
UAC
AUGUCCGUA
mRNA
rRNA
Ribosome
Cytoplasm
AA
Amino Acid
tRNA
UAC
Anticodon
AGG

Page 73 NB

1st Period P. NB

- Write a paragraph after building your DNA molecule that include the vocabulary words: Double helix, Nitrogen bases, Hydrogen bond, Nucleotide, Backbone, Deoxyribose, Phosphate, Adenine, Thymine, Cytosine, Guanine.

Chapter 11

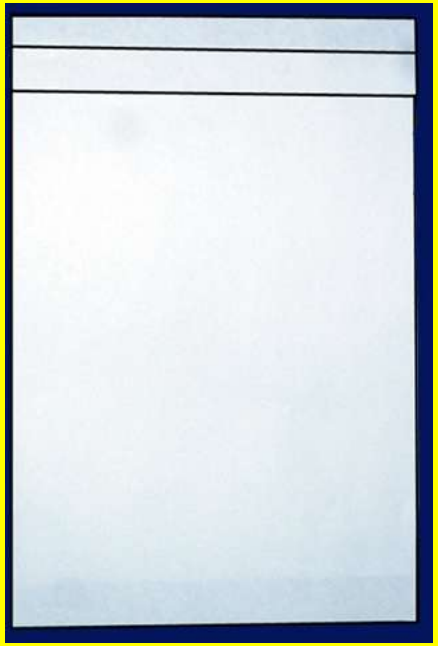
Foldables Study Organizers

STEP 1

Collect 3 sheets of paper and layer them about 1.5 cm apart vertically. Keep the edges level.

P. 53 NB

FOLDABLES™ Study Organizer



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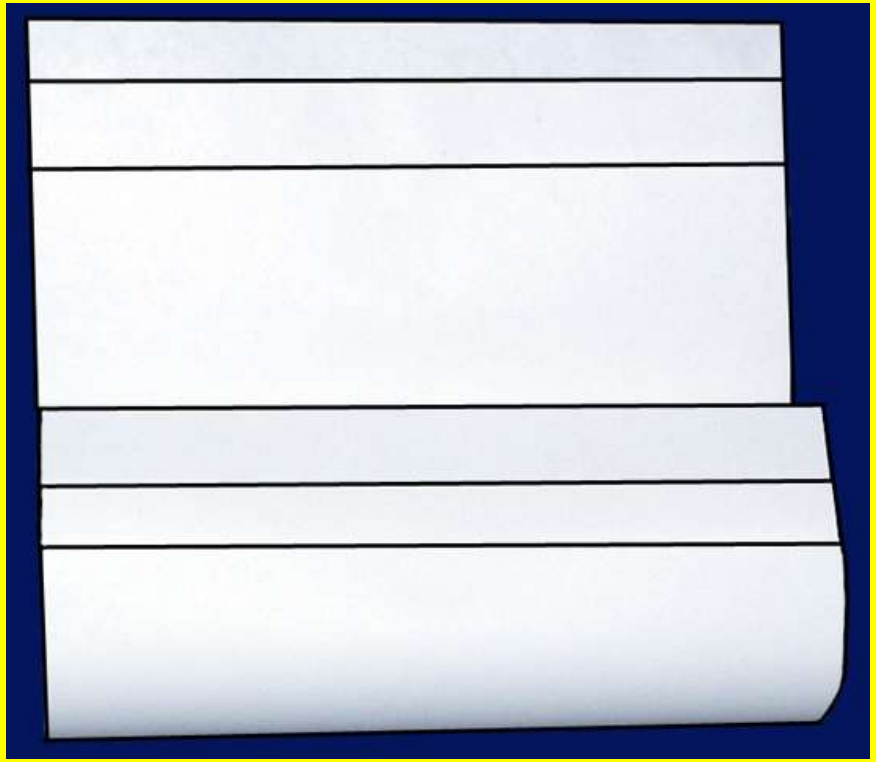
Foldables Study Organizers

STEP 2

Fold up the bottom edges of the paper to form 6 equal tabs. P. 53NB



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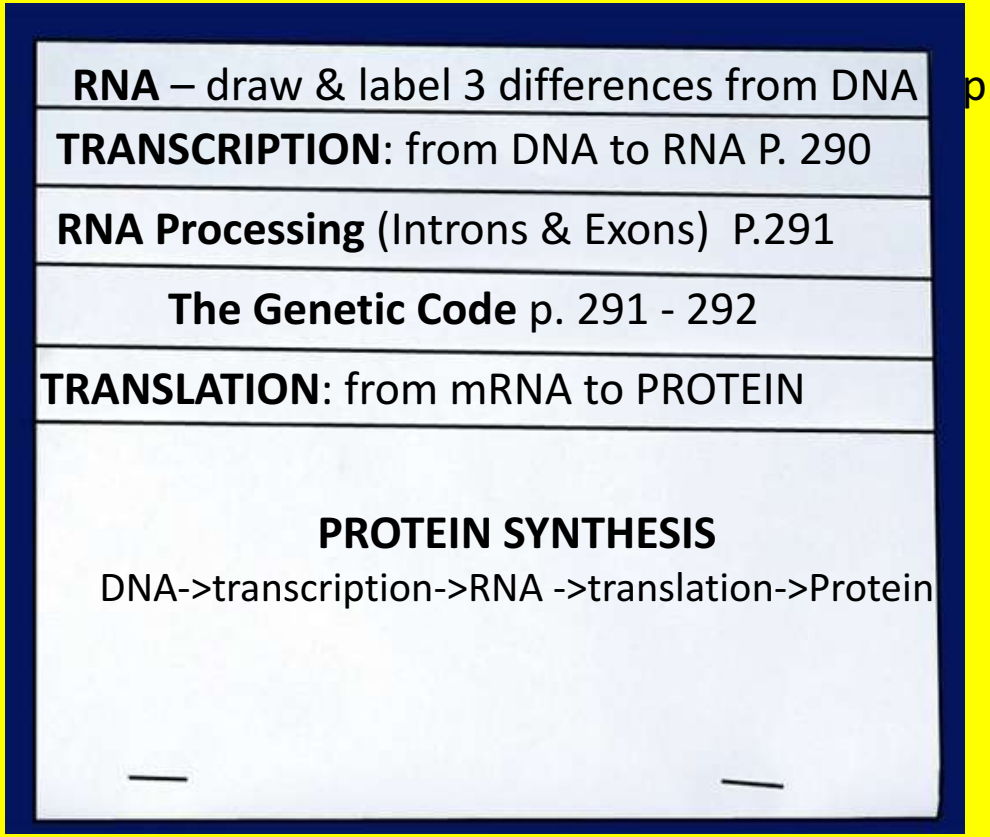
Chapter 11

Foldables Study Organizers

STEP 3

Fold the papers and crease well to hold the tabs in place. Staple along the fold. **Label** each tab. P. 53NB



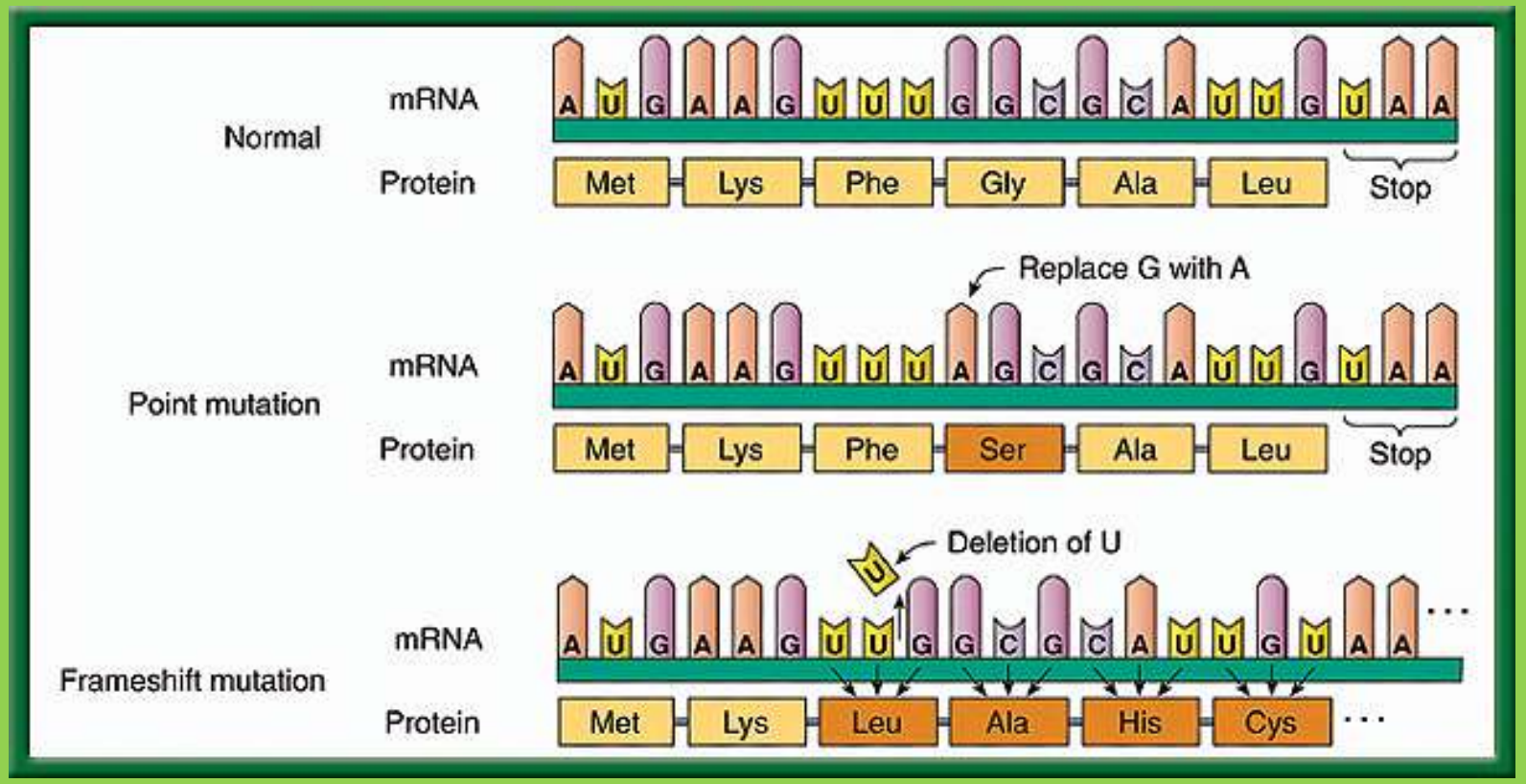
p. 289

p. 294 11.9A

To return to the chapter summary click escape or close this document.

END OF SLIDE

10/9 Mutations: A change in a gene 11.3
Obj. TSW learn how mutations happen, and explain the difference between point & Frameshift mutation from WU, notes & conclusion of Protein Synthesis Lab. P. 74 NB



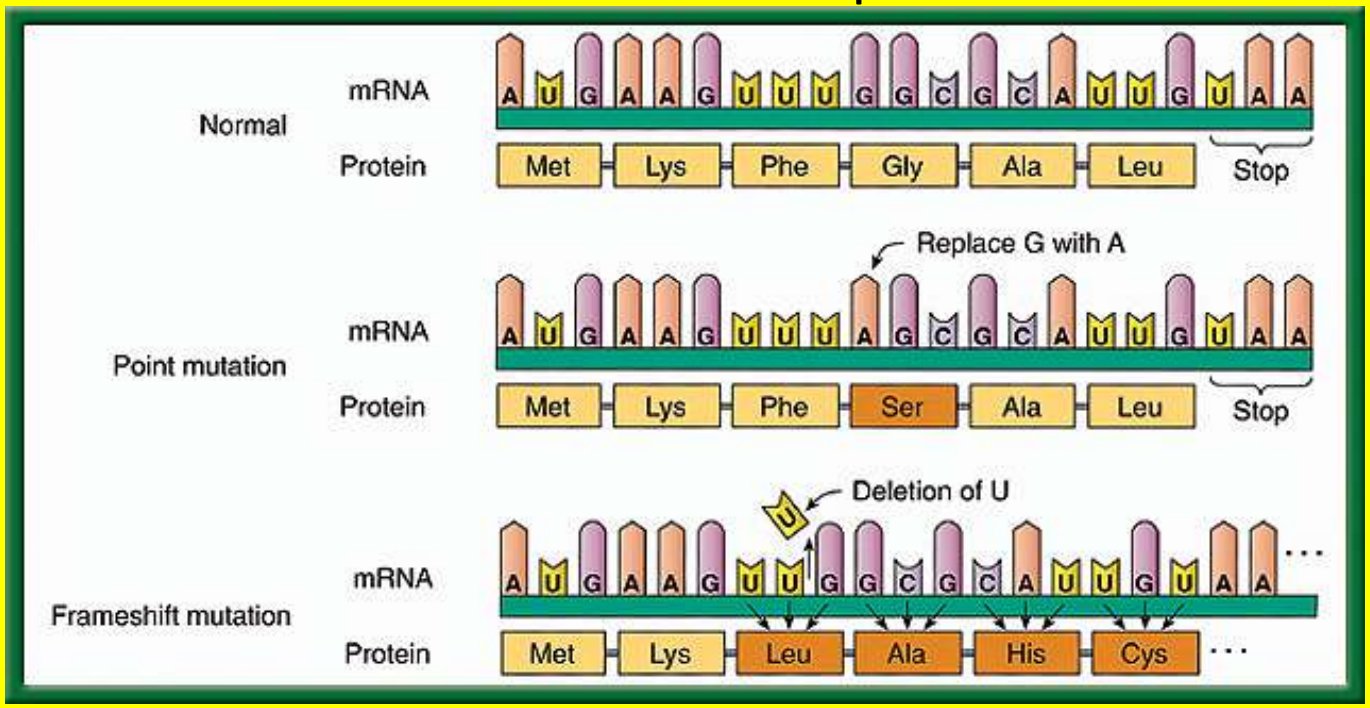
1. What are some causes of mutations?
2. Compare & Contrast the effects of a point mutation & a frameshift mutation.
3. Which mutation is worse and why?

#1. Causes of Mutations

- **Mutagens-** change in the DNA caused by the Environment – Pollution, UV Radiation, Drugs, Stress
- **Random mistakes-** proofreading enzymes are not working

#2. Gene Mutations – Point & Frameshift Mutations p.298 BB

Which mutation is worse? Why?



#3. Frameshift Mutation is worse because it changes every amino acid after the deletion or addition of the nucleotide.

Rice Krispy Protein Synthesis P.75NB

1. My protein looks like: Round, Flat, Color, M&M or Gummi Bears
2. Deleting the fifth nucleotide of your DNA will cause **a frameshift** mutation that changes every amino acid after the deletion. Change how many marshmallows were used.
3. Changing the 11th nucleotide of your DNA sequence from G to T would be a **point mutation** and will change the amino acid **Serine** to **STOP codon**, however, this is bad because the protein is not complete. Marshmellows would not be smooth.
4. If the 19th, 20th, 21st nucleotides of your DNA sequence were deleted the 7th codon were deleted the rice krispie treat would not have color.
5. Two proteins are different by some were flat, round, some were red, some blue, some M&M's &/ gummy bears.

Conclusion

1.If you were given the

Classwork – Transcription & Translation p. 53 NB

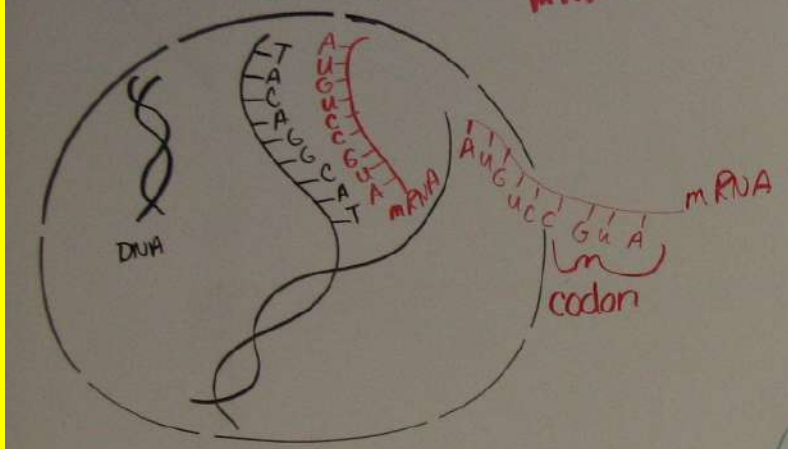
- Work on worksheet about Protein Synthesis.
- Transcribe the DNA sequence.
- Then, translate the Amino Acid sequence to the right of the Codons.

Draw Protein Synthesis

- P. 73 NB
- Turn your book Landscape Style ←------→
- Have 4 different colored pencils.
- Write on the RED line at the top: **Protein Synthesis: the making of Proteins**
- Use ¾ of the page
- The last ¼ of the page will be a summary/ AXES paragraph.

P.52 NB **Protein Synthesis** – the making of

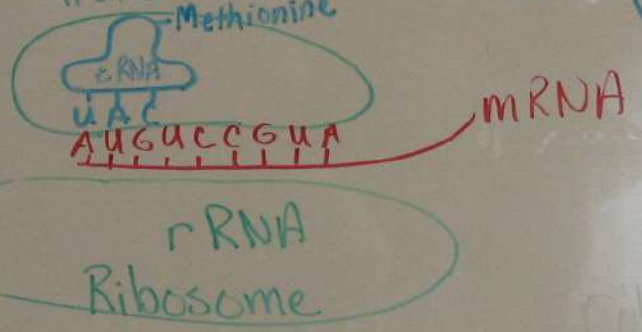
Transcription – to write mRNA

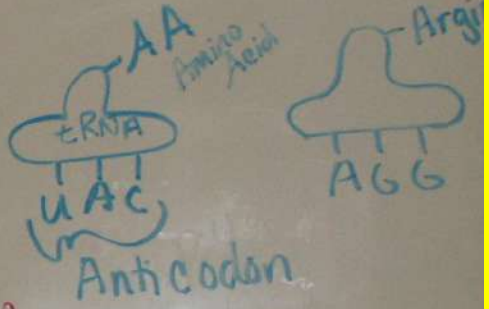


Nucleus

AA-AA-AA-... Protein

Translation – Read mRNA



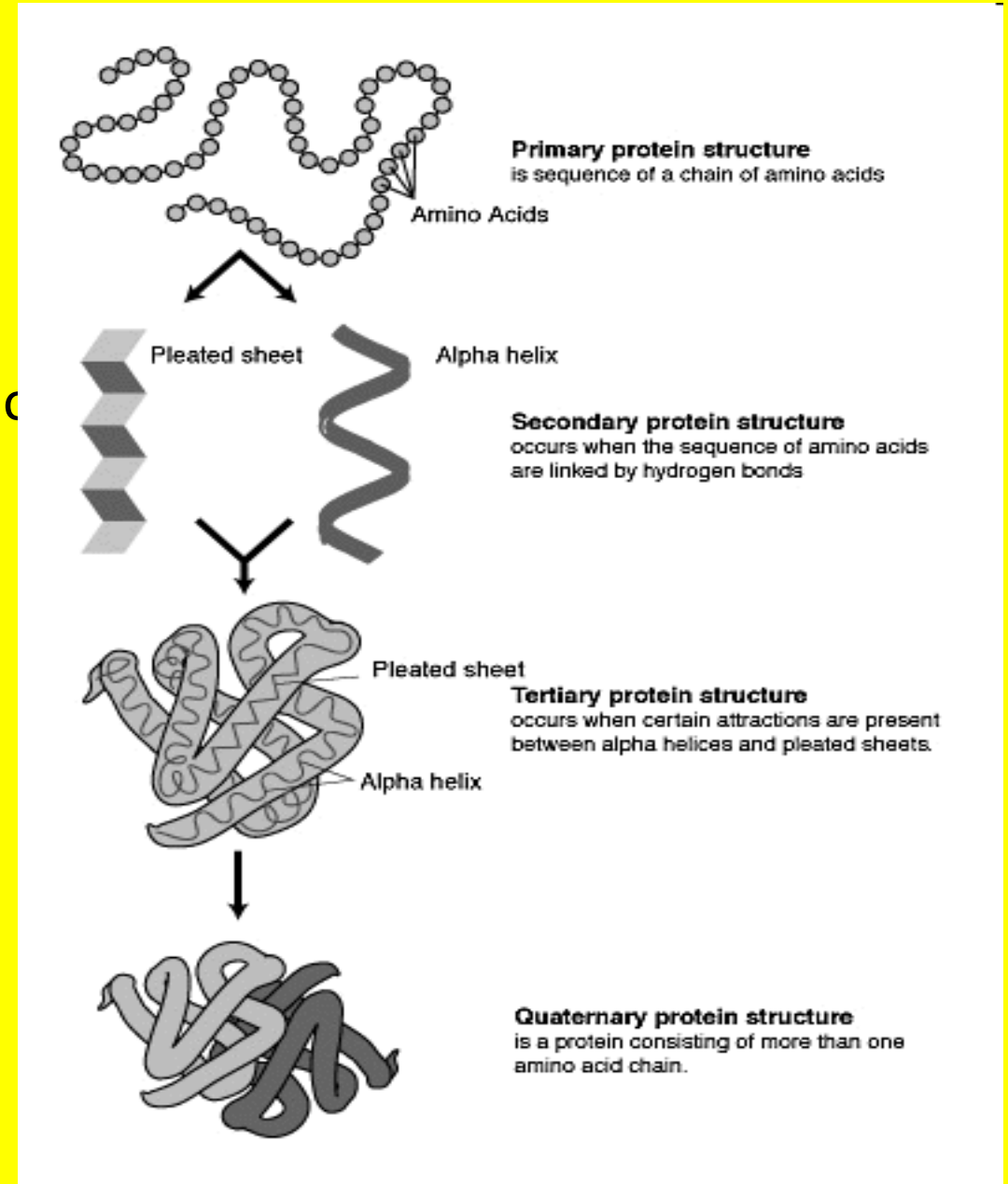


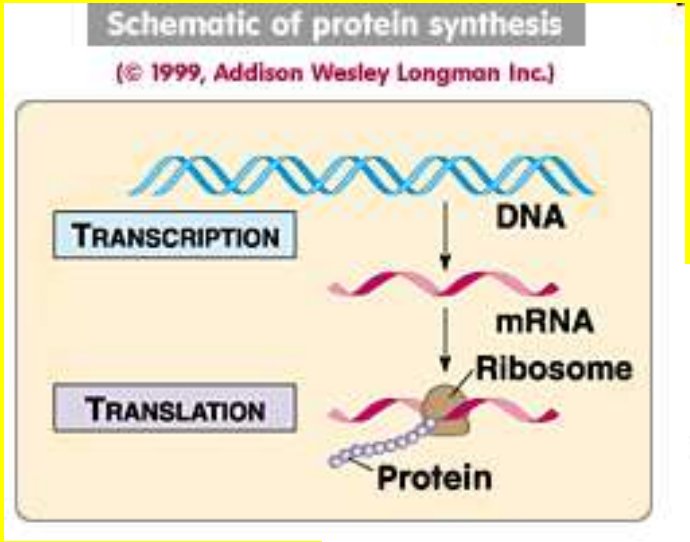
rRNA
Ribosome

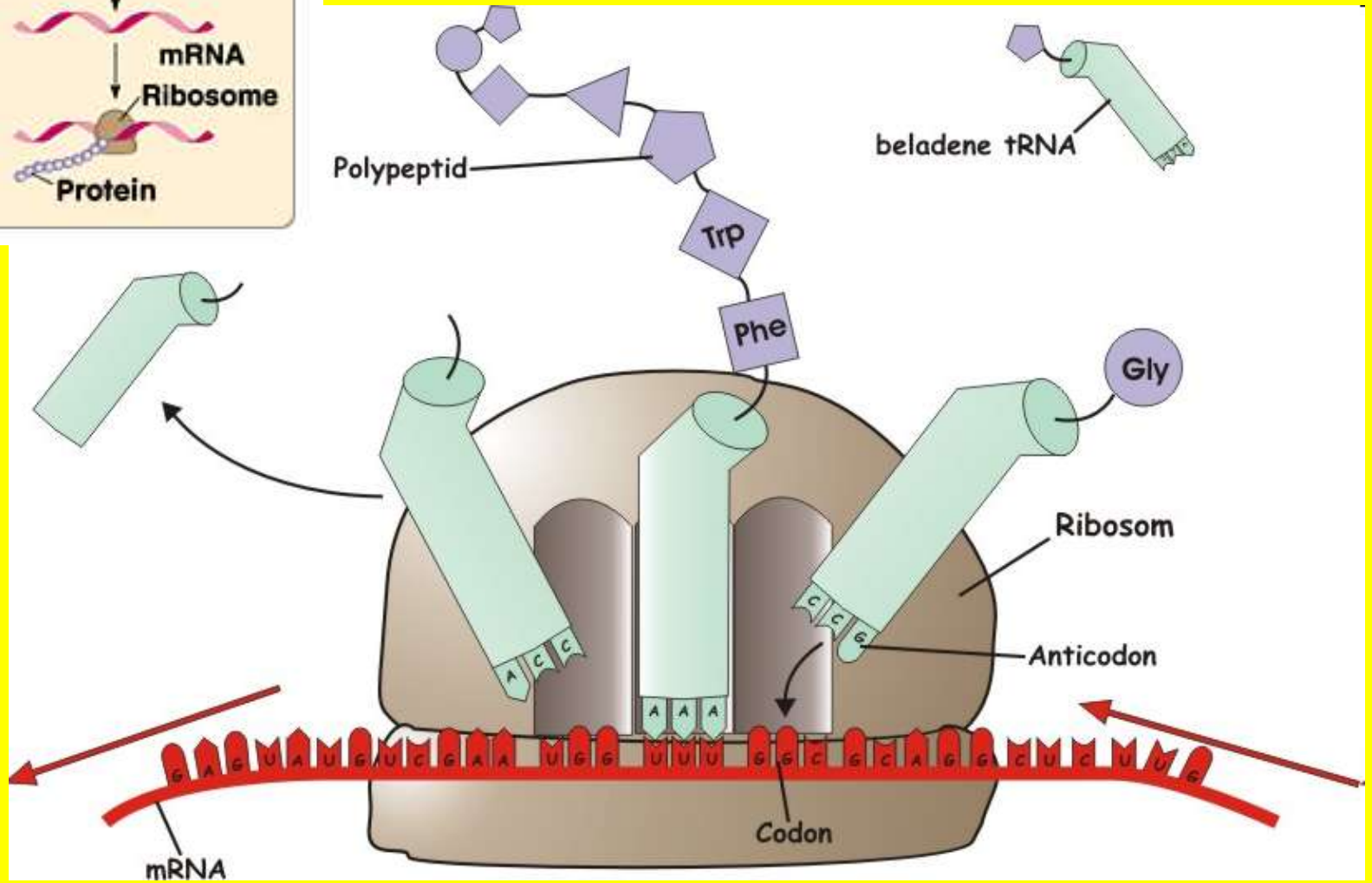
Cytoplasm

Proteins Notes P. 81 NB

- Proteins can come in many different shapes and sizes
- The number & sequence o amino acids determine its a proteins shape.
- An example of proteins: ENZYMES!
- Proteins must have a specific structure in order to function properly.




Schematic of protein synthesis
(© 1999, Addison Wesley Longman Inc.)
TRANSCRIPTION
DNA
mRNA
Ribosome
TRANSLATION
Protein


Polypeptid
beladene tRNA
Trp
Phe
Gly
Ribosom
Anticodon
Codon
mRNA

10/12 Applied Genetics 13.2

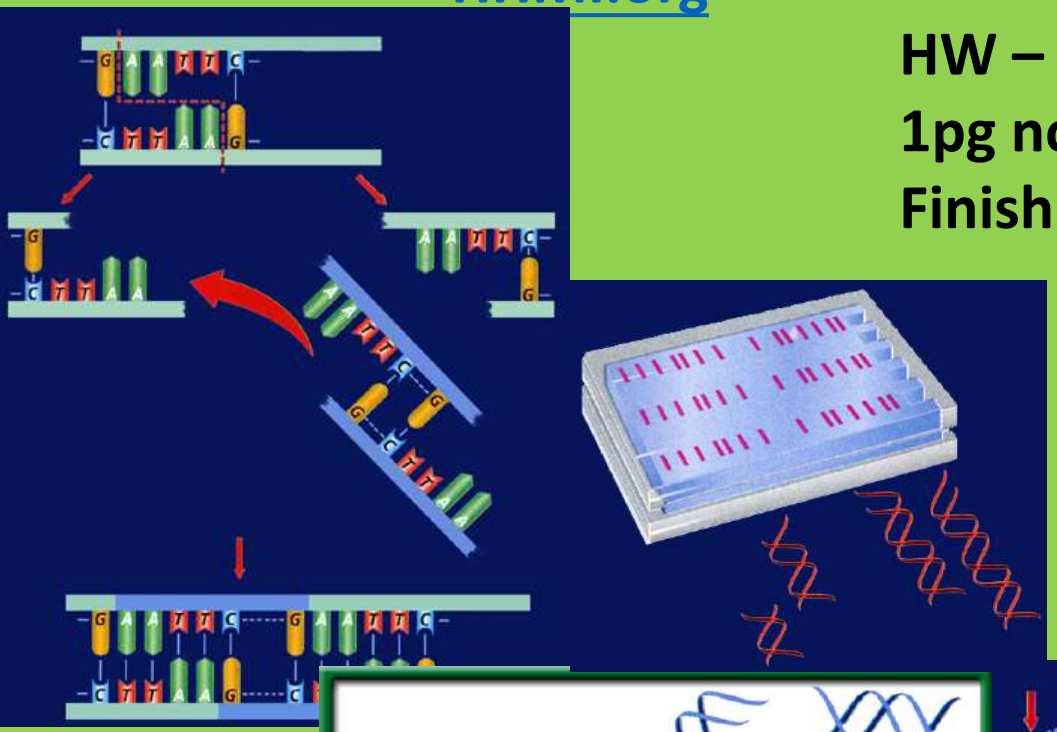
Obj. TSW be able to explain how basic DNA technology is used to construct recombinant DNA molecules in a Minilab 13.1 p.76 NB

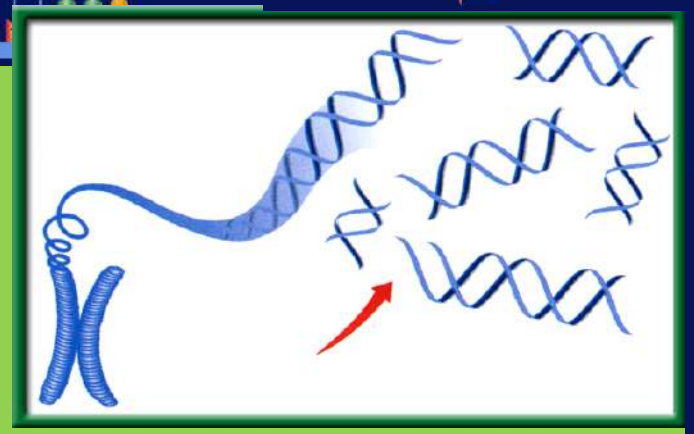
HHMI.org

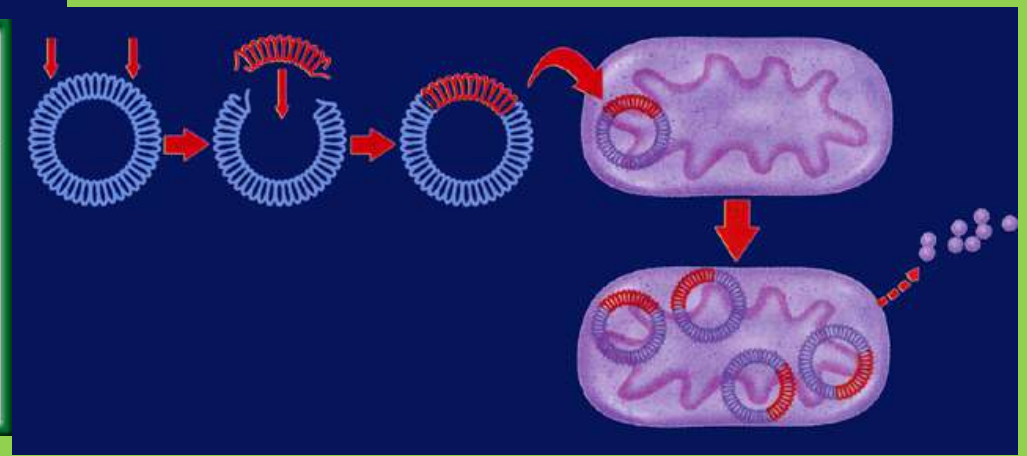
NOVA.pbs.org

HW – Read CH 13
1pg notes P. 81 NB
Finish Study Guide

1. Genetic Engineering uses Recombinant DNA, explain.
2. Explain a transgenic organism.
3. Explain two ways in which recombinant bacteria are used for human applications.







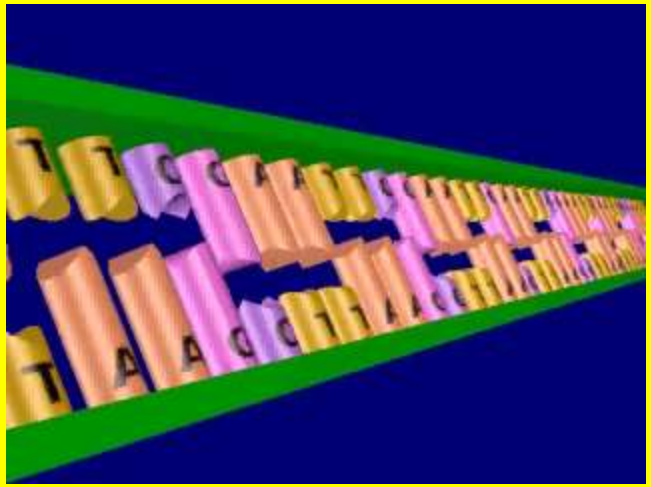
Genetic Engineering

#1. Recombinant DNA is DNA that has one or more genes from another organism in it's genome.

#2. A transgenic organism has Recombinant DNA.

#3. Bacteria is a transgenic organism that can have the gene to make insulin for people who have Diabetes. They also can have the gene for Growth Hormone to help people who have Dwarfism be a more normal range of height.

Restriction enzymes cleave DNA



Click image to view movie

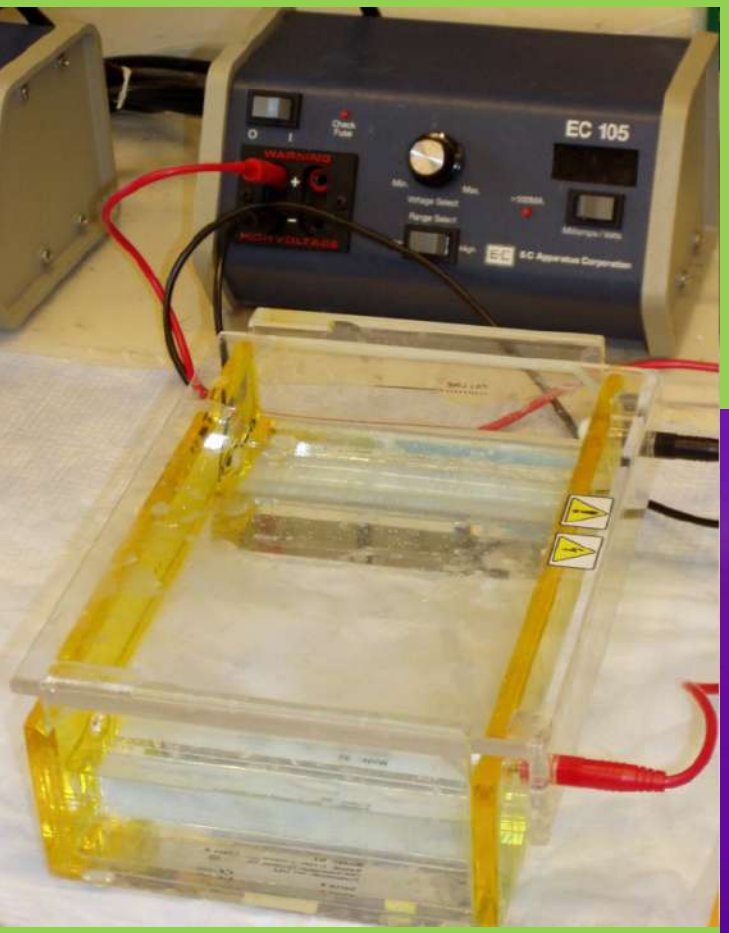
Vectors transfer DNA

- Biological vectors include viruses and plasmids. A plasmid, is a small ring of DNA found in a bacterial cell.

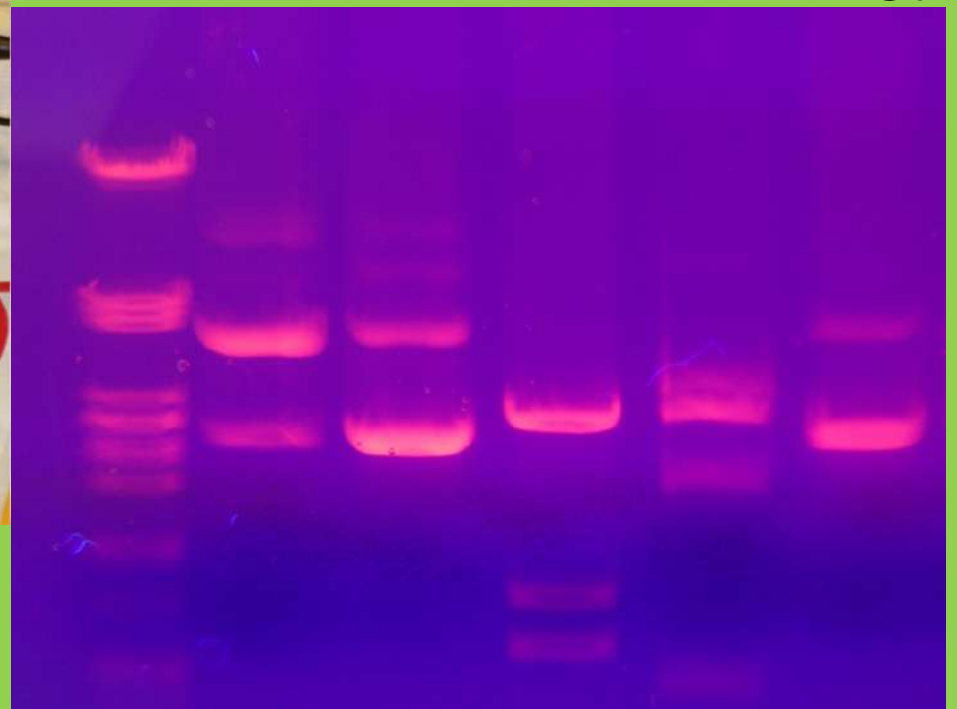
Click image to view movie

10/13 Gel Electrophoresis CH 13.1

Obj. TSW learn how to build a protein from an amino acid sequence using the hydrophobic and hydrophilic properties of the amino acids. P. 78 NB

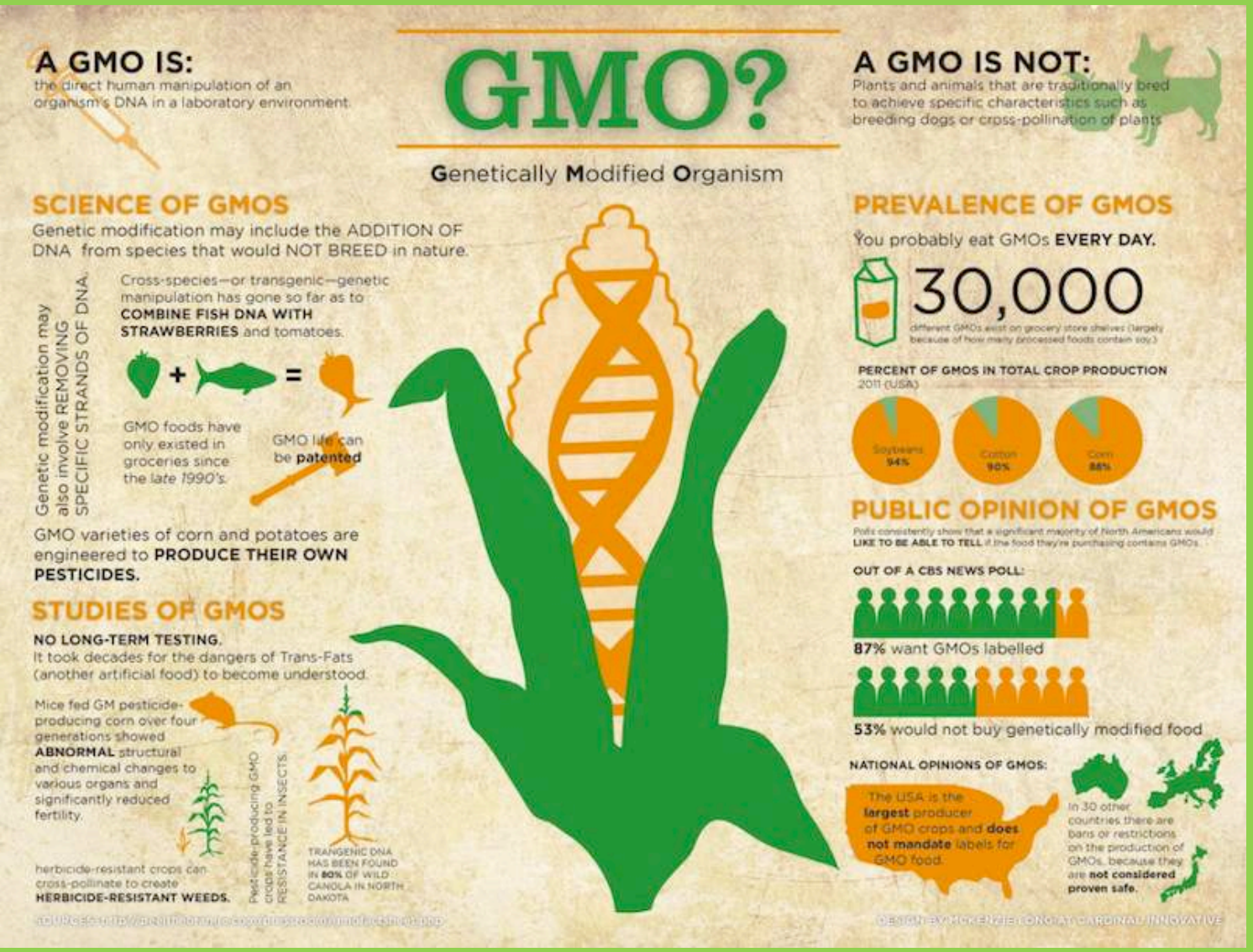


Watch Gel Video
HW CH 13
HW Study Guide
Final 10/15



1. What is Gel Electrophoresis?
2. Why is DNA fingerprinting important?
3. Explain the field of Genetic Engineering and how a Gel Electrophoresis applies.

10/14 Genetically Modified Organisms EEI Curriculum
Obj. TSW demonstrate the pros and cons of Genetically Modified Organisms. p. 80 NB



1. What does GMO stand for?
2. What are some concerns about GMO's.
3. What are some benefits to GMO's.