

What types of bonds are found between the bases in DNA?

Covalent

Hydrogen

If there is a section of DNA with 200 basepairs and there are 110 Adenines

How many T? 110

How many C? 90

How many G? 90

Where does DNA replication take place?

Nucleus

Name 2 differences between DNA and RNA

<u>DNA</u>	<u>RNA</u>
T CGA	U
2 Strands	1 Strand
deoxyribose	Ribose

Objective: The student will be able to transcribe DNA to mRNA and to translate it to a peptide chain

Homework: Leveled Practice

Agenda: Warm Up

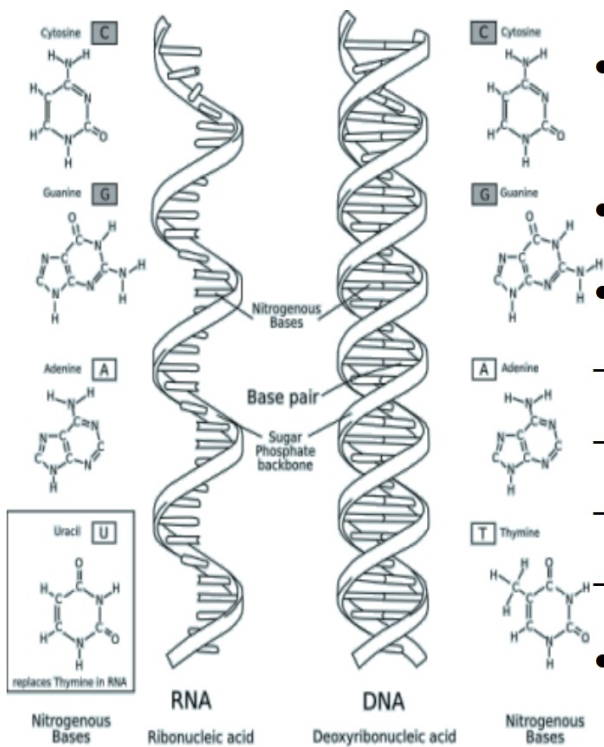
Notes

Animation/Video

Leveled Practice

Homework: Replication, Transcription, Translation Leveled Practice
Quiz Friday on DNA Replication,
Transcription, and Translation

RNA is Composed of 3 Parts



- Ribose - smaller sugar than deoxyribose
- Phosphate
- 4 nitrogenous bases
 - A Adenine
 - G Guanine
 - C Cytosine
 - U Uracil ✱
- RNA is Single stranded and thus smaller than DNA and able to leave the nucleus through pores (hole in membrane)

(fill in notes)



3 Types of RNA

mRNA: Messenger RNA

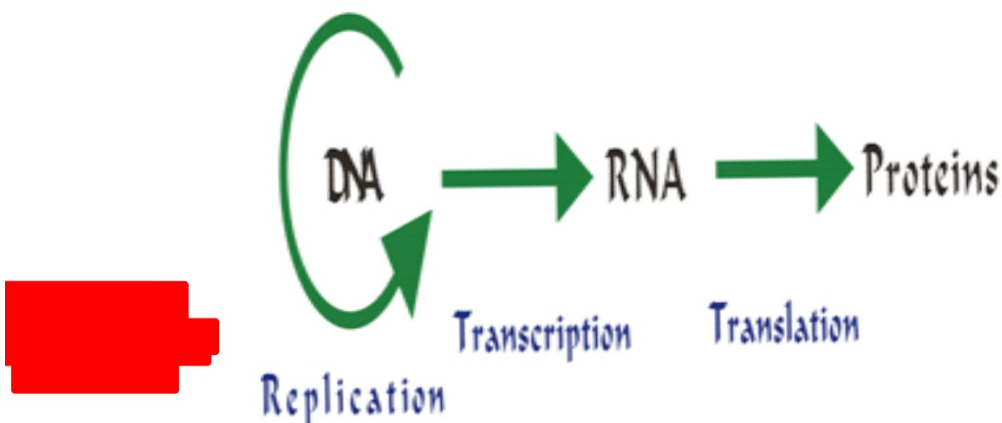
- Carries the gene code from the Nucleus to the Cytoplasm

tRNA: Transfer RNA

- Delivers Amino Acids to the ribosome

rRNA: Ribosomal RNA

- Makes up the Ribosome





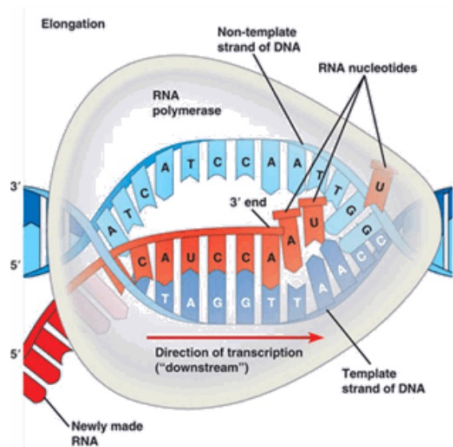
Transcription: DNA \Rightarrow mRNA

Transcription Writing the DNA Message to mRNA

- Takes place in the **Nucleus** of the cell
- Code for a gene get transferred to mRNA

Step 1: DNA uncoils and unzips

Step 2: The exposed DNA bases match up with RNA **Nucleotides** in the nucleus to form **mRNA**



DNA	RNA
A ---	U
T ---	A
G ---	C
C ---	G

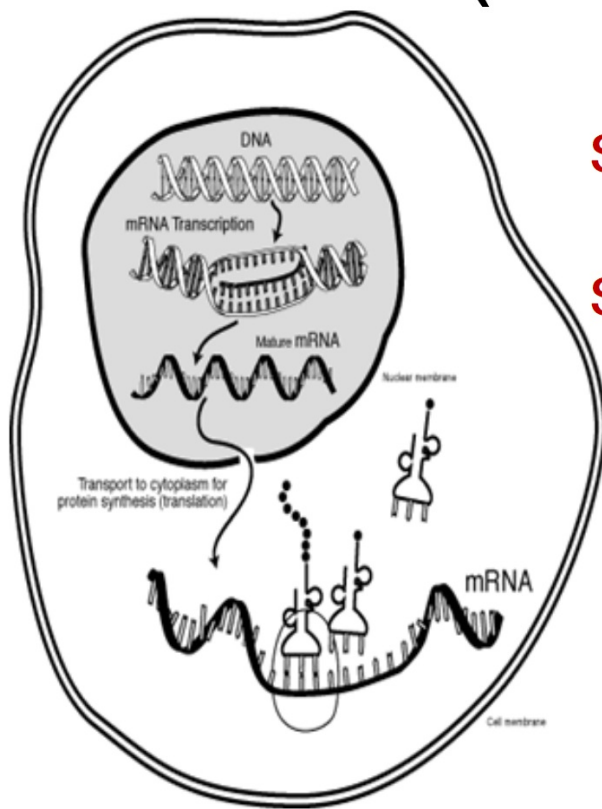


Transcribe the following DNA sequence to mRNA

TACGAGCCATATAAA
AUGCUCGGUAUAUUU

ATCGGAT
UAGCCUA

mRNA (Messenger RNA)



Step 3: The mRNA will detach from the DNA

Step 4: The mRNA will move out of the **nucleus** into the **Cytoplasm** and attach to a **Ribosome**.

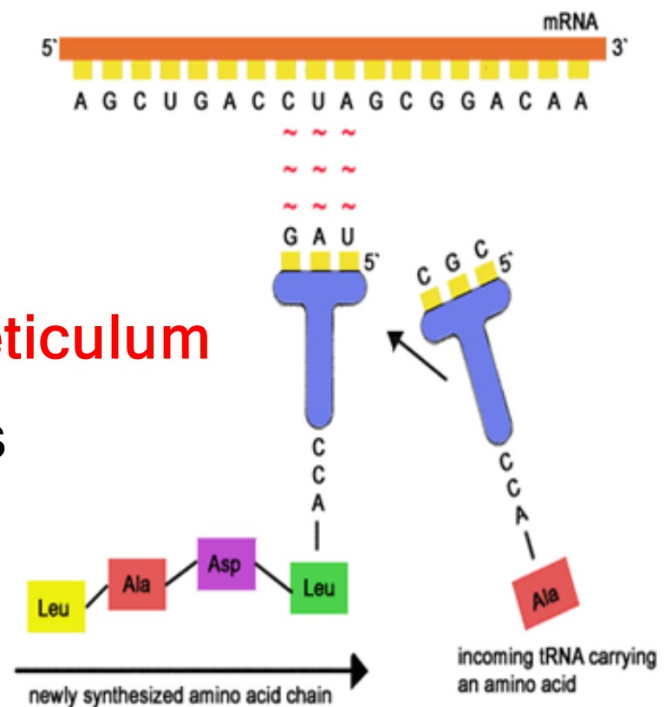


Translation: Reading the mRNA to make protein

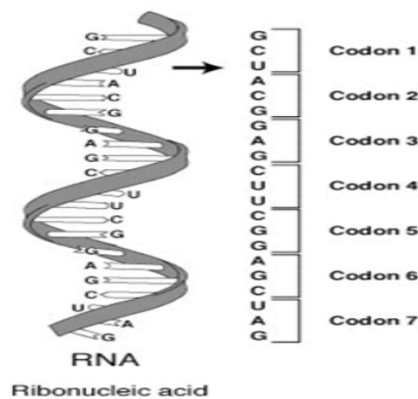
- Occurs on the Ribosome which may be free floating OR attached to the Rough

(ER) Endoplasmic Reticulum

- The mRNA strand is pulled through the ribosome **3** bases at a time, in triplets

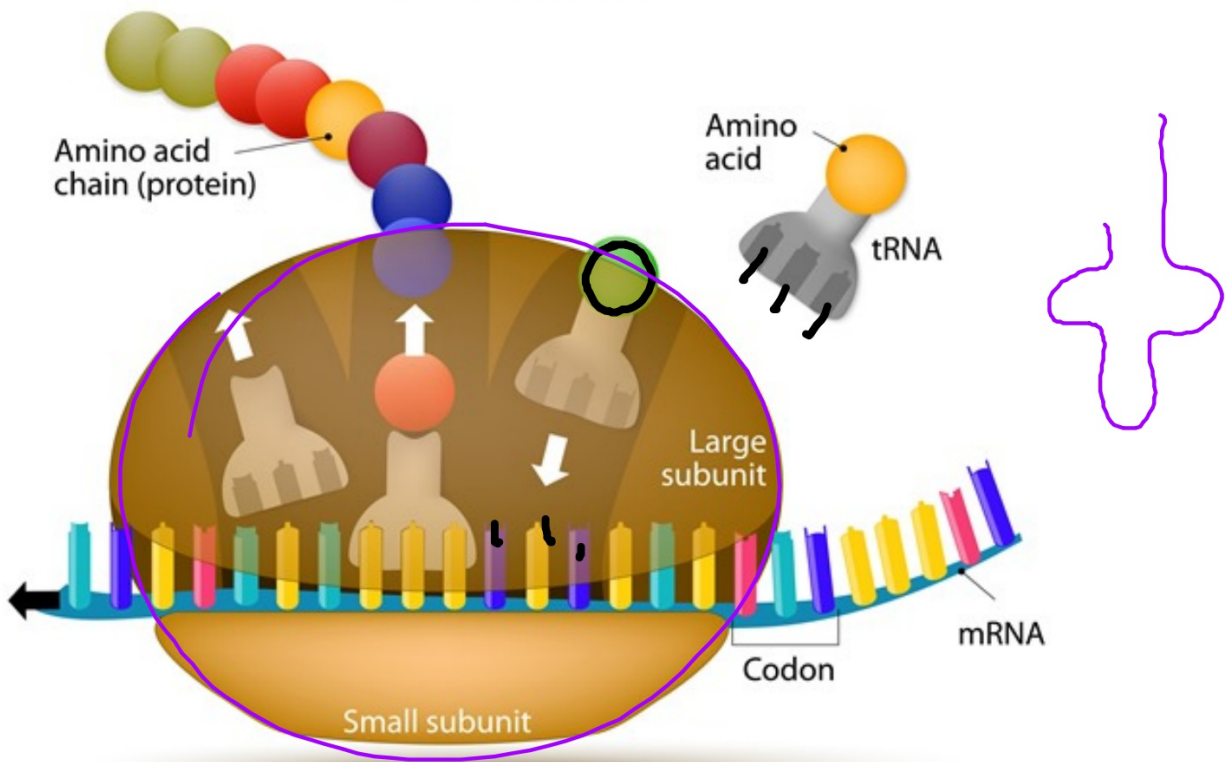


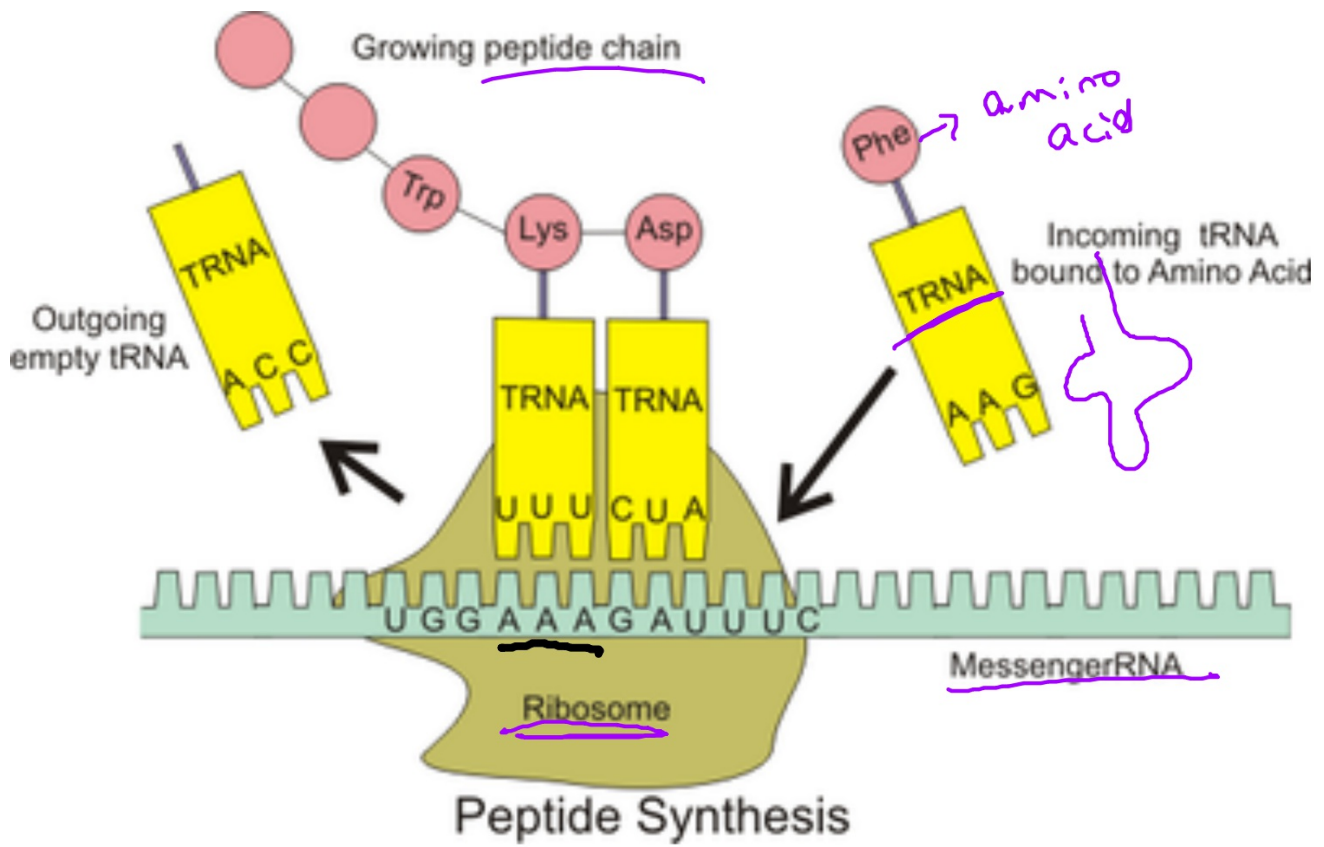
- Each of these triplets on the mRNA strand is called a Codon



- Each codon will code for 1 amino acid
- These amino acids, when put together, form polypeptides, or proteins
- The genetic code is Redundant, meaning that there are 64 codons, but only 20 amino acids
 - Each codon codes for one amino acid, but some amino acids are coded for by more than one codon

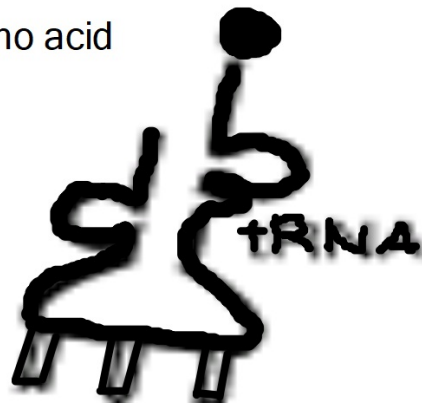
RIBOSOME





tRNA (Transfer RNA)

- Transfer RNA (tRNA) reads mRNA and delivers the appropriate **Amino Acid** .
- At one end of a tRNA molecule is a set of 3 bases that will complement the mRNA strand. This is called the **Anticodon**
- At the other end is a specific amino acid



- If the 3 base anti-codon complements the 3 base codon of the mRNA, they will combine briefly the tRNA will drop off the amino acid
- As each codon is read, the next tRNA brings in a new amino acid, and the protein chain grows

DNA: 5'-TAC AAT GTC ACG AGA TGA GTT-3'

mRNA (codons):

AUG UUA CAG UGC UCU ACU CAA

Peptide Sequence:

Met - Leu - Gln - Cys - Ser - Thr - Gln

TABLE OF CODONS AND AMINO ACIDS

First Base	Second Base								Third Base
	U		C		A		G		
U	UUU	Phenylalanine (Phe)	UCU	Serine (Ser)	UAU	Tyrosine (Tyr)	UGU	Cysteine (Cys)	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine (Leu)	UCA		UAA	Stop	UGA	Stop	A
UUG	UCG		UAG	UGG	Tryptophan (Trp)		G		
C	CUU	Leucine (Leu)	CCU	Proline (Pro)	CAU	Histine (His)	CGU	Arginine (Arg)	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Glutamine (Gln)	CGA		A
	CUG		CCG		CAG		CGG		G
A	AUU	Isoleucine (Iso)	ACU	Threonine (Thr)	AAU	Asparagine (Asn)	AGU	Serine (Ser)	U
	AUC		ACC		AAC		AGC		C
	AUA	ACA	AAA		Lysine (Lys)	AGA	Arginine (Arg)	A	
AUG	Methionine (Met)	ACG	AAG	AGG		G			
G	GUU	Valine (Val)	GCU	Alanine (Ala)	GAU	Aspartic Acid (Asp)	GGU	Glycine (Gly)	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		Glutamic Acid (Glu)	GGG	A		
	GUG		GCG			GAG	GGG		G

Use Codon Chart to find Peptide Sequence



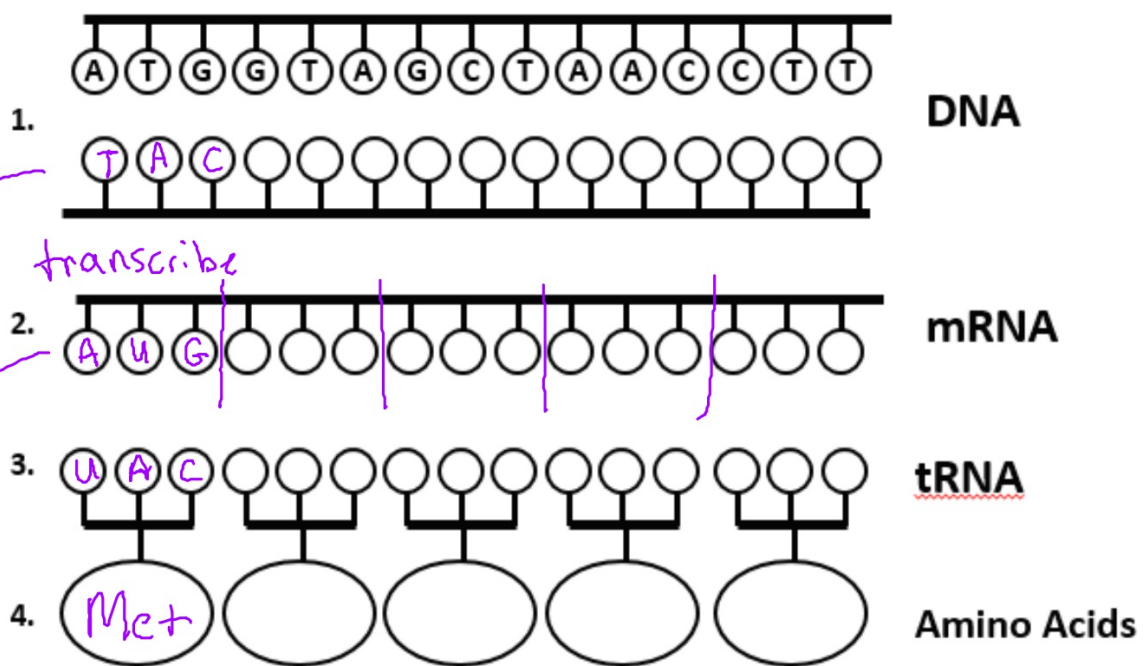
AUG

TABLE OF CODONS AND AMINO ACIDS

First Base	Second Base								Third Base
	U		C		A		G		
U	UUU	Phenylalanine (Phe)	UCU	Serine (Ser)	UAU	Tyrosine (Tyr)	UGU	Cysteine (Cys)	U
	UUC		UCC		UAC		UGC		C
	UUA	Leucine (Leu)	UCA		UAA	Stop	UGA	Stop	A
	UUG		UCG		UAG		UGG	Tryptophan (Trp)	G
C	CUU	Leucine (Leu)	CCU	Proline (Pro)	CAU	Histine (His)	CGU	Arginine (Arg)	U
	CUC		CCC		CAC		CGC		C
	CUA		CCA		CAA	Glutamine (Gln)	CGA		A
	CUG		CCG		CAG		CGG		
A	AUU	Isoleucine (Iso)	ACU	Threonine (Thr)	AAU	Asparagine (Asn)	AGU	Serine (Ser)	U
	AUC		ACC		AAC		AGC		C
	AUA	Methionine (Met)	ACA		AAA	Lysine (Lys)	AGA	Arginine (Arg)	A
	<u>AUG</u>		ACG		AAG		AGG		G
G	GUU	Valine (Val)	GCU	Alanine (Ala)	GAU	Aspartic Acid (Asp)	GGU	Glycine (Gly)	U
	GUC		GCC		GAC		GGC		C
	GUA		GCA		GAA	Glutamic Acid (Glu)	GGA		A
	GUG		GCG		GAG		GGG		

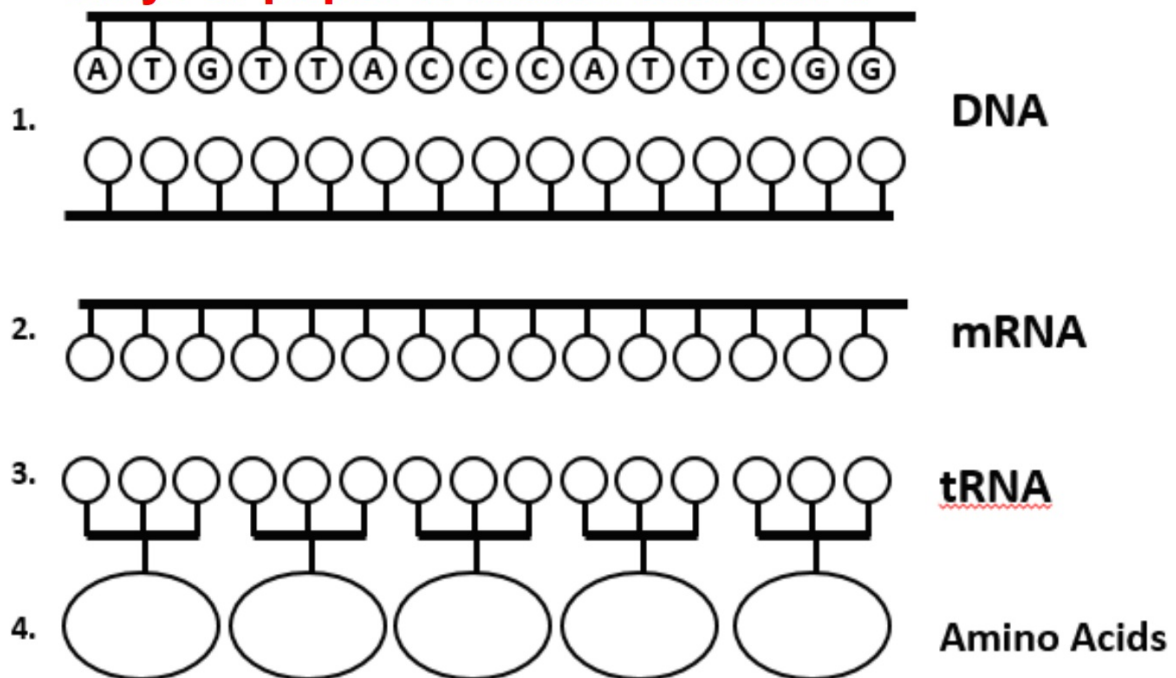
**Watch the following Animation of
protein synthesis**





Use the Bottom DNA strand to transcribe to mRNA
Use the mRNA strand to read the codon chart

**Oops...change the letters of DNA
on your paper to match the board**



**Use the Bottom DNA strand to transcribe to mRNA
Use the mRNA strand to read the codon chart**

Study Guide for Quiz...Homework (Start Now)

Replication, Transcription, Translation Levelled Practice

Name: _____ Period: _____

Replication:

Level 1: Identify the complementary bases for DNA:

A: _____ T: _____ C: _____ G: _____

Where does replication take place? _____

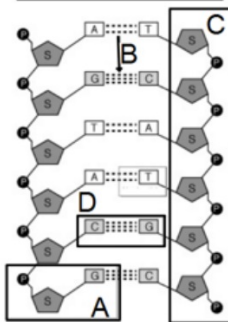


Level 2: Replicate the DNA by writing the COMPLEMENTARY strand:

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

Level 3: Identify the following parts of the DNA molecule:

Hydrogen Bonds, Nucleotide, Sugar-Phosphate Backbone, and Base Pairs



A= _____

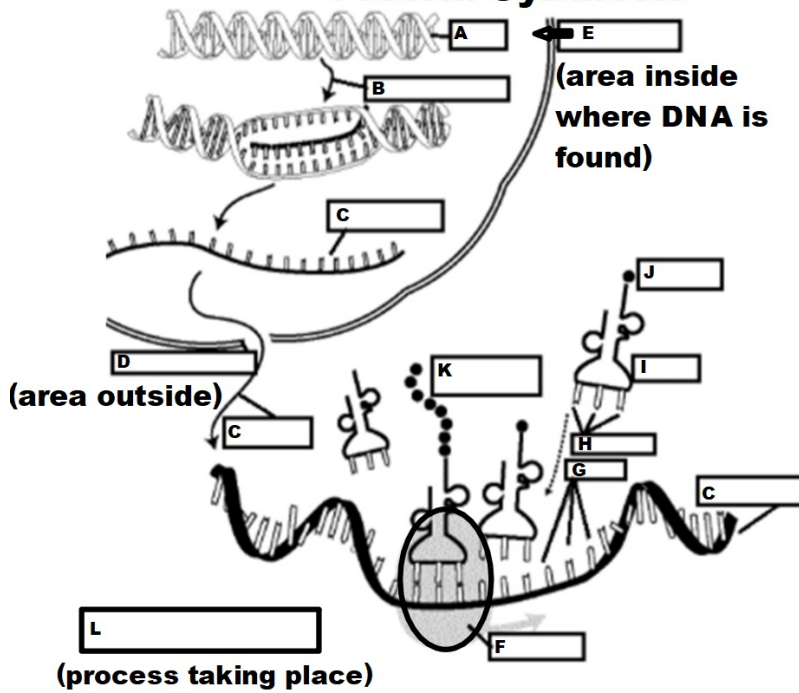
B= _____

C= _____

D= _____

Level 4: Explain how the structure of DNA allows it to replicate itself perfectly each time.

Protein Synthesis



Word Bank:

Nucleus

Cytoplasm

DNA

mRNA (3 times)

peptide chain (protein)

codon

anticodon

ribosome

amino acid

tRNA

Transcription

Translation