

**Transcription/Translation  
Genetic Code is Universal  
Practice Quiz**



**What is the central dogma  
of life?**



DNA → RNA → Protein

**Answer:**



**What is protein Synthesis?**



- The production of protein (polypeptides)
- There are two phases:
  - Transcription
  - Translation

**Answer:**



**Describe the difference between transcription and translation.**



- Transcription
  - DNA --> RNA (Same Language: Nucleotides)
- Translation
  - RNA --> Protein (Different Languages: Nucleotide to Amino Acid)

**Answer:**



**What are the differences  
between DNA and RNA?**





- DNA/RNA
- Deoxyribose/Ribose
- T/U
- Double/Single Stranded

**Answer:**



**Describe the Differences  
between the types of RNA.**



- mRNA – messenger, takes genetic code to the ribosome.
- tRNA – transfer, takes amino acids to the ribosome.
- rRNA – ribosomal, makes up the structure of the ribosome.

**Answer:**



**How many amino acids  
are there?**

**How are amino acids  
connected together?**



- 20
- Peptide bonds, that is why sometimes proteins are called polypeptides.

**Answer:**



**What is a gene?**



- A segment of DNA that codes for a protein.

**Answer:**



**Where does transcription  
take place?**



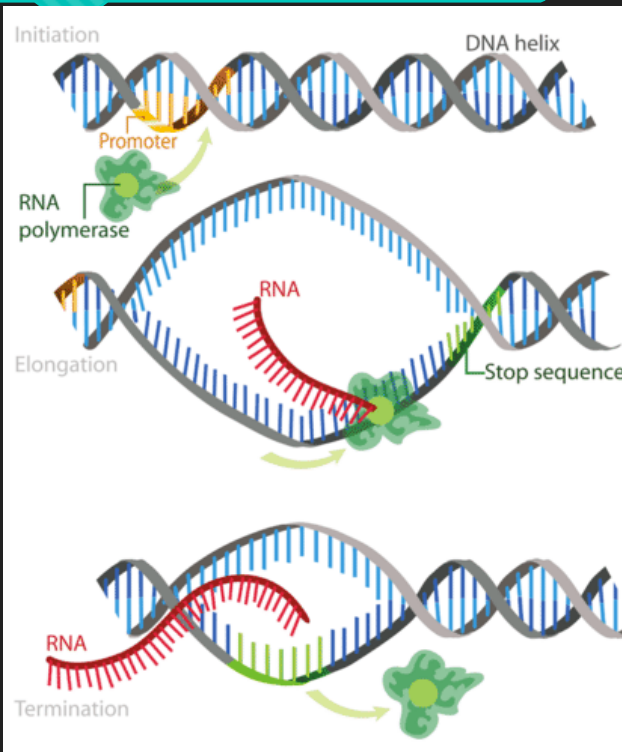


The nucleus

**Answer:**



**Describe transcription**



Answer:

- Helicase unwinds the DNA
- RNA Polymerase grabs onto the DNA strand and starts creating the RNA strand (on the 3' strand)
  - Using u's instead of t's
- Same structure of DNA replication, replication forks, Replication bubble,
- RNA is created, the RNA leaves the nucleus when completed and heads out to the ribosome.
- The DNA winds back up into a double helix.
- There is a template strand and a complement strand on the DNA. The RNA is created based on the template strand.



Template Strand	AATTACATGACTAGGC
COMPLEMENT STRAND	
mRNA	

Practice converting these strands.



Template Strand	AATTACATGACTAGGC
COMPLEMENT STRAND	TTAATGTACTGATCCG
mRNA	UUAAUGUACUGAUCCG

**Answer:**



Template Strand	TACCGATCCGAATAGCC
COMPLEMENT STRAND	
mRNA	



Template Strand	TACCGATCCGAATAGCC
COMPLEMENT STRAND	ATGGCTAGGCTTATCGG
mRNA	AUGGCUAGGCUUAUCGG

**Answer:**



**mRNA is divided into triplet  
code, what does that  
mean?**





- Triplet code means that you look sections of 3 bases at a time.
- Those three letter units are called codons
- Each codon codes for a specific amino acid
  
- There are 20 amino acids and 64 codons, so multiple codons code for 1 amino acid.

**Answer:**

Be able to use the following codon chart:

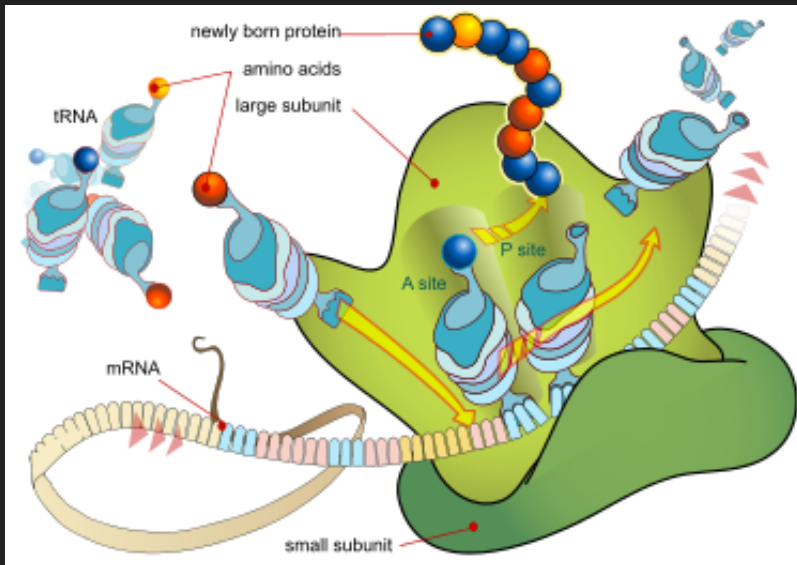
First Letter	Second Letter				Third Letter
	U	C	A	G	
U	phenylalanine	serine	tyrosine	cysteine	U
	phenylalanine	serine	tyrosine	cysteine	C
	leucine	serine	stop	stop	A
	leucine	serine	stop	tryptophan	G
C	leucine	proline	histidine	arginine	U
	leucine	proline	histidine	arginine	C
	leucine	proline	glutamine	arginine	A
	leucine	proline	glutamine	arginine	G
A	isoleucine	threonine	asparagine	serine	U
	isoleucine	threonine	asparagine	serine	C
	isoleucine	threonine	lysine	arginine	A
	methionine	threonine	lysine	arginine	G
G	valine	alanine	aspartate	glycine	U
	valine	alanine	aspartate	glycine	C
	valine	alanine	glutamate	glycine	A
	valine	alanine	glutamate	glycine	G

Answer: Codon UCA

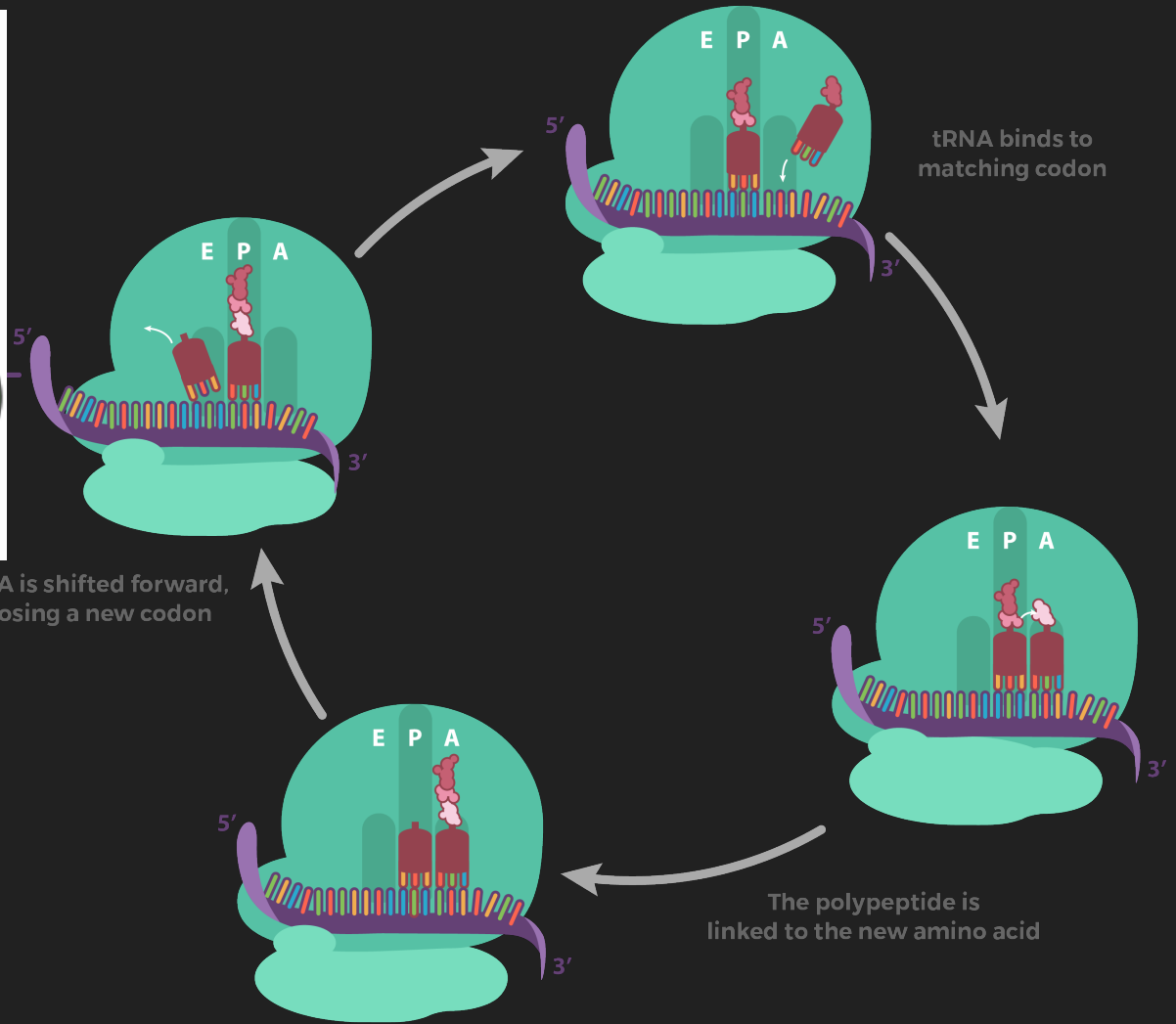
First Letter	Second Letter				Third Letter
	U	C	A	G	
U	phenylalanine	serine	tyrosine	cysteine	U
	phenylalanine	serine	tyrosine	cysteine	C
	leucine	serine	stop	stop	A
	leucine	serine	stop	tryptophan	G
C	leucine	proline	histidine	arginine	U
	leucine	proline	histidine	arginine	C
	leucine	proline	glutamine	arginine	A
	leucine	proline	glutamine	arginine	G
A	isoleucine	threonine	asparagine	serine	U
	isoleucine	threonine	asparagine	serine	C
	isoleucine	threonine	lysine	arginine	A
	methionine	threonine	lysine	arginine	G
G	valine	alanine	aspartate	glycine	U
	valine	alanine	aspartate	glycine	C
	valine	alanine	glutamate	glycine	A
	valine	alanine	glutamate	glycine	G



**Understand the process of translation.**



**Answer: Notice the codons (mRNA) matching up with anticodons (tRNA). The amino acids bind together with peptide bonds.**



<b>Template Strand</b>	<b>Tac-ctc-cag-cct-agg-tcc-att</b>
Complement Strand	
mRNA (Codons)	
tRNA (anticodons)	
Amino Acids	

Complete the following chart:

<b>Template Strand</b>	<b>Tac-ctc-cag-cct-agg-tcc-att</b>
Complement Strand	Atg-gag-gtc-gga-tcc-agg-taa
mRNA (Codons)	Aug-gag-guc-gga-ucc-agg-uaa
tRNA (anticodons)	Uac-cuc-cag-ccu-agg-ucc-auu
Amino Acids	Met (Start)-Glu-Val-Gly- Ser-Arg- Stop

- A couple things to remember:
  - mRNA is made off of the template strand but is the same as the complement strand except you replace the t's with u's.
  - Anticodons go u-a and a-u
  - Use the codon chart 4 slides back to get the amino acids.
- Practice a couple more times using your own strands. (THIS IS COMMONLY MISSED ON THE TEST BECAUSE STUDENTS DON'T PRACTICE)

**Answer:**



**What does it mean that the genetic code is universal?**





- All organisms have the same structure in their DNA/RNA/Protein.
- They always are made the same way, with the same processes, etc...
- Every organism starts with a start codon and end with stop codons.
- Everything works the same way!

**Answer:**