

# Protein Synthesis

Name Key  
Period \_\_\_\_\_ Date \_\_\_\_\_

## Worksheet

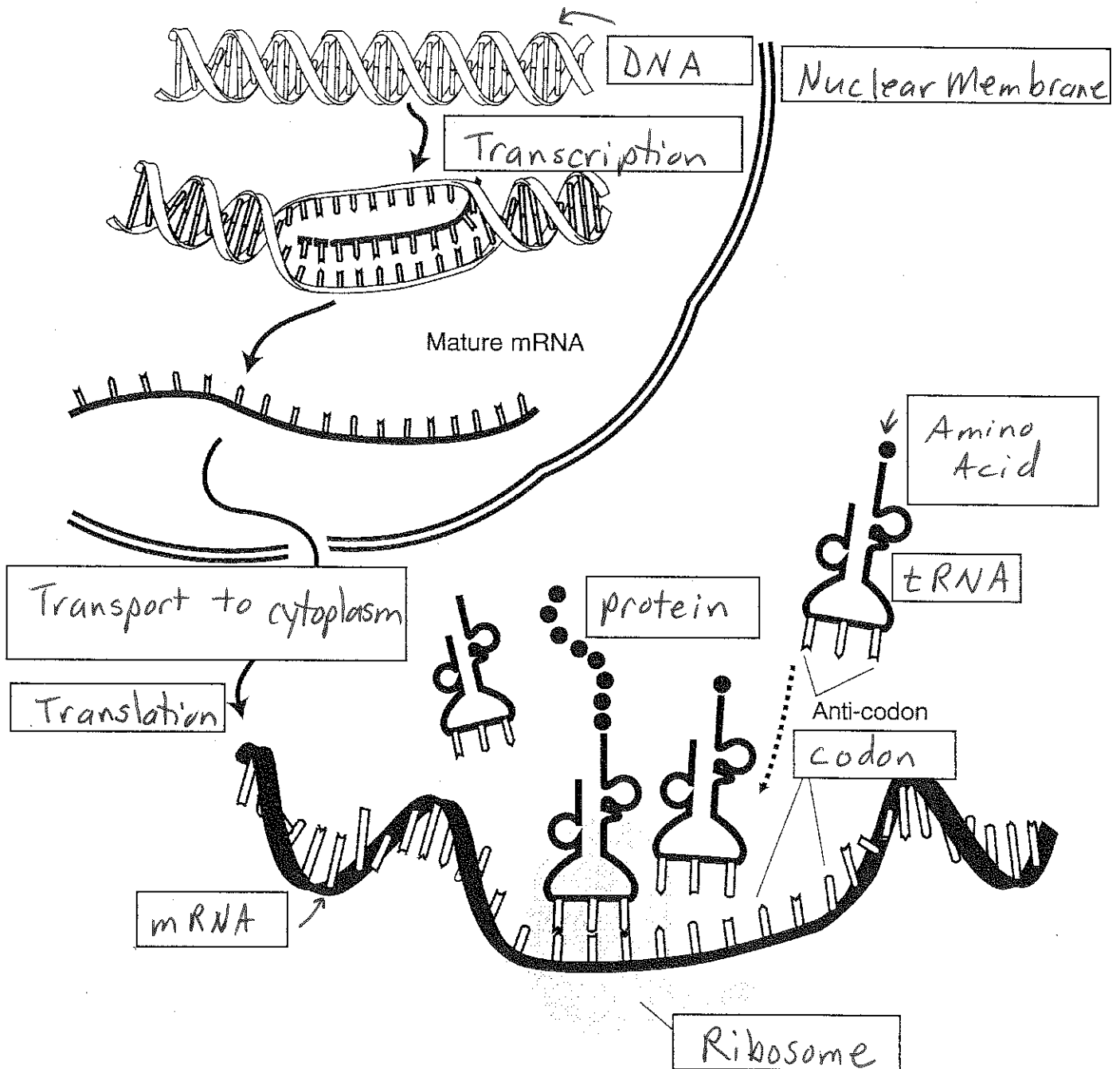
Place the correct term into the illustration's boxes

### Terms to Use

- Amino Acid
- Codon
- DNA
- mRNA

- Nuclear membrane
- Protein
- Ribosome
- tRNA

- Transport to cytoplasm
- Transcription
- Translation



# Protein Synthesis

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## Worksheet

### Ribonucleic acid • RNA

- RNA is one of the three major biological macromolecules that are essential for all known forms of life.
- It works with DNA to create proteins by reading the DNA's code, copying the code, taking the code out of the nucleus into the cytoplasm, joining amino acids together forming proteins at a ribosomal site.
- There are two forms:
  - mRNA, messenger, takes code from DNA in nucleus to cytoplasm
  - tRNA, transfer, translates code from mRNA to amino acid at ribosome
- It's backbone sugar is ribose
- It contains the following nitrogenous bases
  - C - Cytosine
  - G - Guanine
  - A - Adenine
  - U - Uracil (in place of DNA's thymine)

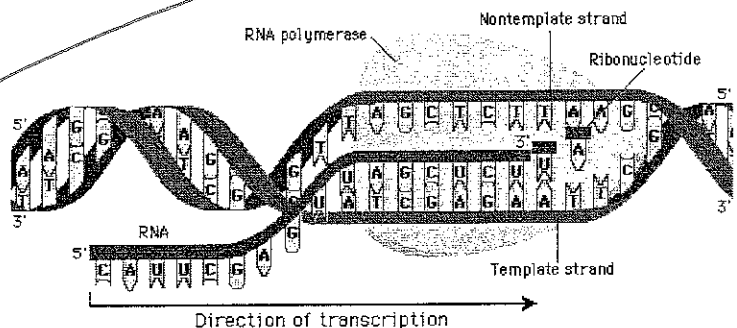
Protein Synthesis occurs in two parts.

### Nitrogenous Base Paring

DNA	RNA
G	C
C	G
T	A
A	U

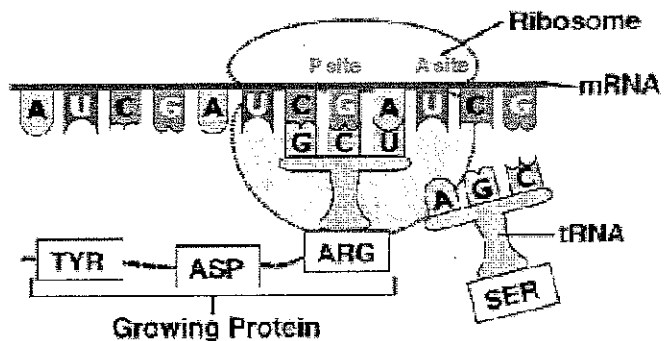
### Part I — Transcription

1. mRNA (messenger RNA) travels from the cell's cytoplasm into the nucleus
2. In the nucleus DNA unzips
3. mRNA bases float into unzipped DNA following the order of the nitrogenous bases
4. Nitrogenous Base Paring in chart to right
5. mRNA carries DNA's code, in it's strand, out into cell's cytoplasm
6. In the cytoplasm mRNA joins with tRNA for next step, translation



### Part II — Translation

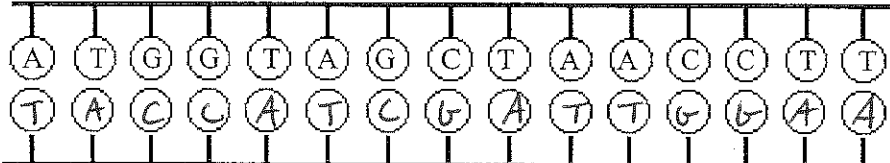
1. mRNA travels to and joins to a ribosomal unit at the 5' untranslated region.
2. A tRNA (looks like a clover leaf) carrying a "start" anti codon and the amino acid attaches to the codon on the mRNA.
3. The ribosome moves in the 3' direction down the messenger RNA by three bases or one codon shifting the tRNA and protein (polypeptide chain).
4. tRNA ejected from the ribosome.
5. Process continues until a "stop" codon is reached which finishes the process releasing the protein.



## Protein Synthesis Worksheet

Directions:

- 1<sup>st</sup> Fill in the complimentary DNA strand using DNA base pairing rules.
- 2<sup>nd</sup> Fill in the correct mRNA bases by transcribing the bottom DNA code.
- 3<sup>rd</sup> Translate the mRNA codons and find the correct amino acid using the Codon Table
- 4<sup>th</sup> Write in the amino acid and the correct anti-codon the tRNA molecule.
- 5<sup>th</sup> The answer to the questions about protein synthesis below the amino acids.

1.  DNA

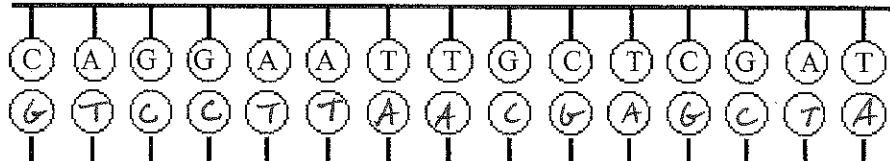
2.  mRNA

3.  tRNA

4.  Amino Acids

5. mRNA is synthesized in translation or transcription?

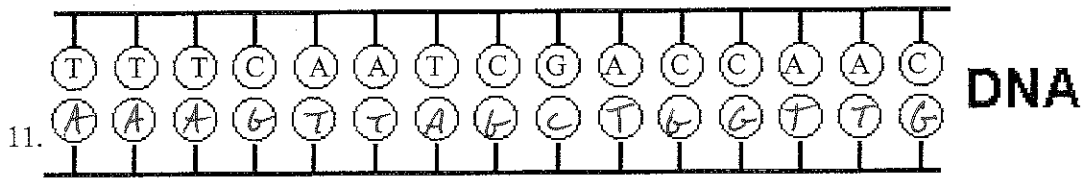
6. mRNA has codon or anti-codons?

7.  DNA

8.  mRNA

9.  tRNA

10.  Amino Acids



15. 1 or 3 codons equal one amino acid? *1 codon = 3 bases*

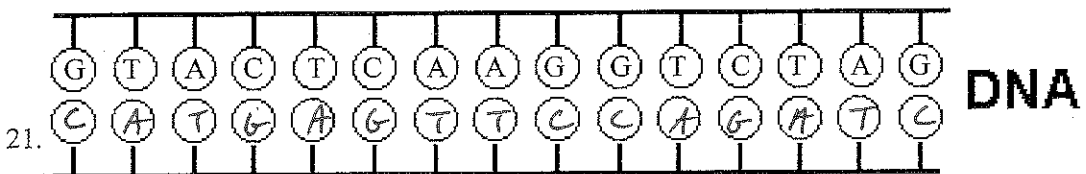
16. tRNA brings amino acids to the nucleus or ribosome?

17. A polypeptide is a sequence of proteins or amino acids?

18. tRNA has codons or anti-codons?

19. tRNA transfers amino acids during translation or transcription?

20. Ribosomes are the site where translation or transcription takes place?



# CODON TABLE

<b>1 s t  B a s e</b>	<b>U</b>	Phenylalanine	Serine	Tyrosine	Cysteine	<b>U C A G</b>
		Phenylalanine	Serine	Tyrosine	Cysteine	
		Leucine	Serine	Stop	Stop	
		Leucine	Serine	Stop	Tryptophan	
	<b>C</b>	Leucine	Proline	Histidine	Arginine	<b>U C A G</b>
		Leucine	Proline	Histidine	Arginine	
		Leucine	Proline	Glutamine	Arginine	
		Leucine	Proline	Glutamine	Arginine	
	<b>A</b>	Isoleucine	Threonine	Asparagine	Serine	<b>U C A G</b>
		Isoleucine	Threonine	Asparagine	Serine	
		Isoleucine	Threonine	Lysine	Arginine	
		Methionine	Threonine	Lysine	Arginine	
	<b>G</b>	Valine	Alanine	Aspartic acid	Glycine	<b>U C A G</b>
		Valine	Alanine	Aspartic acid	Glycine	
		Valine	Alanine	Glutamic acid	Glycine	
		Valine	Alanine	Glutamic acid	Glycine	
		<b>U</b>	<b>C</b>	<b>A</b>	<b>G</b>	
<b>2nd Base</b>						

