

## DNA Workshop Online Activity

Go to the following website: <http://www.pbs.org/wgbh/aso/tryit/dna/#>

Click on **Go Directly to DNA Workshop Activity**

### Part I: Click on DNA Replication

- Click on **Unzip**. What happened? Read the textbox that appears at the left.
- Click **OK**
- Drag the matching bases until they are all paired up. When you are done, read the textbox that appears on the right. All \_\_\_\_\_ human chromosomes contain 3 \_\_\_\_\_ base pairs.

1. Where in the cell does DNA replication take place? \_\_\_\_\_
2. What has to happen to the DNA before it can start replicating?
3. What are the four bases? How do they pair up?

A pairs up with \_\_\_\_\_      C pairs up with \_\_\_\_\_  
G pairs up with \_\_\_\_\_      T pairs up with \_\_\_\_\_

4. Describe what you end up with after you finish the activity.

### Part II: Transcription

- Click on Protein Synthesis
- Click on **Unzip**. Read the textbox that appears on the left.
- Click on **OK**
- Drag the matching bases until they are all paired up. When done, read the textbox on the left.

5. Where does transcription take place? \_\_\_\_\_
6. What kind of molecule is formed? \_\_\_\_\_
7. What are the three bases in mRNA that are the SAME as in DNA?
8. Which base is found in mRNA that is NOT found in DNA? \_\_\_\_\_  
Which DNA base does it take the place of? \_\_\_\_\_
9. How many strands does each type of molecule have? DNA \_\_\_\_\_ RNA \_\_\_\_\_

**Part III: Translation**

- **Part III will load automatically when you finish Part 2**
- **Match** the first tRNA anticodons to mRNA codons. Read the textbox.
- Click **OK**. Match the remaining two mRNA codons to their corresponding tRNA anticodons. Read each textbox as it pops up. Answer question 10 below. Continue through question 15.

10. What happened. Summarize the textbox's information.

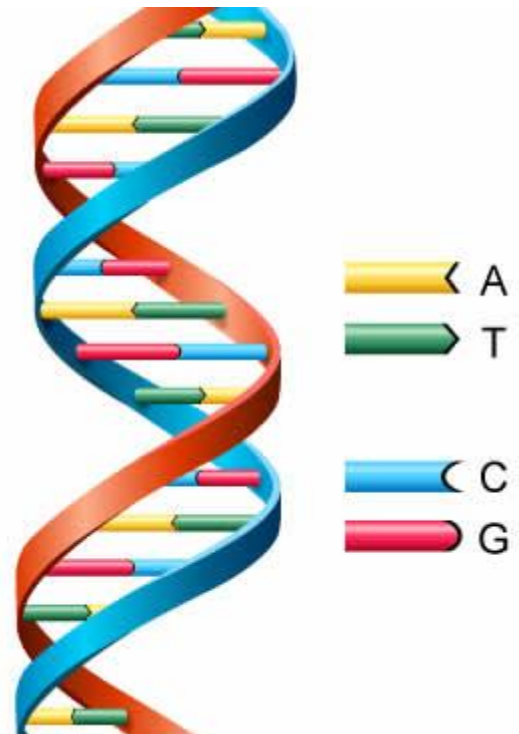
11. What organelle makes proteins? \_\_\_\_\_

12. Where is the above organelle found? (Nucleus or cytoplasm) \_\_\_\_\_

13. Three mRNA bases come together to form codons. What are the matching sets of tRNA called?  
\_\_\_\_\_

14. Besides anticodons, what else is attached to the tRNA? (Hint: The pieces that make up proteins.)

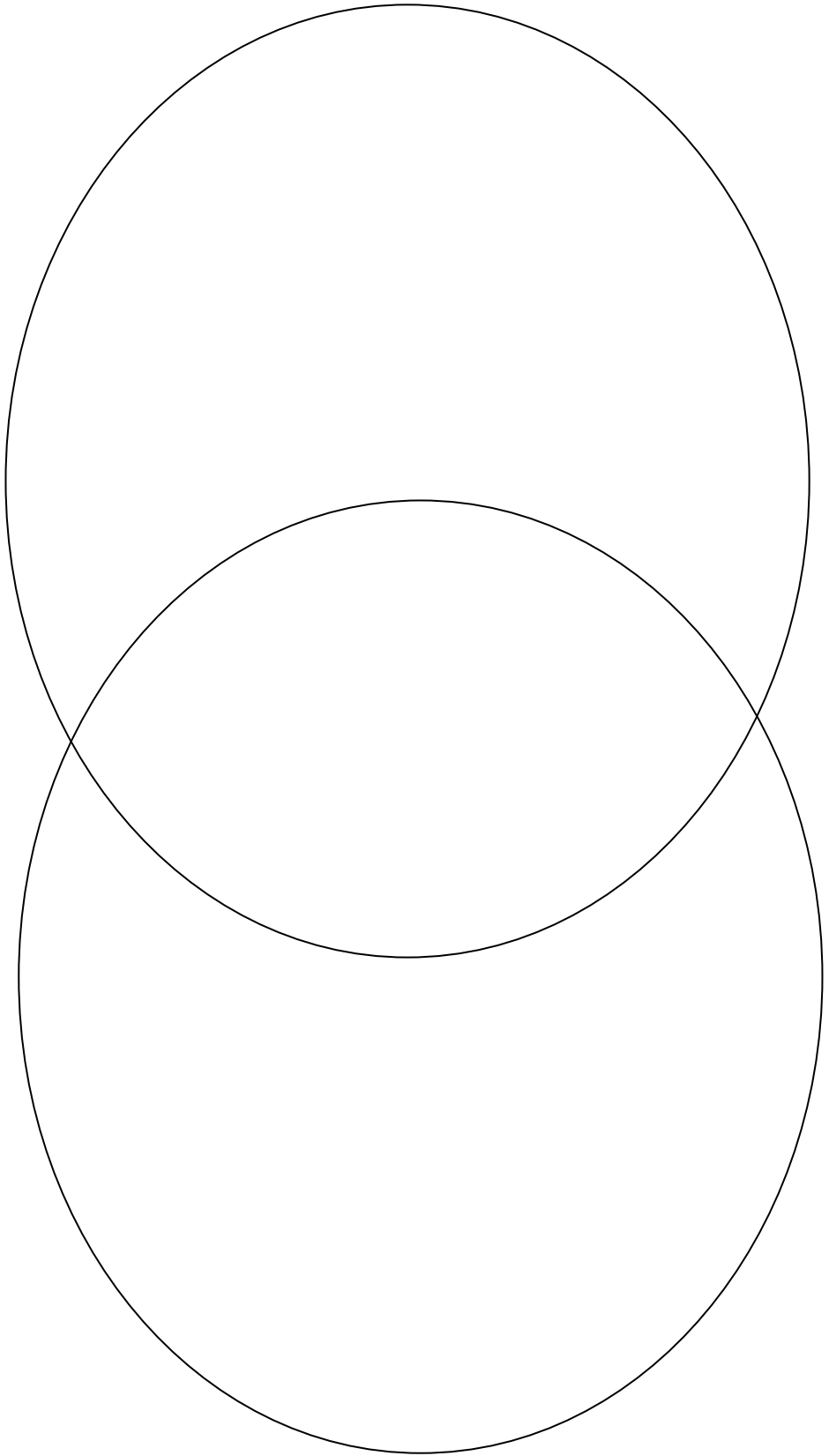
15. List the amino acids in the protein that you just formed:



**Venn Diagram to Compare DNA to RNA**

RNA

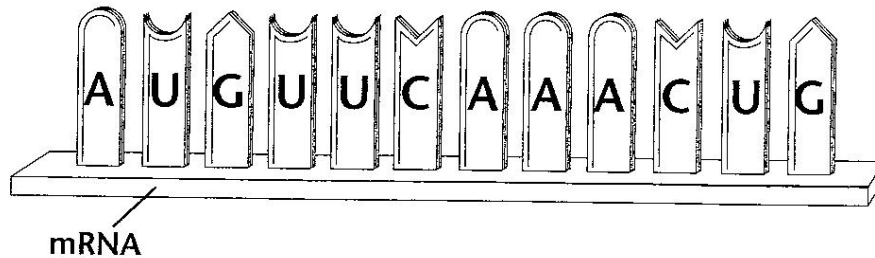
DNA



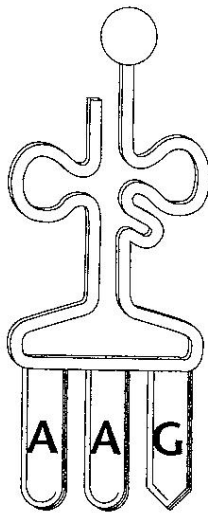
### Translation

During translation, transfer RNA (tRNA) anticodons match to messenger RNA (mRNA) codons. Each tRNA molecule can carry one particular amino acid. The amino acids are joined to form a polypeptide.

*Number the four tRNA anticodons in the order in which they should appear to match the codons in the mRNA strand.*

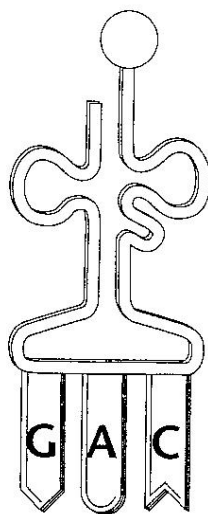


phenylalanine



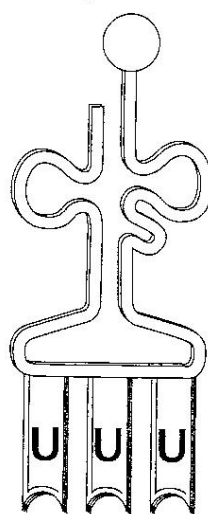
\_\_\_\_\_

leucine



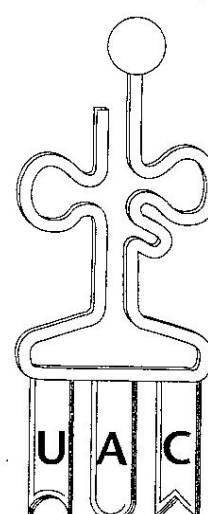
\_\_\_\_\_

lysine



\_\_\_\_\_

methionine



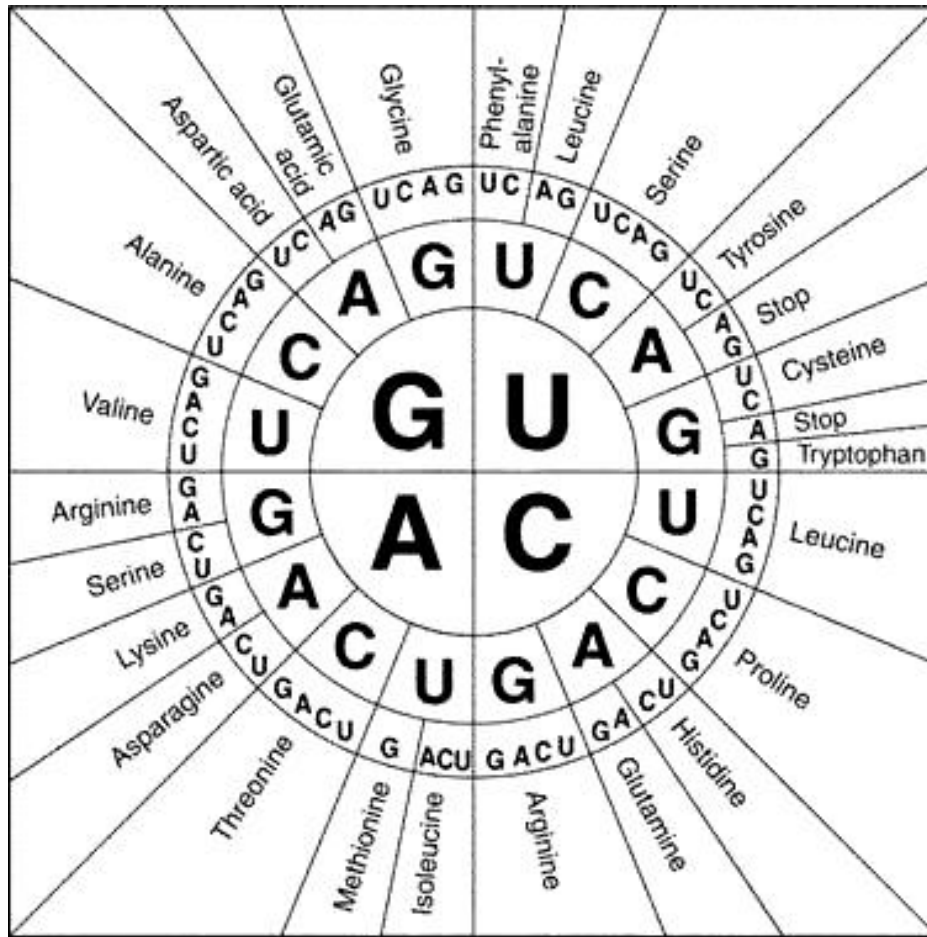
\_\_\_\_\_

*Use the diagrams to answer the question.*

1. List the amino acids in the order they would appear in the polypeptide coded for by the mRNA.

\_\_\_\_\_  
\_\_\_\_\_

### mRNA Codon Wheel



1. The first codon in an mRNA is always AUG. What amino acid does it code for? \_\_\_\_\_.
2. Stop codons end the translation of each protein. List the three stop codons:  
\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_
3. How many different codons are possible with 4 bases and codons composed of three bases each? (Hint: Count the codons).
4. What's the point in having several codons for the same amino acid?

### PROTEIN SYNTHESIS WORKSHEET

- Given the following strand of a **DNA molecule**, construct the complimentary strand.
  - STRAND 1 G C A A C G G T T
  - STRAND 2 \_ \_ \_ \_ \_
- Using **STRAND 1** above, create the mRNA molecule that would result from transcription.
  - DNA STRAND 1 G C A A C G G T T
  - mRNA: \_ \_ \_ \_ \_
- Use your mRNA codon chart to determine the order of amino acids that result in the protein coded for by the DNA molecule. **USE YOUR mRNA STRAND ONLY!**
  - Amino Acid Sequence: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_
- Now list the corresponding tRNA molecules that transfer the amino acids:
  - tRNA: \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_

#### PROBLEM 1:

- DNA STRAND 1 = T C T G T T G T T
- DNA STRAND 2 =
- mRNA =
- Amino Acid Sequence
- tRNA =

#### PROBLEM 2:

- DNA STRAND 1 = G C A A C A A A T
- DNA STRAND 2 =
- mRNA =
- Amino Acid Sequence
- tRNA =

**PROBLEM 3:**

- DNA STRAND 1 = T C T T T A C A T
- DNA STRAND 2 =
- mRNA =
- Amino Acid Sequence
- tRNA =

**PROBLEM 4:**

- DNA STRAND 1 = C A T A A T T C T
- DNA STRAND 2 =
- mRNA =
- Amino Acid Sequence
- tRNA =

**PROBLEM 5:**

- DNA STRAND 1 = G C A A A T C G A
- DNA STRAND 2 =
- mRNA =
- Amino Acid Sequence
- tRNA =

## SECRET MESSAGE DECODER



Write a message, in double-stranded, DNA code, in the space below. The upper half of the DNA molecule should contain your "secret" message. Transcribe it into mRNA using the decoder table below. Fill in the tRNA codes too. Then, write your coded DNA message on a strip of paper and give it to a friend. See if they can decode it correctly.

**Message in DNA code:**

**mRNA**

**tRNA**

### mRNA Codons

| CODON | ENGL. | CODON | ENGL. | CODON | ENGL. | CODON | ENGL.  |
|-------|-------|-------|-------|-------|-------|-------|--------|
| AAA   | A     | CAA   | Q     | GAA   | g     | UAA   | w      |
| AAC   | B     | CAC   | R     | GAC   | h     | UAC   | x      |
| AAG   | C     | CAG   | S     | GAG   | i     | UAG   | y      |
| AAU   | D     | CAU   | T     | GAU   | j     | UAU   | z      |
| ACA   | E     | CCA   | U     | GCA   | k     | UCA   | 1      |
| ACC   | F     | CCC   | V     | GCC   | l     | UCC   | 2      |
| ACG   | G     | CCG   | W     | GCG   | m     | UCG   | 3      |
| ACU   | H     | CCU   | X     | GCU   | n     | UCT   | 4      |
| AGA   | I     | CGA   | Y     | GGA   | o     | UGA   | 5      |
| AGC   | J     | CGC   | Z     | GGC   | p     | UGC   | 6      |
| AGG   | K     | CGG   | a     | GGG   | q     | UGG   | 7      |
| AGU   | L     | CGU   | b     | GGU   | r     | UGT   | 8      |
| ATA   | M     | CUA   | c     | GUA   | s     | UUA   | 9      |
| ATC   | N     | CUC   | d     | GUC   | t     | UUC   | 0      |
| ATG   | O     | CTG   | e     | GUG   | u     | UUG   | Space  |
| AUU   | P     | CUU   | f     | GUU   | v     | UUU   | Period |