

# SfS Away from the Classroom!

## AP05: Genes to Proteins (Recommended for Grades 7-8)

Please use the following resources to learn about Genes to Proteins.

Watch this Video: https://www.youtube.com/watch?v=oefAl2x2CQM&t=269s

### **Answer these questions:**

- What is a gene?
- What are two differences between DNA and messenger RNA (mRNA)?
- Where in a cell is mRNA made? Where in a cell are amino acids put together to make proteins?

Activities: Follow these directions to crack a DNA code.

#### You will need:

Which of these three faces is encoded in the DNA sequence: CAGTCGGAAAAGAGCTCTATAACA?





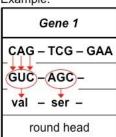


- 1. Copy the table, below left, onto a piece of paper. (You do not need to copy the example.)
  - The row labeled DNA lists the bases (letters: A, T, G, or C) for three genes. This is the same DNA sequence as in the question above separated into 3 letter codons.
  - Each gene contains the code for one trait: face shape, eye type, or mouth type.

#### Table to copy:

	Gene 1	Gene 2	Gene 3
DNA	CAG - TCG - GAA	AAG – AGC	TCT - ATA - ACA
mRNA			
amino acid			
trait			

## Example:



- 2. Convert the DNA code into an mRNA code.
  - Each letter in DNA corresponds to a particular letter in mRNA.
    - See the table on the right.
  - Use this information to complete the mRNA row in your table.

DNA mRNA

 $A \longrightarrow U$ 

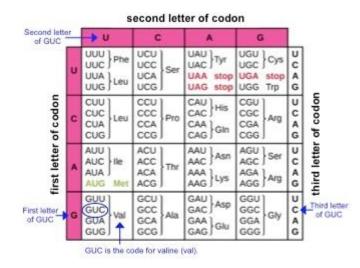
 $T \longrightarrow A$ 

 $G \longrightarrow C$ 

 $C \longrightarrow G$ 



- 3. Identify the amino acids encoded in the mRNA.
  - Codes for each amino acid are given in the codon chart on the right.
  - Decode each codon in the mRNA sequence.
  - Use this information to complete the Amino Acid row in your table.



- 4. Determine traits from amino acids.
  - For this activity, each combination of amino acids has been assigned to a trait in the Amino Acid-to-Trait chart on the right.
  - Use the chart to complete the trait row in your table.

Genes	<b>Amino Acids</b>	Trait	
Gene 1 head shape	val – ser - leu	Round head	
	val – ser - lys	Rectangular head	
	val – ser - asp	Diamond head	
Gene 2 mouth type	phe – ser	Smiley mouth	
	phe – phe	Vampire mouth <del>∏</del>	
	leu – ser	Toothy mouth	
Gene 3 eye type	arg – tyr - cys	Round eyes	
eye type	arg – arg - asp	Oval eyes 🕥	
	arg – tyr - trp	Organism can't survive	

5. Which face has the traits of your coded DNA?

## Make observations & use Claims, Evidence, and Reasoning!

- 1. Claim: DNA can tell us a lot about an organism.
  - Evidence:
  - Reasoning:
- 2. Claim: Scientists can decode some DNA.
  - Evidence:
  - Reasoning:

