

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

Watch this Video: <https://www.youtube.com/watch?v=oefAI2x2CQM&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:

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



- 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
<b>DNA</b>	CAG – TCG – GAA	AAG – AGC	TCT – ATA – ACA
<b>mRNA</b>			
<b>amino acid</b>			
<b>trait</b>			

Example:

Gene 1
CAG – TCG – GAA
GUC – AGC –
val – ser –
round head

- 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	→ U
T	→ A
G	→ C
C	→ G









- 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.

**second letter of codon**

		second letter of codon				
		U	C	A	G	
first letter of codon	U	UUU } Phe UUC } UUA } Leu UUG }	UCU } Ser UCC } UCA } UCG }	UAU } Tyr UAC } UAA stop UAG stop	UGU } Cys UGC } UGA stop UGG Trp	third letter of codon
	C	CUU } CUC } Leu CUA } CUG }	CCU } CCC } Pro CCA } CCG }	CAU } His CAC } CAA } Gln CAG }	CGU } CGC } Arg CGA } CGG }	
	A	AUU } Ile AUC } AUA } AUG Met	ACU } ACC } Thr ACA } ACG }	AAU } Asn AAC } AAA } Lys AAG }	AGU } Ser AGC } AGA } Arg AGG }	
	G	GUU } Val GUC } GUA } GUG }	GCU } GCC } Ala GCA } GCG }	GAU } Asp GAC } GAA } Glu GAG }	GGU } GGC } Gly GGA } GGG }	

GUC is the code for valine (val).

- 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	Amino Acids	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 
	leu – ser	Toothy mouth 
Gene 3 eye type	arg – tyr - cys	Round eyes 
	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!**

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