SAY IT WITH DNA: PROTEIN SYNTHESIS WORKSHEET

Category	Basic Concepts of Science
Resource type	Dry lab

Scientific Investigation Skills and Career Exploration	Overall Expectations	Specific Expectations
A1.11 communicate ideas, plans, procedures, results, and conclusions orally, in writing, and/or in electronic presentations, using appropriate language and a variety of formats	D2 Investigate, through laboratory activities the structures of cell components and their roles in processes that occur within the cell	D2.1 use appropriate terminology related to molecular genetics D2.2 analyse a simulated strand of DNA to determine the genetic code and base pairing of DNA D3.3 explain the steps involved in the process of protein synthesis and how genetic expression is controlled in prokaryotes and eukaryotes

Prior Knowledge	Student Learning Goals
Students have an understanding of: ✓ The Central Dogma ✓ Basepairing in DNA vs. RNA ✓ Splicing ✓ Redundancy in the genetic code	By the end of the activity students will be able to: ✓ Identify the amino acid that is coded by a given DNA sequence ✓ Know what polypeptide chain is produced from a given sequence of DNA

Teacher's Notes

Directions	• This activity is to be completed after the students have learned about the central dogma, which is a fundamental and basic concept in molecular genetics. It is intended to review and solidify the concept that the genetic code provides the instructions for protein synthesis. • This is an AfL activity to ensure that students understand the central dogma. • Included below is the teacher's resource. It has the "DNA to amino acid dictionary" where teachers can use this to make their own personalized messages for the students.
Suggestions	• Review base pairing in DNA (A with T and G with C) vs. RNA (A with U and G with C) • Ask the students to create their own secret message (PART B #4). The students can decode one anothers' messages. • This activity can also be done backwards (from translation to transcription); students will learn how to determine the DNA sequences for a polypeptide/protein
Limitations	• This activity drastically simplifies how protein synthesis occurs. o it does not accurately represent how DNA transcription occurs in eukaryotes since it leaves out mRNA processing (e.g. splicing out of introns); o It does not include other cell components (e.g. RNA polymerase, ribosomes) that are involved in DNA transcription and translation; • Students should notice that methionine is found in the middle of certain DNA sequences or not at all in the questions. Students should be reminded that methionine signals for ribosomal translation.
Modifications for special need students	• Make sure to go over the instructions as well as repeating the instructions several times • Allow more time for students to complete the activity. For example, if the teacher chooses to ask the students to create their own messages, the message swap can be completed next class. This also gives students more time to ask the teacher questions one-on-one if needed.
Resource(s)	• This activity was adopted and modified from: http://www.indiana.edu/~ensiweb/connections/genetics/dna.les.html