**How does the DNA code work?**

In this section you have the first 90 nucleotides and the first 30 amino acids for a protein. The goal is to try to find the code for all amino acids.

Pick one amino acid and look for all the places it is repeated throughout all the sequences. Find the base sequence that codes for that amino acid. Is it the same every time? **Record this information on the table below.** Repeat with three more amino acids.

When you are done with **four** amino acids, share your codes with your research group. Let’s try to find the codes for at least 10 amino acids.

|  |  |  |
| --- | --- | --- |
| **Amino acid name** | **Symbol** | **Nucleotide sequence(s)** |
| Alanine | A |  |
| Arginine | R |  |
| Asparagine | N |  |
| Aspartic acid | D |  |
| Cysteine | C |  |
| Glutamic acid | E |  |
| Glutamine | Q |  |
| Glycine | G |  |
| Histidine | H |  |
| Isoleucine | I |  |
| Leucine | L |  |
| Lysine | K |  |
| Methionine | M |  |
| Phenylalanine | F |  |
| Proline | P |  |
| Serine | S |  |
| Threonine | T |  |
| Tryptophan | W |  |
| Tyrosine | Y |  |
| Valine | V |  |

**Analysis Questions**

1. Now look back over the data table above and look for patterns. What can you say about the number of codes for a particular amino acid?
2. In what ways are the codes for the same amino acid similar to one another?
3. We know that there are twenty different amino acids made from DNA. Based on the way you think the code works, how many possible combinations are there? If you are unsure of how to figure this out mathematically, explain why you think the number is either greater or smaller than 20?
4. How is your answer above consistent with the pattern you found in the number of codes for the different amino acids you examined in question number 1?

Think about the amazing number of proteins produced in the body. All of these proteins are coded for on long strands of DNA. How might the code have a built-in system that tells the body where a particular protein stops and starts?

Consider this analogy:

A paragraph may contain many different sentences, but you can tell where each sentence begins and ends.

1. How do you determine where a sentence begins and ends in English?
2. Look at your answer to number 6 above. Based on the sequences you have looked at, what do you think signifies the beginning of the protein code in DNA?
3. What amino acid does that sequence code for?

Use the space below to record the **big ideas** about how the DNA code works. What did you learn about how DNA works?