

To: John Doe

DNA Sequence:

TCATCGGTCTTGACTACACTGCTCTGTAGCACTTCACTGTACTAACTGCTGGTA

Letter	Code
start	TTG
stop	TAA
A	ACT
B	CAT
C	TCA
D	TAC
E	CTA
F	GCT
G	GTC
H	CGT
I	CTG
J	TGC
K	TCG
L	ATC

Letter	Code
M	ACA
N	CTC
O	TGT
P	GAG
Q	TAT
R	CAC
S	TGA
T	TAG
U	GAT
V	GTA
W	ATG
X	AGT
Y	GAC
Z	GCA

Letter	Code
0	ATA
1	TCT
2	GCG
3	GTG
4	AGA
5	CGC
6	ATT
7	ACC
8	AGG
9	CAA
	AGC
.	ACG

In this activity, we're going to study how DNA stores and transfers information. For our purposes, the DNA will code a message in English. Your job is to translate the message and execute the instruction. Each letter in the english alphabet will be represented by a string of three base codes. Since each DNA strand has hundreds of genes, there also needs to be codes to tell where each gene starts and stops. The DNA inbetween genes is called non-coding DNA (and is sometimes referred to as junk DNA).



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DNA and Proteins

DNA molecules are very long polymers made up of only four different monomer components. The monomers are the chemicals: cytosine, guanine, adenine and thymine. They are called nucleotides or, sometimes, bases, and are labeled C, G, A, and T for short.

The DNA can be found in the nucleus of our cells (as well as all other eukaryotic organisms). Each DNA strand is coiled and wrapped up very tightly so it can fit in the nucleus. A DNA strand might contain millions of bases, and an unraveled strand can be several centimeters long. Humans have 23 pairs of DNA molecules. One of each pair comes from each parent.

DNA tells our bodies what to do. It does this by producing proteins.

- Some proteins build structures like muscle,
- Other proteins are enzymes that catalyze chemical reactions,
- Other proteins are used to send messages.

Each DNA strand can produce hundreds of different proteins. The section of the DNA strand that produces a specific protein is called a gene.

The DNA sits in the nucleus and produces messenger proteins (messenger RNA or mRNA for short) that go out into the cell where the ribosomes translate the mRNA into proteins.

Proteins are long polymers made up of amino acids. Since there are only 4 different types of nucleotides and 21 amino acids, in the mRNA each amino acid is represented by a group of 3 nucleotide bases. Each group of three is called a codon.