Mr. Ulrich
Regents Biology

Name:.....Block:……...

Lab #.....

Genetic Police Sketch-Artist

Objective: To understand and practice the processes of DNA replication, transcription and translation.

Background: Imagine yourself 30 years in the future in a society not unlike the setting of the film "GATTACA". Biotechnology has progressed to the point at which everyone's DNA fingerprint is on file with the government. That information is used to keep people (and their genes) segregated from one another in certain parts of the country. It has been learned that someone has left his or her assigned sector. Luckily for society, that person left behind some DNA evidence in the form of skin cells taken from an old, smelly gym sock. The police need your expertise in DNA technology to help create a sketch that will lead to the capture of the runaway before the person's genes enter the wrong gene pool. Below is the key that is needed to "decode" the characteristics of the missing person. You will have to transcribe and translate his or her characteristics and then provide a picture of what you have determined the fugitive to look like.

How you'll do it:

1. Your equipment has provided you with one half of the DNA configuration. You will need to first replicate the missing half.
2. After you have finished the other DNA strand, transcribe the DNA codes of the DNA strand that you have just replicated.
3. After you have transcribed the DNA into mRNA separate the mRNA bases into codons. Find the first AUG codon, which translate into methionine, or the "Start" codon.
4. After the first AUG, circle the next codons and translate those into amino acids using the chart found below. Continue until you reach a "Stop" codon. The "Stop" codons are UAA, UAG, and UGA.
5. Continue down the RNA strand (in triplets) until you get to the next "Start" codon and translate the next codons up to the "Stop" codon.
6. After you have identified the seven chains, highlight or outline both the seven chains (where you circled the codons) and the seven proteins. Label them with the numbers of the traits that they cause to happen.
7. Now draw the face of the missing person on a blank sheet of 8 ½" X 11" paper.
8. Your finished lab should include your finished sketch, your scrap paper and the conclusion questions at the end of the lab. Be sure to sign your artwork.

THE DNA STRAND:

ATAATGGTAGCCTTAGCGATGATTTAATAGGTGTTTGTGTACTGAACGGGGAT
GACTAGTGGGTGGCCCTATTGAAAATTTACCTGCACTTATATGGACGAGCAAA
ATCGTTGTTAGCATATGGTTATGGCGGGCAGTCAGTGATTTTAAACTCATGAG
GACAAAGGGCATATGGTTTTGGGTAAGAGTCACTAAGGGGTTAAAATGTATT
GTCAAGAGATAGATTGAATAAGTCTTTCCATGCACAGAGGTGATTTTACCTAA
TCTCCCGGGTTTTTTATA

Resources:

Table 1: **Amino Acid Codes For Proteins**

Protein No.	Amino Acid Chain	Genetic Expression
1.	Met-Tyr-Cys-Gin-Glu-Ile-Asp	Maleness
2.	Met-Thr-Pro-Met-Tyr-Cys-Gin	Femaleness
3.	Met-Thr-Cys-Pro-Trp-Gly-Tyr	Oval, thin face, stubby nose
4.	Met-Thr-Ser-Gly-Trp-Pro-Tyr	Round, fat face, pointy nose
5.	Met-Ala-Gly-Ser-Glu-Thr-Phe	Long, strait hair
6.	Met-Val-Met-Ala-Gly-Ser-Gin	Short, curly hair
7.	Met-Leu-Ser-Met-His-Arg-Gly	Large ears, earlobes free
8.	Met-His-Arg-Gly-Asp-Phe-Thr	Small, pointy ears, earlobes attached
9.	Met-Asp-Glu-Gin-Asn-Arg-Cys	Widow’s peak
10.	Met-Asp-Gin-Glu-Asp-Arg-Cys	Straight bangs
11.	Met-Val-Ala-Leu-Ala-Met-Ile	Small, beady eyes, poor vision
12.	Met-Val-Ala-Asp-Pro-Thr-Ile	Large, oval eyes, cross-eyed
13.	Met-Val-Leu-Glu-Lys-Ser-His	Wide mouth, crooked teeth
14.	Met-Val-Leu-Gly-Lys-Ser-His	Small mouth, straight teeth

Table 2: **mRNA Codon Translator Table**

First Nucleotide	Second Nucleotide				Third Nucleotide
	U	**C**	**A**	**G**	
	Phe	Ser	Tyr	Cys	**U**
	Phe	Ser	Tyr	Cys	**C**
U	Leu	Ser	*STOP*	*STOP*	**A**
	Leu	Ser	*STOP*	Trp	**G**
	Leu	Pro	His	Arg	**U**
	Leu	Pro	His	Arg	**C**
C	Leu	Pro	Gin	Arg	**A**
	Leu	Pro	Gin	Arg	**G**
	Ile	Thr	Asn	Ser	**U**
	Ile	Thr	Asn	Ser	**C**
A	Ile	Thr	Lys	Arg	**A**
	Met	Thr	Lys	Arg	**G**
	Val	Ala	Asp	Gly	**U**
	Val	Ala	Asp	Gly	**C**
G	Val	Ala	Glu	Gly	**A**
	Val	Ala	Glu	Gly	**G**

Conclusion Questions:

Please, answer these on a separate sheet of paper using complete sentences and rephrasing the question.

1. Where is genetic material stored in eukaryotic cells?
2. What is the difference between *transcription* and *translation*?
3. What organelle is the site of translation?
4. What special proteins make all of this possible?
5. During which stage of mitosis does all of this occur?
6. There are several reasons why this activity is just not possible in real life based on our present understanding of genetics. What are two of those reasons?