Protein Synthesis Worksheet

1- Complete the tables below using the information learned above.

DNA strand	GTTACGGTTAGATTG
mRNA transcript	CAAUGCCAAUCUUAAC
tRNA anticodons	GUUACGGUUAGAUUUG
Amino acid sequence	Gln - cys - Gln - Ser - Asn

DNA strand	TACCAAGCAGTTCGGACTG
mRNA transcript	AUGGUUCGUCAAGCCUGAC
tRNA anticodons	UACCAAGCAGUUCGGACUG
Amino acid sequence	Start - val - arg - Gln - Ala - stop

DNA strand	TACGTTCACAACTGA
mRNA transcript	AUGCAAGUGUUGACU
tRNA anticodons	UACGUUCACAACUGA
Amino acid sequence	Start - Gln - val - Leu - Thr

2- Answer the questions using the following DNA sequence.

A A T G C C A G T G G T T C G C A C

a- Give the base sequence of the complimentary DNA strand.

TTA CGG TCA CCA AGC GTG

b- Give the mRNA strand that would be produced.

UUA CGG UCA CCA AGC GUG

c- Give the tRNA strand that would be produced. Place the appropriate AA above each anti-codon.

Leu Arg Ser Pro Ser Val
AAU GCC AGU GGU UCG CAC

d- Give the amino acid sequence which will be produced.

Leu - Arg - Ser - Pro - Ser - Val

e- If the fourth nucleotide in the original DNA strand were changed from 'G' to 'C', would it change the protein produced? Explain.

yes CCC produces GGG as mRNA = glycine
GCC " CGG " " = arganine

f- If a 'G' were added to the original DNA strand after the third nucleotide, would different amino acids be produced? Explain.

yes because different codons will be produced which means different AA produced.

g- Explain if it is guaranteed that the amino acid sequence will change if you replace a nitrogen base with another nitrogen base.

No, different codons will produce the same AA.

3- Answer the questions using the following DNA sequence.

C A A A G G A T A T A C C A A T C C A G A A T G A T C

a- Make the mRNA strand.

GUU UCC UAU AUG GUU AGG UCU UAC UAG

b- Give the tRNA strand that would be produced.

CAA AGG AUA UAC CAA UCC AGA AUG AUC

c- Give the sequence of amino acids produced.

Val Ser Tyr start-Val-Arg-Ser-Tyr-stop

4- Answer the questions using the following DNA sequence.

C G C A T C T A C G A T C G T A C T G C T G A A

a- Make the mRNA code using the above strand.

GCG UAG AUG CUA GCA UGA CGA CUU

b- Using the sequence from the mRNA, show the sequence of the AA which are produced.

Ala-stop start-Leu-Ala-stop Arg Leu

5- Make DNA strand of 27 nitrogen bases using the following instructions.
(Hint- it is easier to make the mRNA strand then the DNA strand)

- The start amino acid strand should be the third triplet and the end amino acid strand should be the second to last triplet.
- The 2nd and 5th triplet should code for the same amino acid, but a different codon must be used.
- The 4th, 6th and 7th triplet should code for the same amino acid, but a different codon must be used.

a- What is the lead DNA strand?

GGC GGG TAC CAA GGT CAG CAT ATT CCA

b- What is the mRNA strand?

CCG CCC AUG GUU CCA GUC GUA UAA GGU

c- Give the amino acid sequence.

pro pro start- Val- pro- val - val - stop gly

6- Fill in the blank, words can be used more than once.

a- Chromosomes are made up of genes = DNA - nucleo. Genes are made up of DNA - nucleotide. Chromosomes, genes and DNA are found in the nucleus of a cell.

b- When transcription occurs the type of RNA used is mRNA and when translation occurs tRNA is the type of RNA used?

c- Protein synthesis occurs in the ribosome. There are 64 possible codons and 20 possible amino acids. Many amino acids produce different proteins. The amino acid sequence depends on a person's DNA.

d- Individuals look different because they have different DNA - protein. A human has 23 pairs of chromosomes. Chromosomes are inherited by parents which is why they have 2 of every chromosome.

e- The amino acid produced depends on the codon - DNA. The tRNA's function is to transport AA to the ribosome.

f- The start codon is AUG and the stop codons are UAA UAG UGA.

g- The sex chromosomes for a boy is XY and sex chromosomes for girls are XX. It is the male who determines the sex of a baby.