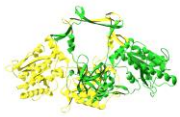
Name: _____ Date: _____

**Protein Practice**
**HS-LS1-1 Protein Synthesis Practice**



**I <u>can</u> statements for the HS-LS1-1 Unit:**

- I can **model** the structure of DNA and **describe** the importance of it within our cells.
- I can **construct an explanation** of how genes code for proteins.

**(____ points)**

1. Here is one half of a DNA strand. Complete the other half by writing the **complementary base pairs.**

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

2. You just wrote in the template strand of DNA. Use the template strand to transcribe a strand of **mRNA**.

3. Write down the **tRNA anti-codons** that pair with the mRNA strand.

4. Use your codon wheel to write down the correct **amino acid sequence** from the mRNA strand you created.

5. How can there be so many proteins when there are only 20 amino acids?

6. What are the stop codons? What do these tell us? Be **specific**.

7. What is the start codon? What does this mean? Be **specific**.

8. What is a codon? What strand do you find a codon on? Give an **example** of a codon.

9. What is an anticodon? On what strand can you find an anticodon?

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10. What is the goal of transcription?

11. Where does transcription occur within the cell?

12. What is the goal of translation?

13. Where does translation occur within the cell?

14. Amino acids are put together by _____ bonds and form a(n) _____.

15. What strand do you look at in order to write down your amino acid sequence?

16. DNA: CAT CCA ACC ATA CCC CTA TAC CCA TAT CCT CCC ATT AAA CCG

mRNA: _____

A.A.: _____

17. DNA: AGATAA AGA CCA GCA ACA TAATAC CTC TTA ACA CTC CTC CGA TGA ACT

mRNA: _____

A.A.: _____

18. DNA: TACCTTGGGGAATATCTTCGATGAATCCGTACACGCTGGACGGTACTCGCC ATC

mRNA: _____

A.A.: _____

19. DNA: TAA ACT CGG TAC TAG ATC TAA CTA GCT TTA CCC ATC

mRNA: _____

A.A.: _____

20. What would happen to the protein above if the sequence of DNA **changed by one base**? Provide an **example** of how the protein would change using the above strand.

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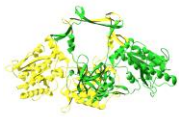
**Protein Practice**
**HS-LS1-1 Protein Synthesis Practice**
**KEY**



**I can statements for the HS-LS1-1 Unit:**

- I can **model** the structure of DNA and **describe** the importance of it within our cells.
- I can **construct an explanation** of how genes code for proteins.

**(____ points)**

1. Here is one half of a DNA strand. Complete the other half by writing the **complementary base pairs.**

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

2. You just wrote in the template strand of DNA. Use the template strand to transcribe a strand of **mRNA**. A-U-G-C-C-A-U-A-U-G-G-G-U-A-A

3. Write down the **tRNA anti-codons** that pair with the mRNA strand.
U-A-C-G-G-U-A-U-A-C-C-C-A-T-T

4. Use your codon wheel to write down the correct **amino acid sequence** from the mRNA strand you created.
Methionine-Proline-Tyrosine-Glycine-Stop

5. How can there be so many proteins when there are only 20 amino acids? The reason there are so many different types of proteins when there are only 20 amino acids is because, the amino acids can sequence themselves in different patterns, creating a different protein. This is kind of like letters in the alphabet forming many words.
6. What are the stop codons? What do these tell us? Be **specific**. The stop codons are: UGA,UAA, UAG. They tell us when the mRNA is done being transcribed from DNA.
7. What is the start codon? What does this mean? Be **specific**. AUG is the start codon. This tells the RNA polymerase when to start adding nucleotides to build the mRNA molecule to pair with the complementary strand of DNA.
8. What is a codon? What strand do you find a codon on? Give an **example** of a codon. A codon is a sequence of three bases (letters) found on the mRNA strand. An example of a codon is GUU. This codes for the amino acid Valine.
9. What is an anticodon? On what strand can you find an anticodon? An anticodon is a sequence of three bases (letters) found on the tRNA strand. This pairs with the codon sequence found on the mRNA strand.

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10. What is the goal of transcription? The goal of transcription is to build a strand of mRNA from the complementary DNA template strand.

11. Where does transcription occur within the cell? Transcription occurs within the nucleus of the cell.
12. What is the goal of translation? The goal of translation is to build a protein.

13. Where does translation occur within the cell? Translation occurs in the cytoplasm of the cell.
14. Amino acids are put together by peptide bonds and form a(n) protein.

15. What strand do you look at in order to write down your amino acid sequence? In order to write down the amino acid sequence, you look at the mRNA strand to get the codons which code for the amino acids that build the protein.

16. DNA: CAT CCA ACC ATA CCC CTA TAC CCA TAT CCT CCC ATT AAA CCG
mRNA: GUA GGU UGG UAU GGG GAU AUG GGU AUA GGA GGG UAA UUU GGC
A.A.: Val-Gly-Tryp-Tyro-Gly-Asp-Meth-Gly-Iso-Gly-Gly-Stop

17. DNA: AGA TAA AGA CCA GCA ACA TAA TAC CTC TTA ACA CTC CTC CGA TGA
mRNA UCU AUU UCU GGU CGU UGU AUU AUG GAG AAU UGU GAG GAG GCU ACU
A.A. Ser-Iso-Ser-Gly-Arg-Cys-Iso-Meth-Glu-Asp-Cys-Glu-Glu-Ala-Thr

18. DNA TAC CTT GGG GAA TAT CTT CGA TGA ATC CGT ACA CGC TGG ACG GTA
mRNA AUG GAA CCC CUU AUA GAA GCU ACU UAG GCA UGU GCG ACC UGC CAU
A.A. Meth-Glu-Pro-Leu-Iso-Glu-Ala-Thr-STOP

19. DNA TAA ACT CGG TAC TAG ATC TAA CTA GCT TTA CCC ATC
mRNA AUU UGA GCC AUG AUC UAG AUU GAU CGA AAU GGG UAG
A.A. Iso-STOP

20. What would happen to the protein above if the sequence of DNA **changed by one base**? Provide an **example** of how the protein would change using the above strand.
Answers will vary here. If the amino acid sequence above changed by one base pair, the entire protein could change. For example, if a base was substituted for another base, it could change the amino acid sequence, changing the protein formed. If a base was added or deleted, there would be a shift in the sequence, and the majority of the sequence would change, changing the protein dramatically. Also, there is a chance nothing would change with the protein. For example, if AUU changed to AUC, it codes for the same exact amino acid and the protein would not change.

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