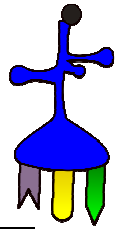


Name: _____

Period: _____

Date: _____

DNA Replication & Protein Synthesis Virtual Lab Sheet



PART 1 DNA: Use the following link to read the What is DNA article by the Genetics Home Reference.
<https://ghr.nlm.nih.gov/primer/basics/dna>

1. What is DNA? _____
2. What does DNA stand for? _____
3. What are the four chemical bases? _____
4. What does the DNA serve as? _____

PART 2 DNA REPLICATION: Use the following link to read the Discovery of the Structure of DNA article by Khan Academy. As you read the article, answer the following questions. <https://www.khanacademy.org/science/high-school-biology/hs-molecular-genetics/hs-discovery-and-structure-of-dna/a/discovery-of-the-structure-of-dna>

5. What are the subunits of DNA? _____
6. What three things is a nucleotide made of?
1. _____ 2. _____ 3. _____
7. What type bond forms between deoxyribose of one nucleotide and the phosphate group of the next? _____
8. What are the three parts of Chargaff's Rule?
 - _____
 - _____
 - _____

Scroll down to "Base Pairing"

9. What type of bonds are the two strands of the DNA double helix held together by? _____
10. What is A (adenine) always bonded with? _____
11. What is G (guanine) always bonded with? _____
12. The A-T and C-G associations are known as what? _____

PART 3 DNA – APPLYING CHARGAFF'S RULE: Use the following link to access DNA Replication by Pearson Science. Read the screen and follow the directions below to complete this activity.
http://www.phschool.com/atschool/phbio/active_art/dna_replication/index.html

13. What is the name of the process when DNA duplicates? _____
14. Click "Start" to view the animation. What is the principle enzyme involved in DNA replication? _____
15. In what direction(s) does DNA Replicated? _____

16. Click "Build a DNA Strand". Build 2 strands of DNA by dragging the bases on the right to the strand of DNA.

PART 4 BASE PAIRING PRACTICE: Use the following link to play the Replication Rush by NanoSpace game. As you play the game, answer the following questions. http://nanospace.molecularium.com/attractions/replication_rush/

17. Click "Pair" and then "Play" Play the game. What is your best...

a) Score: _____ b) Speed: _____ c) Errors: _____

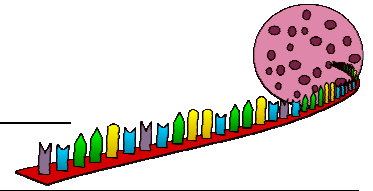
PART 5 PROTEIN SYNTHESIS: Use the link below to watch the "Protein Synthesis" video by the Amoeba Sisters. Answer the questions below as you watch. <https://www.youtube.com/watch?v=oefAl2x2CQM>

18. Why are your eyes the color they are? _____

19. Where does protein synthesis happen? _____

20. What are the two major steps of protein synthesis in order?

1. _____ 2. _____



21. Where does transcription start? _____

22. What is an amino acid? _____

23. What type of bond holds together amino acids? _____

24. Transfer RNA (tRNA) reads bases in groups of _____. This group is called a _____

Fill in the Table Below as You Watch

Type of RNA	Made During Transcription or Translation?	Where Does it Take Place in the Cell (Some may have multiple places)	What is the main job of this type of RNA?
25. mRNA			
26. tRNA			
27. rRNA			

PART 6 TRANSCRIBE & TRANSLATE: Click on the following link to complete the “Transcribe and Translate a Gene” interactive from the Learn Genetics University of Utah website.

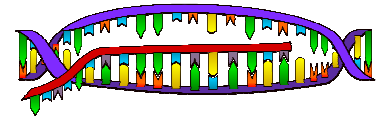
<http://learn.genetics.utah.edu/content/basics/transcribe/>

Follow the directions on the screen. List the 5 Amino Acids you coded for to make the protein below.

28. a. _____ b. _____ c. _____
d. _____ e. _____

PART 7 PROTEIN SYNTHESIS GAME: Click on the link below to play the Protein Synthesis Race Video Game by BioMan Biology. Click “Start a New Game” to begin. Read the screens and follow the directions to complete the game. As you complete the game, answer the following questions on the handout.

<http://www.biomanbio.com/GamesandLabs/LifeChemgames/Protsynth.html>



Transcription In the Nucleus

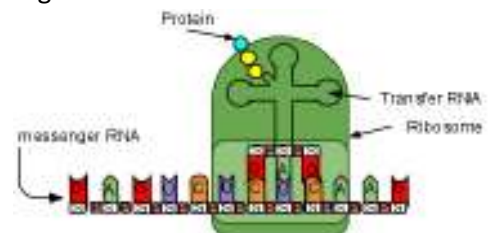
29. Transcription is the process of copying a gene to create _____
30. Transcription is the first process that must happen in order to make a _____
31. In order for transcription to happen, DNA must _____
32. How many strands of DNA are used for transcription? _____
33. Will you be playing with the top or bottom strip of DNA? _____
34. What is the name of the enzyme used to make RNA nucleotides? _____

***Helpful Hint! Transcription is different than DNA base pairing! In transcription, the RNA nucleotide Adenine pairs with DNA nucleotide Thymine, and DNA nucleotide Adenine pairs with the RNA nucleotide Uracil. The Cytosine still pairs with the Guanine.*

35. What type of molecule did you create when you transcribed all of the nucleotides? _____
36. What does the messenger RNA (mRNA) do? _____
37. What happens to the DNA molecule after transcription? _____
38. Where does the messenger RNA have to travel to after transcription? _____

Transcription - Did You Get It? Answer the 9 multiple choice questions in the game.

39. Write down your score here _____



Translation in the Ribosome

40. A protein is a chain of _____

41. The _____ of amino acids in the chain and the _____ of the chain determine what kind of protein it will be.

***Hint! Look at the chart at the upper right of the screen to see what codons code for which amino acid! Pick up the complementary tRNA anticodon to pair with the mRNA codon. When you are pairing the two codons, look at the mRNA code to pair with the correct amino acid color. Use the black line above the tRNA to pick up the correct color. Each code for amino acids is a specific color!*

42. Codons are triplets of nitrogenous bases on mRNA that code for a specific _____

43. Which type of RNA is responsible for translation of mRNA? _____

44. What is another name of a chain of amino acids? _____

45. What happens to the ribosome after translation? _____

46. What does the shape of a folded polypeptide indicate? _____

Translation - Did You Get It?

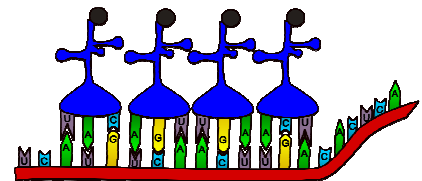
47. Click on the correct term where the arrow or bracket is indicating. How many did you get correct? _____

48. Answer the 8 multiple-choice questions. Write your score here: _____

Summary

49. Write your total time here: _____

50. Write your percent correct here: _____



51. In 3 or more **complete sentences**, describe the process of protein synthesis and explain how transcription and translation creates proteins.
