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Protein synthesis worksheet answers part a

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PROTEIN SYNTHESIS Study Guide PART A. Read the following: Protein synthesis is the process used by the body to make proteins. The first step of protein synthesis is called Transcription. It occurs in the nucleus. During transcription, mRNA transcribes (copies) DNA. DNA is unzipped and the mRNA strand copies a strand of DNA. Once it does this, mRNA leaves the nucleus and goes into the cytoplasm. mRNA will then attach itself to a ribosome. The strand of mRNA is then read in order to make protein. They are read 3 bases at a time. These bases are called codons. tRNA brings the amino acids to the ribosome to help make the protein. The 3 bases on tRNA are called anti-codons. Remember, amino acids are the building blocks for protein. On the mRNA strand, there are start and stop codons. Your body knows where to start and stop making certain proteins. Just like when we read a sentence, we know when to start reading by the capitalized word and when to stop by the period. Ribosome mRNA DNA tRNA mRNA PART B. Answer the following questions on your paper: 1. What is the first step of protein synthesis? transcription 2. What is the second step of protein synthesis? translation 3. Where does the first step of protein synthesis occur? nucleus 4. Where does the second step of protein synthesis occur? ribosome 5. Nitrogen bases are read 3 bases at a time. 6. The bases on the mRNA strand are called codons 7. The bases on tRNA are called anti-codons 8. What is the start codon? AUG 9. What are the stop codons? (Use your mRNA chart) UAA, UAG, UGA 10. A bunch of amino acids attached together is called a Protein Name _____

Part C. Use your codon chart or the chart to determine the amino acid sequence. Remember to read through the strand and ONLY start on AUG and STOP when it tells you to stop. Follow example below: 1. DNA CCT CTT TAC ACA CGG AGG GFA CGC TAT TCT ATG ATT ACA CGG mRNA protein 2. DNA AGA ACA TAA TAC CTC TTA ACA CTC TAA AGA CCA GCA CTC CGA ACT mRNA protein 3. DNA TAC CTT GGG GAA TAT ACA CGC TGG CTT CGA TGA ATC CGT ACG GTA mRNA protein 4. DNA TAA ACT CGG TAC CTA GCT TAG ATC TAA TTA CCC ATC mRNA protein 5. DNA CTA TTA CGA TAC TAG AGC GAA TAG AAA CTT ATC mRNA protein GGA GAA AUG UGU GCC UCC CAU GCG AUA AGA UAC UAA UGU GCC Met Cys Ala Ser His Ala Ile Arg Tyr Stop UCU UGU AUU AUG GAG AAU UGU GAG AAU UCU GGU CGU GAG GCU UGA Met Glu Asn Cys Glu Ile Ser Gly Arg Glu Ala Stop AUG GAA CCC CUU AUA UGU GCG ACC GAA GCU ACU UAG GCA UGC CAU Met Glu Pro Leu Ile Cys Ala Thr Glu Ala Thr Stop AUU UGA GCC AUG GAU CGA AUC AUU AAU GGG UAG Met Asp Arg Ile Stop GAU AAU GCU AUG AUC UCG CUU AUC UUU GAA UAG Met Ile Ser Leu Ile Phe Glu Stop Example: DNA AGA CGG TAC CTC CGG TGG GTG CTT GTC TGT ATC CTT CTC AGT ATC mRNA UCU GCC AUG GAG GCC ACC CAC GAA CAG ACA UAG GAA GAG UCA UAG protein start - glu ala thre hist asp glu threo - stop acid acid Name _____

Part D. Circle the correct choice within the parenthesis for 1 -18. 1. (DNA/RNA) can leave the nucleus. 2. mRNA is made during (transcription/translation). 3. mRNA is made in the (cytoplasm/nucleus). 4. DNA is located in the (nucleus/cytoplasm) 5. (Translation/Transcription) converts DNA into mRNA. 6. (mRNA/tRNA) is used to carry the genetic code from DNA to the ribosomes. 7. (tRNA/rRNA) makes up the ribosome. 8. (DNA/RNA) uses uracil instead of thymine. 9. (RNA/amino) acids make up a protein. 11. Transcription takes place in the (nucleus/cytoplasm). 12. tRNA is used in (translation/transcription). 13. tRNA uses (anticodons/codons) to match to the mRNA. 14. Proteins are made at the (nucleus/ribosome). 15. (tRNA/mRNA) attaches the amino acids into a chain. 16. tRNA is found in the (nucleus/cytoplasm). 17. (Translation/transcription) converts mRNA into a protein. 18. Translation takes place in the (cytoplasm/nucleus). Fill the Diagram in DNA mRNA tRNA Amino Acids A C A A G AG C G G T A T C G A Name _____

19. Label the missing information in the diagram below using the following word list: transcription nucleus nitrogen bases template DNA mRNA A. NUCLEUS B. NITROGEN BASES C. mRNA D. TRANSCRIPTION E. DNA 20. If a sequence of codons on a DNA strand is AAC TAG GGT, what is the corresponding sequence in a strand of mRNA? UUG _____ AUC _____ CCA _____ 21. Label the DNA nucleotide. A. _____ PHOSPHATE B. _____ NITROGEN BASE C. _____ DEOXYRIBOSE _____ A B C DNA Nucleotide Name _____

22. Identify structure A and state what it is made of. PROTEIN made of amino acids 23. Identify structure B. AMINO ACID 24. Identify structure C. TRANSFER RNA (tRNA) _____ 25. Identify structure D and state where it is made. MESSENGER RNA (mRNA) _____ 26. What are the three nitrogen bases in transfer RNA that pair with bases U-G-U in messenger RNA? A. C A A 27. Identify structure E and describe its function. RIBOSOME _____ 28. Use the DNA strand template below to complete the information in the table. DNA Strand ATGC AAAATGCGTGTAG mRNA codons: UACGUUUUACGCACAAUC tRNA anti-codons: AUGCAAAAUGCGUGUUAG 29. Use the mRNA codons in questions 28 to determine the six amino acids. Tyrosine _____, Valine _____, Leucine _____, Arginine _____, Threonine _____, Isoleucine _____ Name _____

Short Answer: 30. Describe what messenger RNA and transfer RNA do during protein synthesis. Messenger RNA copies the DNA strand in the nucleus then travels to the ribosome in the cytoplasm. Transfer RNA brings the amino acids to the ribosome. Transfer RNA has an anticodon attached to one end so it can find the complimentary base pairs (codon) on the mRNA strand allowing it to place the amino acid in the correct order. Amino acids keep attaching to each other until the tRNA reaches a STOP codon on the messenger RNA strand. Once the stop codon is read, the protein is fully assembled. 31. Compare and Contrast RNA and DNA. Include three differences and one similarity. RNA is a single stranded nucleic acid, but DNA is double stranded. RNA contains the nitrogen base Uracil, but DNA contains Thymine instead. RNA contains ribose sugar but DNA contains deoxyribose sugar. Both DNA and RNA are Nucleic Acids that contain the nitrogen bases adenine, guanine, and cytosine. They also both have phosphate molecules that connect the sugar molecules together on the side of the strand. _____

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