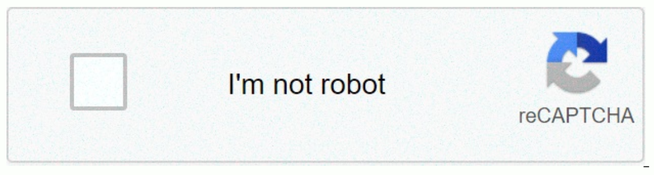

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Protein synthesis worksheet biology corner

Name_____Date_____ one. RNA, ribonucleic acid is very similar to DNA. RNA typically exists as a single wire (not the double helix of DNA). It contains the same bases, adenine, guanine and cytosine. However, there is no thymin found in RNA, instead there is a similar compound called uracil. 2. Transcription is the process by which RNA is made from DNA. It occurs in the core. Label the box with x inside the core with the word TRANSCRIPTION and proceed to color the bases according to the key below. Thymein = Orange Adenine = Dark Green Guanine = Purple Cytosine = Yellow Uracil = Brown Dark Blue DNA Strand Color (D) and Light Blue RNA (R) wire. Color the nuclear membrane (E) gray. Translation 1. Translation occurs in the cytoplasm, specifically in ribosomes. The mRNA made in the nucleus travels to the ribosome to carry the DNA message. Here in ribosome, this message will be translated into a sequence of amino acids. Color the light green ribosome (Y) and note how the RNA wire crosses the ribsosome as a measuring tape and the amino acids are assembled. The RNA strand in the translation area should also be light blue colored, as it was colored in the core. Label the box with x in the translation area with the word TRANSLATION. 2. Important for the translation process is another type of RNA called Transfer RNA (F) that works to transport amino acids to the site of protein synthesis in the ribosome. Color the red tRNA. 3. A tRNA has two important areas. The anticodon, which matches the codon on the RNA strand. Remember that codons are sets of three bases that encode for a single amino acid. Be sure to color the bases of the anticodon of the same color as the bases on your DNA and RNA wire - they are the same molecules! 4. At the top of tRNA are amino acids. There are twenty amino acids that can combine to form proteins of all kinds, these are proteins that are used in life processes. When you digest your food, for example, you are using enzymes that were originally proteins that were assembled from amino acids. Each tRNA has a different amino acid that bind like wagons on a train. Color all amino acids (M) orange. Questions: 1. How many different types of bases can be found in DNA ___ What basis is found in RNA, but not in DNA? _____ 3. How many bases are there in a codon? ____ In an anticodon? _____ 4. How many amino acids are linked to a single transfer RNA? _____ 5. The transcription occurs in ___ the translation takes place in ___ 6. The process of making RNA from DNA is called ___ The process of assembling an RNA protein is called ___ 8. Describe two ways in which differs from DNA: ___ The model shows a stranded double DNA being used as a model for a single wire messenger RNA. MRNA consists of codons that determine the amino acid sequence in a protein strand. This worksheet can be used for basic and advanced biology students and can help students understand the processes. Students color the nitrogen bases (A, G, T, C) and then use this model to color the codons and the growing amino acid chain. Students color according to process instructions and descriptions. Grade level: 9-12 | Time required: 45 minutes HS-LS1-1 Construct an evidence-based explanation of how dna structure determines the structure of proteins that perform the essential functions of life through specialized cell systems Download PDF Google Doc Key (TpT) Shannan Muskopf May 19, 2019 1. One of the DNA strands is used as a model to create a strand of mRNA 2. Requires enzyme RNA polymerase 3. The transcript always begins in a region called the promoter. 4. Introns are DNA segments that do not contain genes. Exons are segments that contain genes. 5. Each 3 bases in the mRNA is a codon, corresponds to an amino acid (see codon chart) TRANSLATION 1. Take the message in mRNA and convert it into a chain of amino acids 2. Individual amino acids will come together to form a protein. Protein forms and composition determine their functionality (hair, enzymes, skin, muscles, etc.) The steps in the translation are: (Fig 12-18) 1. Ribosome binds to mRNA in a specific area. 2. The ribosome begins to combine anticodon tRNA sequences with the mRNA codon sequence. 3. Each time a new tRNA enters the ribosome, the amino acid it carried is added to the elongated polypeptide chain. 4. The ribosome continues until it reaches a stop sequence, then releases the polypeptide and mRNA. 5. The polypeptide forms in its native form and begins to act as a functional protein in the cell. Place the appropriate labels on the boxes. Name: ___ In both humans and cows, this sequence is part of a set of instructions for controlling a body function. In this case, the sequence contains the gene to make protein insulin. Insulin is required for the absorption of blood sugar. Without insulin, a person cannot use digestive sugars in the same way that others can, and they have a disease called diabetes. Instructions: 1 Using the DNA sequence, make a complimentary RNA wire from both the human and the cow. Write RNA directly below the DNA chain to replace U's with T's in RNA) 2. Use the codon table in your book to determine which amino acids are assembled to make insulin protein in both cow and human. *Note: This is not the actual sequence for insulin, which actually contains 51 amino acids. Uniprot provides complete sequencing information on insulin and known variants. DNA CCA TAG CAC GTT ACA ACG TGA AGG AAA RNA Amino Acid COW DNA CCA TAG CAT GTT ACA ACG CGA AGG GAC RNA Amino Acid Analysis 1. Compare the DNA sequence and circle any base that is different in the cow and human sequences. How many bases are different? _____ 2. Examine the amino acids produced. Highlight in yellow any amino acids that are different in the two sequences. How many are there? _____ 3. Two humans (or two cows) could have some differences in their DNA sequences for insulin, but still make exactly the same insulin proteins? Explain. 4. Examine the codon chart and list all the codons that encode amino acid leucine. List them: MUTATIONS: Changes in DNA Diabetes is a disease characterized by the inability to break down sugars. Often a person with diabetes has a faulty DNA sequence that encodes for the manufacture of insulin protein. This mutation is called mutation point because only one base is affected. When the amino acid in a sequence has changed, the shape of the protein changes and may become less functional (or not work at all.) 5.. Suppose a person has a mutation in their DNA, and the first triplet for genetic coding for insulin is T A T (instead of C C A). Determine for which amino acids the new DNA triplet codes. Will this person be diabetic? Explain 6. A silent mutation occurs when the nucleotide changes, but the resulting amino acid is the same. The protein that is made from this new DNA will have no functional difference in the original. What if a mutation occurred in the human insulin gene and the first triplet was changed to C C G? Is it a silent mutation? Explain how you know. A FRAMESHIFT mutation occurs when a base is added (or removed) from a DNA/RNA sequence. 7. Determine the amino acid chain encoded by the following sequence. Suppose a mutation occurs where another A is added after the first codon. What would be the new amino acid sequence? Normal DNA: T G G A G G G A G G G T Normal RNA: Amino Acids: Mutant DNA: T G G A A G G G G G A G G T Mutant RNA: Amino Acids. Why do frame change mutations cause more problems than a point mutation? 8. A SENSELESS MUTATION occurs when a codon is changed to a STOP codon. Many proteins are thousands of amino acids long. At the end of the gene, the cell reaches the stop codon. If a codo is changed to the construction of the amino acid ends and the protein is incomplete. Why would a nonsense mutation be less harmful if it occurred at the end of the gene and not at the beginning? Genetic sequences through species 9. DNA sequences are often used to determine relationships between organisms. DNA sequences encoding for a particular gene can vary widely. Organisms that are closely related will have similar sequences. Below is a list of sequences for some organisms: Human: C A T A T A G C A C A Chimpanzee: C A T A C C T A Pig: C A T G T A C G A Cricket: C C T A G A C G Based on these sequences, which two organisms are most closely related? _____ 10. An unknown organism is found in the forest and the gene is sequenced as follows: Unknown: C A T G G A A T C G A ..... What kind of animal do you think that is? ___ 11. What is the relationship between DNA, codons and proteins? 12. How does the shape of a protein relate to its function? 13. Explain why some mutations are more harmful than others. 14. Build an evidence-based explanation of how dna structure determines the structure of proteins that perform the essential functions of life through specialized cell systems. Cells.

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