

Protein Synthesis Activity

Answer Key

1. Begin by placing the blue or white paper on the nucleus side. On top of this paper, put together the DNA sequence reading: ACC CGA TAT CCC ATT from left to right.
2. What would the complimentary strand of DNA read? TGG GCT ATA GGG TAA
3. Based on the DNA template, place the complimentary mRNA (colored index cards) below each 3-base sequence.
4. What does the mRNA read? UGG GCU AUA GGG UAA
5. What is a 3-base sequence found on mRNA called? codon
6. What is the process called when an mRNA transcript (copy) is made from one strand of DNA? transcription. Which enzyme adds RNA nucleotides? RNA polymerase
7. List the three components of an RNA nucleotide: ribose, base, phosphate
8. Where in the cell does transcription take place? nucleus
9. Where in the cell would mRNA go next? cytoplasm → ribosome
10. List 3 events that happen to mRNA before it leaves the nucleus? What purpose do these modifications serve?
Introns are spliced, 5' cap added, & Poly A Tail added
(Junk mRNA) (allow mRNA to attach to ribosome) (mRNA from degrading)
11. Turn your blue/white paper over so that the ribosome side is showing. Where does the mRNA attach to the ribosome? It attaches to the large subunit, just under the P-site. Go ahead and place your mRNA molecule in this location.
12. When the ribosome begins to read the mRNA transcript and code for the placement of tRNAs, the process is called translation because the mRNA code is being "translated" to a protein.
13. The ribosome begins to read the mRNA transcript 3 bases at a time. As it does this, specific t RNA molecules are coded for. Find the tRNA that corresponds with the first mRNA codon. Once you find this tRNA, find the corresponding amino acid (pink circles) and stick the amino acid to the tRNA.
14. Next, line the tRNA (carrying a specific amino acid) on top of the first mRNA codon (3-base sequence). The first tRNA should be placed in the P-site of the ribosome.
15. Next, find the tRNA that corresponds with the second mRNA codon. Find the correct amino acid for this tRNA and place the second tRNA/amino acid unit in the A-site of the ribosome.
16. Once the cell has two amino acids lined up next to each other (one in the P-site and one in the A-site), an enzyme would form a peptide bond between the two. Place one white string between your two amino acids.

not for general bio

17. Next, shift your ribosome one codon to the right. This would place your first tRNA outside of the ribosome. What would happen to this tRNA? _____

break away from the ribosome

18. Go ahead and take the first tRNA away. Would the first amino acid stay connected? Why or why not? _____

it connects to the 2nd A.A. by a peptide bond

19. Find the third corresponding tRNA and amino acid. Place them into the correct location. Incoming tRNAs always bond to the A-site of the ribosome. Place another peptide bond.

20. Shift your ribosome again one codon to the right. Take away tRNA #2. Go ahead and place tRNA and amino acid #4 in the correct location.

21. Shift your ribosome for a last time, one codon to the right. Is there a correlating tRNA? no This is called a "stop" codon. Find the lime green Enzyme and place it on top of the final mRNA codon. This enzyme causes the ribosome to

release the amino acid chain. The ribosome subunits would fall apart and the mRNA nucleotides would get degraded and enter the nucleus once again.

22. What is a chain of amino acids called? polypeptide chain

23. What does your amino acid sequence read? ala-try-iso-gly-stop

24. What would happen to this amino acid sequence if a mutation occurred in the first base of the second codon? code for a diff. ^{amino}protein acid How would this affect the protein? forms cliff. protein or non-functional protein.

More Questions:

1. What is a 3-base sequence found on tRNA called? Anti-codon
2. Fill in the following table for the overall phases of protein synthesis:

college textbook

Process	Initiation	Elongation	Termination
Transcription Pg. 309 Figure 17.6			
Translation Pg. 317-319			

summarize