

DNA Structure

Create a model of DNA with the following sequence of nitrogenous bases on the anti-sense strand.

3' T A T A A A G A T A C G A A T T T A C G A T A G G C A C T C C C 5'

Be sure your model:

- ☐ Is double stranded
- ☐ Has complementary bonding of bases
- ☐ Has the correct number of H-bonds between bases
- ☐ Has antiparallel 5' and 3' ends

Transcription

Mimic the creation of mRNA from the template strand of DNA by modeling transcription factors, RNA polymerase and mRNA.

Be sure you:

- ☐ Constructed RNA in the 5' to 3' direction
- ☐ Can identify the promoter (sequence T A T A A A)
- ☐ Can identify the terminator (sequence C C C)
- ☐ Model RNA polymerase
- ☐ Model the differences between RNA and DNA

Questions you will be asked:

- *Was the sense or anti-sense strand of the DNA transcribed?*
- *Which end of your mRNA strand is the 5' end? Which is the 3' end?*
- *Where does this process happen in the cell?*
- *What is the name of process by which RNA is made from DNA?*
- *Why must this process be done?*
- *What is the name of the enzyme that performs this process?*
- *What are the three major steps of this process and what happens in each?*

RNA Processing

Simulate RNA processing by adding a G cap and a poly A tail to your mRNA model, and by splicing out the sequence A A A U G C.

Be sure you:

- ☐ Add a guanine cap to 5' end
- ☐ Add a poly A tail to 3' end
- ☐ Cut out the intron
- ☐ Adjoin exons
- ☐ Model the spliceosome

Questions you will be asked:

- *Give two reasons why this process must be done.*
- *Where does this process happen in the cell?*
- *In what types of cell does this process occur?*
- *To what end of the mRNA strand is the G cap added? The poly-A tail?*
- *What is the name of the molecule that does the splicing process in the cell?*
- *What is the name of the section of mRNA that was cut out?*
- *What is the name of the sections of mRNA that were attached together?*

Translation

Model the steps of the INITIATION, ELONGATION, and TERMINATION processes of translation using your spliced mRNA molecule as the code.

Be sure you model:

- ☐ Initiation
- ☐ Elongation
- ☐ Termination
- ☐ Amino-acyl tRNA synthase
- ☐ Codons
- ☐ tRNA
- ☐ Ribosome structure
 - P, A, and E sites*
 - Small subunit*
 - Large subunit*
- ☐ Anticodons
- ☐ Amino acids
- ☐ Polypeptide bond formation
- ☐ Polypeptide chain (chain of amino acids)
- ☐ Polyribosome

Questions you will be asked:

- *What is the name of the molecule that attaches amino acids to tRNA molecules in the cell?*
- *Where does this process happen in the cell?*
- *What is the difference in the types of proteins that are made in these two locations?*
- *What types of molecules are the ribosomes made of?*
- *What are the names of the three steps?*
- *What is the name of the bond that joins two amino acids?*
- *In which direction does the ribosome move along the mRNA?*
- *What does the release factor do?*
- *What happens to the parts after protein synthesis is complete?*