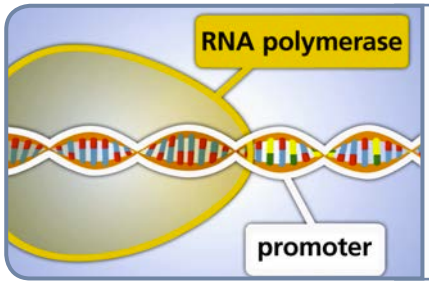
fact sheet

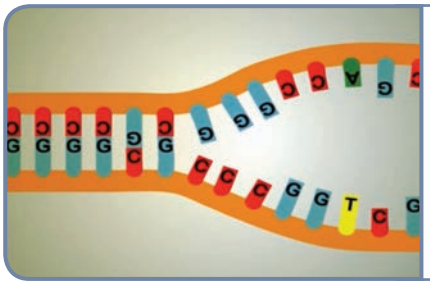
Protein synthesis summary

Stage one: transcription

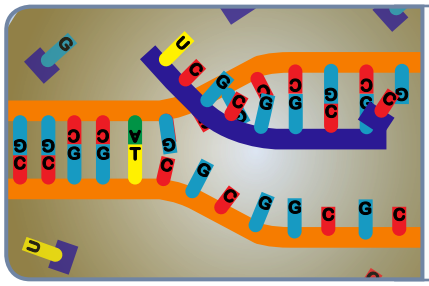
Transcription produces a messenger RNA (mRNA) strand from a DNA template.



RNA polymerase attaches to the promotor region of a gene on a strand of DNA.

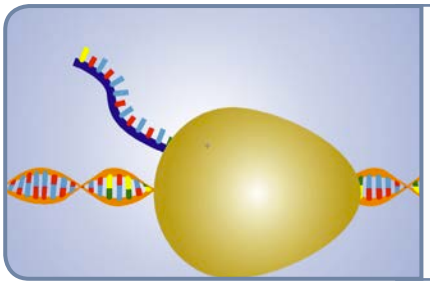


DNA strands separate, exposing nucleotides ready for copying.

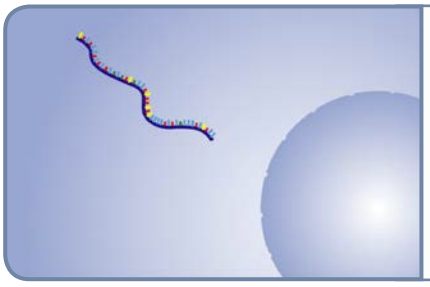


Messenger RNA (mRNA) pairs with a DNA template strand as follows:

- guanine (G) to cytosine (C),
- adenine (A) to thymine (T), and
- uracil (U) to adenine (A).



Nucleotides are added until RNA polymerase reaches a termination sequence in the DNA and releases mRNA.



mRNA moves out of the nucleus, through nuclear pores, into cytoplasm.

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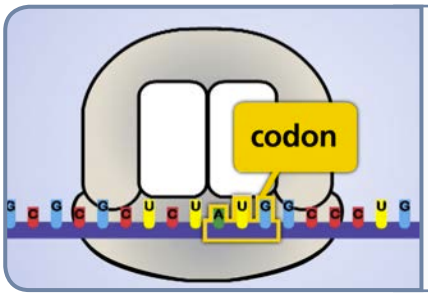
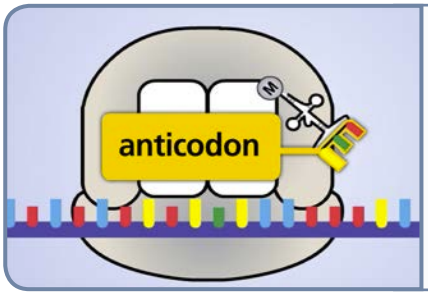
Protein synthesis summary

Stage two: translation

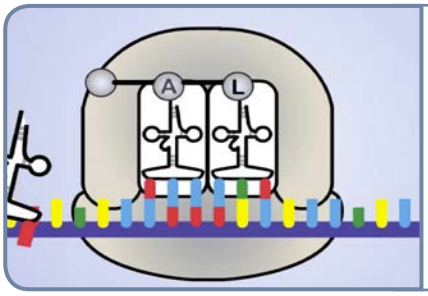
Translation, which occurs in cytoplasm, produces an amino acid chain from a strand of mRNA.



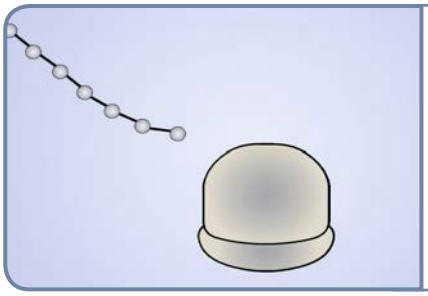
A ribosome binds with a START codon in mRNA. The start codon is AUG.



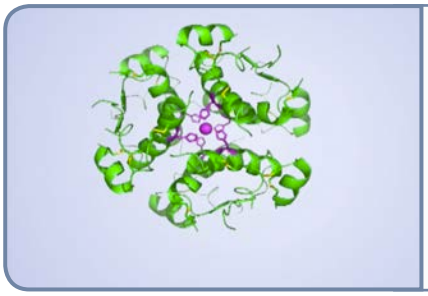
Transfer RNA (tRNA) has a complementary anticodon that attaches to a corresponding mRNA codon. tRNA carries an amino acid.



As the ribosome moves along the strand of mRNA, more amino acids are added to the growing chain.



At the STOP codon (UAG in this sequence), the ribosome releases the mRNA and an amino acid chain.



The amino acid chain folds into a three dimensional shape, called a protein.