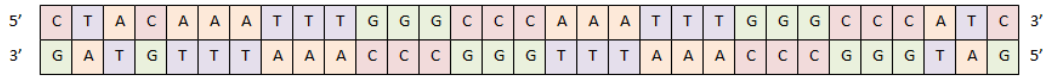
Replication, Transcription, Translation

- What is DNA and RNA?
- What is the structure of DNA and RNA?
- How are nucleotides added onto a growing DNA or RNA strand?
- How is DNA arranged in a eukaryotic cell? A prokaryotic cell?
- What is replication, transcription and translation as far as starting materials and final products?
- Where does replication, transcription and translation occur in eukaryotic cells? prokaryotic cells?

Replication

- What is the function of replication?
- When does replication occur?
- Where does replication occur?
- What is the structure of DNA?
- What does DNA gyrase (a topoisomerase) do?
- What job does helicase perform?
- What job does the stabilizing proteins perform?
- What is meant by complimentary base pairing?
- What are Chargoff's rules and how do they apply to replication?
- What does a "template" mean in reference to replication?
- Given the original DNA sequence of:

5'CTACAAATTTGGGCCCAAATTTGGGCCCATC3'
3'GATGTTTAAACCCGGGTTTAAACCCGGGTAG5'



  - What occurs first to separate and unwind the strands? (go ahead and label the new strands with their 5' and 3' ends)
  - What occurs second after the strands are separated to keep the replication fork open?
  - An enzyme (1) moves in to lay down nucleotides complementary to the DNA template, which enzyme is this, what is it building and why does it do this?
  - After the first enzyme does his job, another enzyme (2) comes in to continue synthesis. What enzyme synthesizes new DNA? How does this enzyme do this?
  - Assuming that helicase is moving in this ← direction, which strand is leading and which is lagging? What if helicase moves this → direction?
  - What happens on the lagging strand? How is this corrected?
  - What is the end result of replication and what is each molecule made of (is it old or new?)
  - What is the importance of telomerases in replication and why are they needed?

Transcription

- What is the function of transcription?
- When does transcription occur?
- Where does transcription occur?

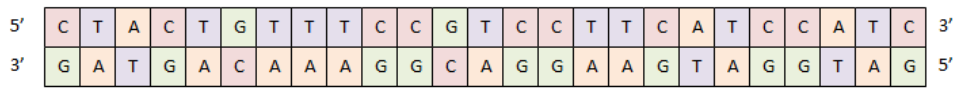
- What enzyme is involved in transcription?
- Is the entire DNA transcribed or just a small part?
- Which strand is used to build your pre-mRNA?
- From the above DNA strand, build your pre-mRNA
- Is the pre-mRNA built in groups or one at a time?
- Once you build your mRNA, it needs to be modified, 3 things happen, what are they?
- What is your eventual product of transcription?

Translation

- What is the function of translation?
- Where does translation occur within the cell?
- What three items do you need for transcription to begin?
- What is the structure of the ribosome as it relates to translation?
- How is mRNA initially aligned in the ribosome?
- Is mRNA read in groups or in singles?
- What actually reads the mRNA and how does it do it?
- What is the structure of the tRNA? What is special about the top and bottom of the tRNA?
- How does an anticodon work?
- When mRNA is read, what action does the ribosome perform?
- Using the sequence above, what tRNA is in the E site? The P site? The A site?
- Using the sequence above, what are the possible amino acids?
- What happens to the ribosome next?
- What is in the E, P and A sites now? What action does the ribosome perform?
- What happens to the ribosome next?
- What is in the E, P and A sites now? What action does the ribosome perform?
- Continue translation until the UAG
- What is special about the UAG codon? Does the tRNA contain and amino acid?
- What happens when the tRNA containing the AUC anticodon enters the P site?

Try some more: (determine the products of replication, transcription and translation for the following:)

1.



2.