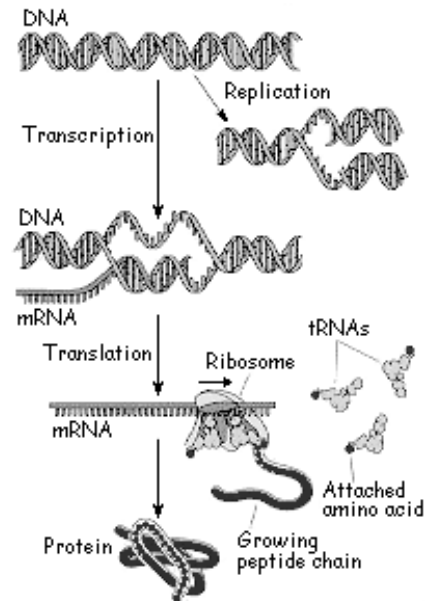


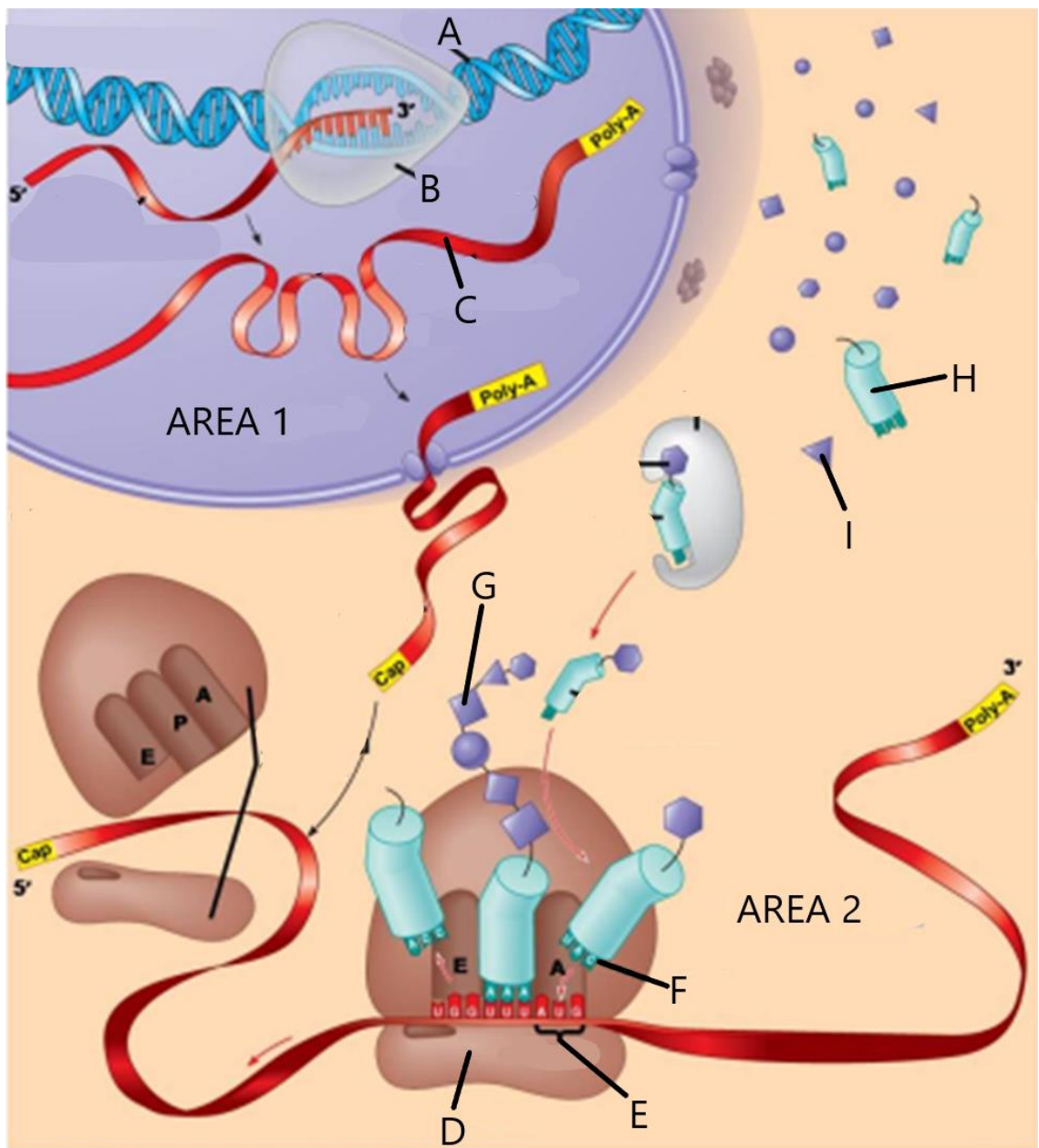
Protein Synthesis Review

1. What is protein synthesis, and where in the cell does it occur?
2. What part of the cell controls the proteins being synthesized?
3. Give a detailed explain of transcription.
4. Give a detailed explain of translation.
5. What does mRNA and tRNA stand for?
6. What is the role of mRNA in protein synthesis?
7. What is the role of tRNA in protein synthesis?
8. What is a codon and anti-codon?
9. Explain the top right diagram in terms of the two paths DNA can take.



10. If a molecule of DNA contained the base sequence A C G , the transfer RNA molecule would have the anti-codon triplet _____.
11. Complete the following mRNA transcription sequence.
 DNA: ACGTTGCAACAGTGTGCACGGAACGTGCTT
 mRNA: UGCAACGUUGUCA
12. A **single strand** of DNA is bonded to a complementary strand of mRNA. Upon analysis, the section was comprised of 10 % C and 15% T. What is the % of A,G and U? Hint: Draw a short section of a single stranded DNA bonded to a complementary strand of mRNA. Examine the base pairings and work it out logically.
13. What is the correct order for the amino acids if the DNA base sequence was as follows:
 DNA sequence: A T G A G C C A G
mRNA sequence:
Amino Acids:

14. Label the diagram and know what is taking place in each area.



Protein Synthesis Review

KEY

1. What is protein synthesis, and where in the cell does it occur?
Process of making proteins. It occurs in 2 stages. Stage 1 transcription occurs in the nucleus. Stage 2, translation occurs in the cytoplasm at the ribosomes.
2. What part of the cell controls the proteins being synthesized?
The base sequence of the DNA.
3. Give a detailed explain of transcription.
Stage 1 of protein synthesis. The process wherein a molecule of mRNA (messenger RNA) is made using a template strand of DNA
Step 1 Initiation
a section of DNA (called a gene) opens up and a promoter sequence allows an enzyme **RNA Polymerase II** to attach to 1/2 the parent DNA.
Step 2 Elongation
pre-mRNA forms using open DNA as template
RNA Polymerase II assembles the RNA nucleotides complementary to the DNA template strand.
Step 3 Termination
when **RNA Polymerase II** reaches a terminator sequence of base pairs along the DNA template, transcription halts. Before it leaves the nucleus, the pre-mRNA is processed by having its ends capped to protect it and having introns (non coding sections) removed while leaving exons (coding sections) in place.
4. Give a detailed explain of translation.
Stage 2 of protein synthesis. The process of creating a polypeptide (protein) using the genetic information present in the mRNA molecule. Occurs in cytoplasm at a ribosome.
Step 1 Initiation
When the mRNA attaches itself to both the ribosome and the tRNA at the "AUG" initiator sequence.
Step 2 Elongation
Every 3 nucleotides of mRNA called a "**codon**" codes for a particular amino acid.
Transfer RNA (tRNA) carrying an amino acid, binds its "**anticodon**" to the complementary mRNA codon. A peptide bond forms between adjacent amino acids and the "empty" tRNA is released to find another amino acid. This continues as the mRNA slides along the ribosome.
Step 3 Termination
Translation is terminated when a "stop codon" is reached in the mRNA strand.
The completed polypeptide (now called a protein) is released.
5. What does mRNA and tRNA stand for?
mRNA (messenger RNA) tRNA (transfer RNA)
6. What is the role of mRNA in protein synthesis?
carry the genetic code (instructions) from the DNA out to the ribosomes.
7. What is the role of tRNA in protein synthesis?
to shuttle the amino acids into position for assembly into a protein.
8. What is a codon and anti-codon?
codon - unit of 3 mRNA nucleotide bases. anti-codon - unit of 3 tRNA nucleotide bases
9. Explain the top right diagram in terms of the two paths DNA can take.
DNA can either enter replication and make a copy of itself or it can enter protein synthesis and direct protein production.
10. If a molecule of DNA contained the base sequence A C G , the transfer RNA molecule would have the anti-codon triplet **A C G**.
11. Complete the following mRNA transcription sequence.
DNA: ACGTTGCAACAGTGTGCACGGAACGTGCTT
mRNA: UGCAACGUUGUCA**CACGUGCCUUGCACGAA**

12. A **single strand** of DNA is bonded to a complementary strand of mRNA. Upon analysis, the section was comprised of 10 % C and 15% T. What is the % of A,G and U? Hint: Draw a short section of a single stranded DNA bonded to a complementary strand of mRNA. Examine the base pairings and work it out logically.

C 10% G 10% T 15% A 40% U 25%

13. What is the correct order of amino acids if the sequence of bases on DNA were as follows:
 What is the correct order for the amino acids if the DNA base sequence was as follows:

DNA sequence: ATG AGC CAG

mRNA sequence: UAC UCG GUC

Amino Acids: **tyrosine, serine, valine**

14.

