

DNA Replication

1. Number the steps of DNA replication in the correct order (1, 2, 3):

- 2 Daughter strands are formed using complementary base pairing.
1 DNA unwinds
3 The DNA of the daughter strands winds with together with its parent strand.

2. Why is DNA replication called "semi-conservative"? half of original is in ^{each} new strand

3. What enzyme unwinds or unzips the parent strand? DNA helicase

4. What enzyme connects the new bases to the old bases in the DNA template?

DNA polymerase III

5. What enzyme connects the new nucleotides together ~~and proofreads them?~~

DNA ligase

6. Show the complimentary base pairing that would occur in the replication of the short DNA molecule below. Use two different colored pencils (or different pens, markers, etc.) to show which strands are the original and which are newly synthesized.

| Original DNA Strand 1 | Original DNA Strand 2 | → | Original DNA Strand 1 (copy from left) | New DNA Strand | + | New DNA Strand | Original DNA Strand 2 (copy from left) |
|-----------------------|-----------------------|---|--|----------------|---|-----------------|--|
| A - T | | → | A | T | + | th A | T |
| C - G | | → | C | G | + | C | G |
| T - A | | → | T | A | + | T | A |
| T - A | | → | T | A | + | T | A |
| A - T | | → | A | T | + | A | T |
| C - G | | → | C | G | + | C | G |
| G - C | | → | G | C | + | G | C |
| C - G | | → | C | G | + | C | G |
| C - G | | → | C | G | + | C | G |
| G - C | | → | G | C | + | G | C |
| A - T | | → | A | T | + | A | T |
| T - A | | → | T | A | + | T | A |

Practicing DNA Transcription and Translation

For the following examples, give the appropriate sequence of DNA, mRNA, tRNA and/or polypeptide (AA = amino acids). **Remember:** A codon chart can only be used for decoding a strand of mRNA.

Codon Chart

Second Position

| | | Second Position | | | | |
|------------------------|--------|-----------------|---------------|------------|------------|---|
| | | U | C | A | G | |
| First Position (5') | U | Phenylalanine | Serine | Tyrosine | Cysteine | U |
| | | Phenylalanine | Serine | Tyrosine | Cysteine | C |
| | | Leucine | Serine | Stop | Stop | A |
| | | Leucine | Serine | Stop | Tryptophan | G |
| | C | Leucine | Proline | Histidine | Arginine | U |
| | | Leucine | Proline | Histidine | Arginine | C |
| | | Leucine | Proline | Glutamine | Arginine | A |
| | | Leucine | Proline | Glutamine | Arginine | G |
| | A | Isoleucine | Threonine | Asparagine | Serine | U |
| | | Isoleucine | Threonine | Asparagine | Serine | C |
| | | Isoleucine | Threonine | Lysine | Arginine | A |
| | | Methionine | Threonine | Lysine | Arginine | G |
| G | Valine | Alanine | Aspartic acid | Glycine | U | |
| | Valine | Alanine | Aspartic acid | Glycine | C | |
| | Valine | Alanine | Glutamic acid | Glycine | A | |
| | Valine | Alanine | Glutamic acid | Glycine | G | |

Third Position
(3')

Example 1:

DNA: T A C G C G C C T A G G G G G T G G

mRNA: AUG CGC GGA UCC CCC ACC

AA: meth arg glyc. serine proline threonine

Example 2:

DNA: T T C G A T T A G A T G C C G A A G

mRNA: AAG CUA AUC UAC GGC UUC

tRNA: UUC GAU UAG AUG CCG AAC

AA: lysine leucine isoleucine tyrosine glycine phenylalanine

Example 3:

DNA: C A I G G I A T G G A T C C C G T A

mRNA: GUA CCA UAC CUA GGG CAU

tRNA: CAU GUU AUG GAU CCC GUA

AA: valine proline tyrosine leucine glycine histidine

Protein Synthesis Overview Diagram

Label the summary of protein synthesis diagrammed below using the following terms: transcription, translation, DNA, mRNA, ribosome, tRNA, amino acid, polypeptide, nucleus, codon, and anticodon.

