What is Transcription?

Worksheet

Transcription is the synthesis of mRNA from a DNA template by RNA polymerase, which reads the template strand 3'5' and builds a complementary RNA strand 5'3', substituting uracil (U) for thymine (T).

Questions

1. Transcription produces:

A) a new DNA molecule
B) an mRNA molecule
C) a protein
D) a ribosome

2. Which base pairs with adenine in RNA?

A) thymine
B) uracil
C) guanine
D) cytosine

3. What removes introns from pre-mRNA?

A) RNA polymerase
B) helicase
C) splicing (spliceosome)
D) DNA ligase

4. RNA polymerase reads the DNA template strand in which direction?

A) 5'3'
B) 3'5'
C) randomly
D) both directions at once

5. A DNA template strand reads 3'-TACCGGATT-5'. What mRNA sequence is transcribed?

6. The coding (non-template) strand of a gene reads 5'-ATGGCTAAC-3'. What is the mRNA sequence?

7. A gene's primary transcript (pre-mRNA) is 1,200 nucleotides long. After splicing removes 350 nucleotides of introns, how long is the mature mRNA (before considering the poly-A tail)?

8. Define: What enzyme carries out transcription?

9. Define: What base replaces thymine in RNA?

10. Define: Where does transcription begin?

Answer Key

1. B) an mRNA molecule - Transcription copies DNA into a complementary mRNA molecule.
2. B) uracil - RNA uses uracil instead of thymine, so it pairs with adenine.
3. C) splicing (spliceosome) - The spliceosome removes introns and joins exons during RNA splicing.
4. B) 3'5' - It reads the template 3'5' while synthesizing the new mRNA 5'3'.
5. RNA polymerase pairs A-U, T-A, C-G, G-C (uracil replaces thymine in RNA). Template 3'-TACCGGATT-5' mRNA 5'-AUGGCCUAA-3'
6. The mRNA has the same sequence as the coding strand, except U replaces T. Coding strand 5'-ATGGCTAAC-3' mRNA 5'-AUGGCUAAC-3'
7. Mature mRNA length = pre-mRNA length intron length = 1,200 350 = 850 nucleotides
8. RNA polymerase, which synthesizes mRNA from a DNA template.
9. Uracil (U) pairs with adenine instead of thymine.
10. At the promoter, a specific DNA sequence where RNA polymerase binds.