

Transcription Worksheet

Answers

The central dogma of molecular biology states:

1. DNA replicates. (**replication**)
2. DNA codes for the production of mRNA. (**transcription**)
3. mRNA migrates from the nucleus to the cytoplasm.
4. MRNA carries coded information to the ribosomes. Ribosomes create proteins. (**translation**)

DNA codes for proteins.

DNA vs. RNA (Compare and contrast DNA and RNA):

DNA	RNA
Double Stranded	Single Stranded
Contains the bases: adenine and thymine, guanine and cytosine.	Contains the bases: adenine and uracil, guanine and cytosine.
Made with a deoxyribose sugar.	Made with a ribose sugar.

Translation

Objective: **The objective of transcription is to create mRNA (messenger RNA) from a strand of DNA.**

This process occurs in three essential stages.

The three essential stages are;

1. **Initiation**
2. **Elongation**
3. **Termination**

Stage 1: Initiation

1. **RNA polymerase** binds to the **promoter** or the **TATA box** and opens up the double helix.
2. **RNA polymerase** binds to the **promoter** as it contains many **adenine** and **thymine** bases. They only have two **hydrogen bonds** which makes it easier to break the double helix.

Stage 2: Elongation

1. On the **template strand** of DNA, RNA polymerase builds mRNA in the **5' to 3'** direction. The **promoter** is not transcribed.
2. The **coding strand** is the unused strand of DNA.
3. No RNA primers are required to start the process unlike DNA replication.

Stage 3: Termination

1. A **termination sequence** is encountered and recognized by the RNA polymerase at the end of the gene.
2. The **primary transcript** of mRNA is removed from the **template strand**.
3. The process is repeated when **RNA polymerase** binds to another **promoter** and begins **transcribing** another gene.

Before leaving the nucleus, some modifications are made to protect the mRNA in the cytoplasm.

A **5' cap** is added to protect it from **digestion** and to tell ribosomes to initiate **translation**.

The **3' poly – A – tail** is added to protect the mRNA from **degeneration**. It is a tail of **200 adenine** nucleotides. It is added by **poly – A – polymerase**.

Genes are made out of two components; **introns** and **exons**.

Exons are the coding regions, the part that is going to be translated into a protein.

Introns are the non coding regions.

Spliceosome removes the **introns** from the mRNA.

After all of this you are left with a **mRNA transcript**.