CONCEPT: EUKARYOTIC TRANSCRIPTION

● Eukaryotic transcription is more _____ than prokaryotic transcription

□ Diverse **RNA polymerases** transcribe different RNAs

RNA polymerase I	Ribosomal RNA
RNA polymerase II	Messenger RNA
RNA polymerase III	tRNA

□ Transcription initiation requires many _____

- **General transcription factors (GTFs)** are proteins that are required to initiate transcription

  - Ex: TFIIA, TFIIB, TFIID

- **Promoter** is a DNA sequence that initiation factors bind upstream of the gene transcript

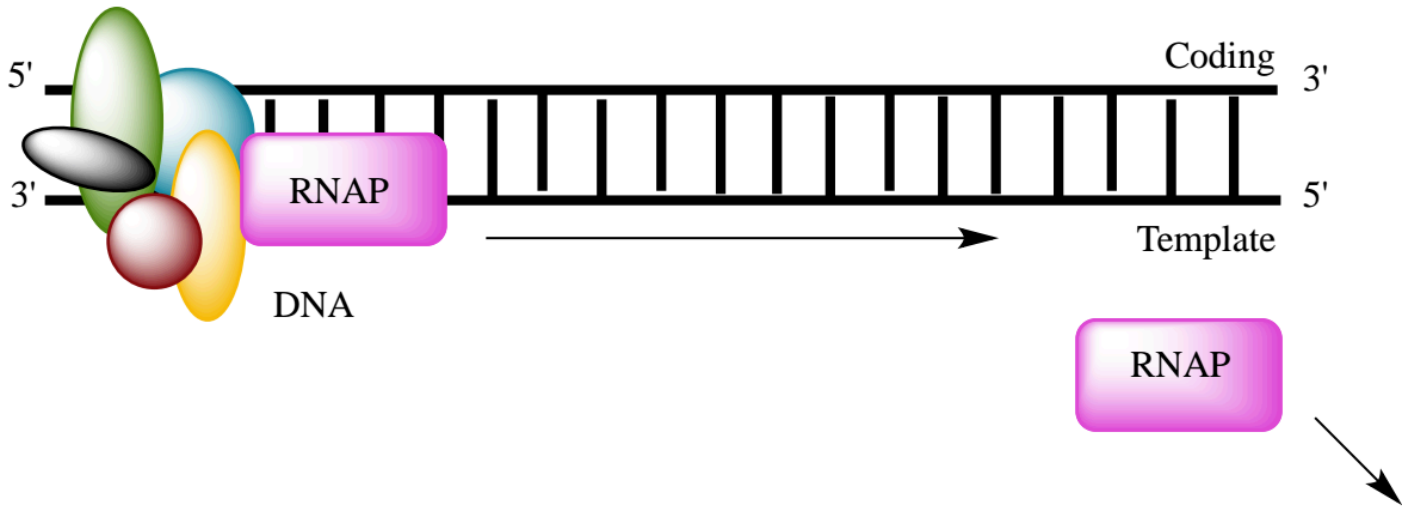
  - **TATA-box** is a sequence of Ts and As ~30 bp upstream of start site

    - **TFIID (TATA binding protein**) binds this sequence and recruits GTFs

- GFTs bound to the promoter recruit RNA polymerase II

  - **Preinitation complex** includes GFTs, RNA polymerase II at the promoter

EXAMPLE:



□ Transcription elongation begins after transcription _____

- The **carboxyl terminal domain** on the RNA polymerase II controls elongation

- Phosphorylation of this tail occurs by GTFs

- When phosphorylated, it releases RNA polymerase II from the initiation complex

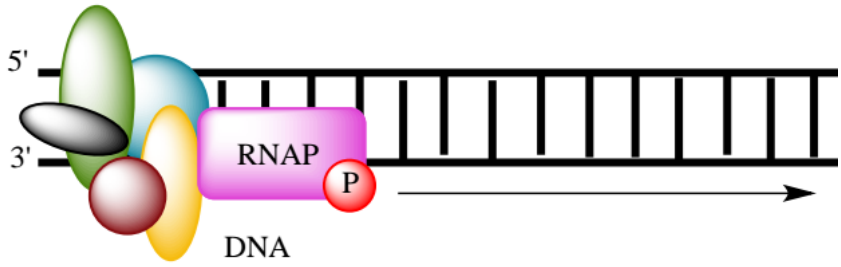
- Once released, RNA polymerase II elongates the transcript

□ Transcription termination doesn't have to occur at a specific sequence

- RNA polymerase II transcribes 100s or 1000s of nucleotides past the coding sequence

- RNA processing forms the coding mRNA sequence

EXAMPLE:



□ A number of factors _____ transcription

- **Enhancers** activate and help enhance transcription

- **Silencers** repress transcription

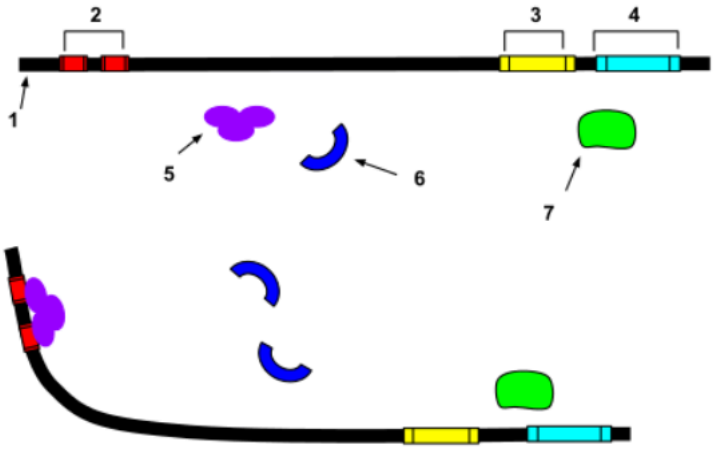
- **Specific transcription factors** that work to activate or repress specific genes

□ These factors can be located near or far to the transcription start site

- **Cis-acting elements** are elements that are found within the same chromosome

- **Trans-acting elements** are elements that are found in other chromosomes

EXAMPLE:



PRACTICE:

1. Which of the following polymerases is responsible for transcribing mRNA in eukaryotes?
    a. RNA polymerase I
    b. RNA polymerase II
    c. RNA polymerase III
    d. RNA polymerase

2. Which of the following general transcription factors is responsible for binding to the TATA-Box
    a. TFIIA
    b. TFIIB
    c. TFIID
    d. TFIIH

3. Which of the following modifications occurs to the RNA polymerase tail in order to trigger it to elongate the transcript?
    a. Methylation
    b. Acetylation
    c. Carboxylation
    d. Phosphorylation

4. Which of the following regulatory mechanisms regulates transcription from a great distance away from the gene?
    a. Silencers
    b. Specific transcription factors
    c. Enhancers
    d. Promoters