CONCEPT: STEPS OF TRANSCRIPTION

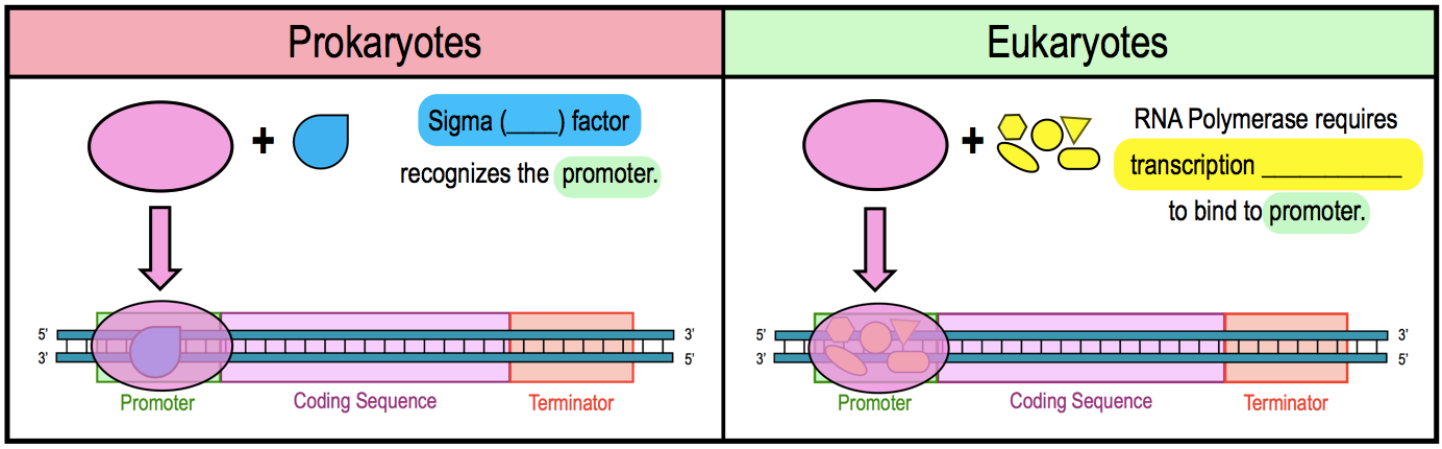
●The process of *transcription* consists of _____ steps:

1 _____ 2 _____ 3 _____

1) Initiation of Transcription

●**Initiation**: RNA polymerase _____ to promoter on DNA & _____ the two DNA strands.

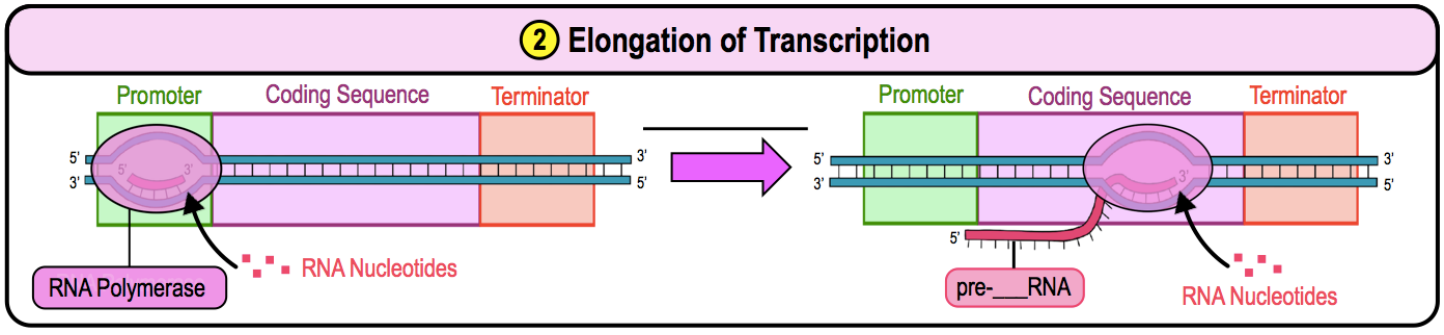
- □ _____ **(σ) factor** of a prokaryotic RNA polymerase recognizes the promoter sequence.
- □ In eukaryotes, **transcription factor** proteins are required to bind the promoter.
- □ Unwinding of the DNA exposes the DNA *template* strand, which RNA polymerase uses as a guide to build RNA.



2) Elongation of Transcription

●**Elongation**: RNA polymerase _____ an RNA molecule by pairing free RNA nucleotides with the DNA template.

- □ RNA polymerase continues to move, unwinding _____ & building _____ in the 5' to _____ direction.
- □ A single gene can be transcribed *simultaneously* by several RNA polymerases to make more RNA.



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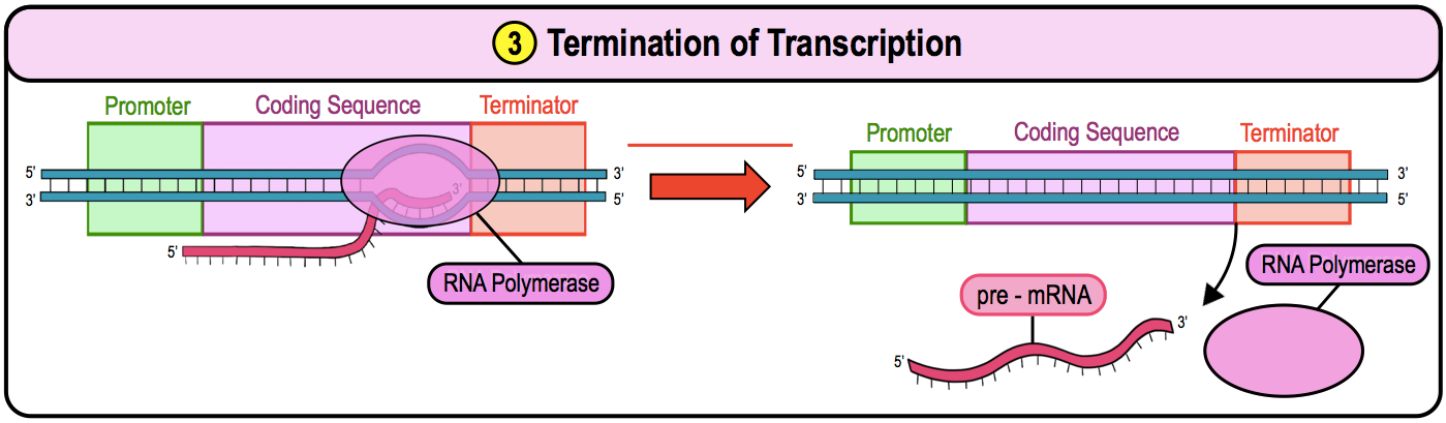
3) Termination of Transcription

●**Termination**: process that results in the _____ of transcription to produce an RNA molecule.

□ Prokaryotes & eukaryotes _____ in the way they terminate transcription.

□ *Eukaryotic* termination forms a _____-mRNA molecule requiring further modification (*RNA processing*).



PRACTICE: During which stage of transcription do the following processes take place?

1) RNA polymerase binds to the promoter. 2) The RNA transcript is released. 3) The RNA transcript extended.

a) 1-termination; 2-initiation; 3-elongation.

b) 1-initiation; 2-elongation; 3-termination.

c) 1-elongation; 2-termination; 3- initiation.

d) 1-initiation; 2-termination; 3-elongation.

e) 1-termination; 2-elongation; 3-initiation.

PRACTICE: Transcription in eukaryotes requires which of the following molecules in addition to RNA polymerase?

a) Anticodons.

b) Ribosomes and tRNA.

c) Transcription factors.

d) Aminoacyl-tRNA synthetase.

CONCEPT: STEPS OF TRANSCRIPTION

PRACTICE: Which of the following is the correct transcript of mRNA for the following DNA template?

DNA Template: 3'-ATGAAGCCGAGTCAT-5'.

a) 3'-TACTTCGGCTCAGTA-5'.
b) 3'-AUGACUCGGCUUCAU-5'.
c) 3'-UACUUCGGCUCAGUA-5'.
d) 3'-ATGACTCGGCTTCAT-5'.

PRACTICE: During transcription of DNA to RNA:

a) The RNA polymerase moves along the DNA in the 5' to the 3' direction.
b) The 3' end of the RNA molecule is produced first.
c) The RNA polymerase must first bind to a promoter sequence.
d) Transcription is always initiated at a "start codon".

PRACTICE: What happens during the initiation step of DNA transcription?

a) The mRNA detaches from the RNA polymerase as the RNA polymerase leaves the DNA strand.
b) RNA polymerase attaches to the DNA at the promoter sequence of the gene.
c) A ribosome attaches to the initiation codon of a completed mRNA strand.
d) RNA polymerase moves along the template strand of the DNA creating an mRNA strand.

PRACTICE: Which of the following properties is NOT shared by RNA polymerase and DNA polymerase.

a) Can initiate strand synthesis.
b) Dependent on a DNA sequence template.
c) Catalyzes phosphodiester bond formation.
d) Cannot proofread using a 3'-to-5' exonuclease activity.
e) Polymerizes nucleotides in a 5'-to-3' direction.