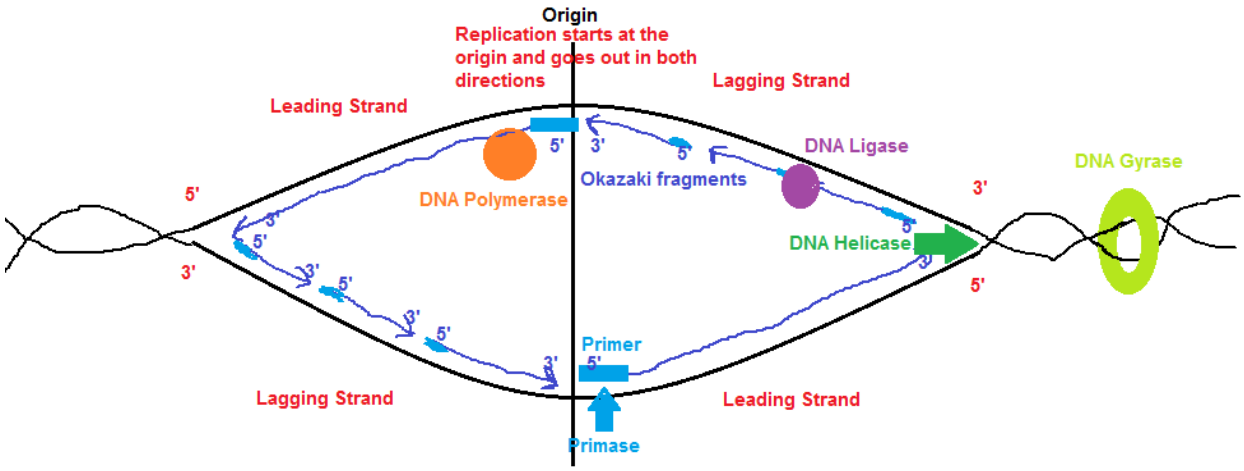
1. Below draw an image of a replication bubble in eukaryotic DNA. Indicate all the enzymes used during replication. Try and do it without referring to your notes.



** Prokaryotic DNA polymerase uses I, II, II. Eukaryotic DNA polymerase uses α,β,ε (Greek like us college students).**

2. Where do replication, transcription, translation occur in eukaryotes? In prokaryotes?

	Prokaryotes	Eukaryotes
DNA Replication	Cytoplasm	Nucleus
Transcription	Cytoplasm	Nucleus
Translation	Cytoplasm	Cytoplasm

3. Fill in the table regarding consensus sequences.

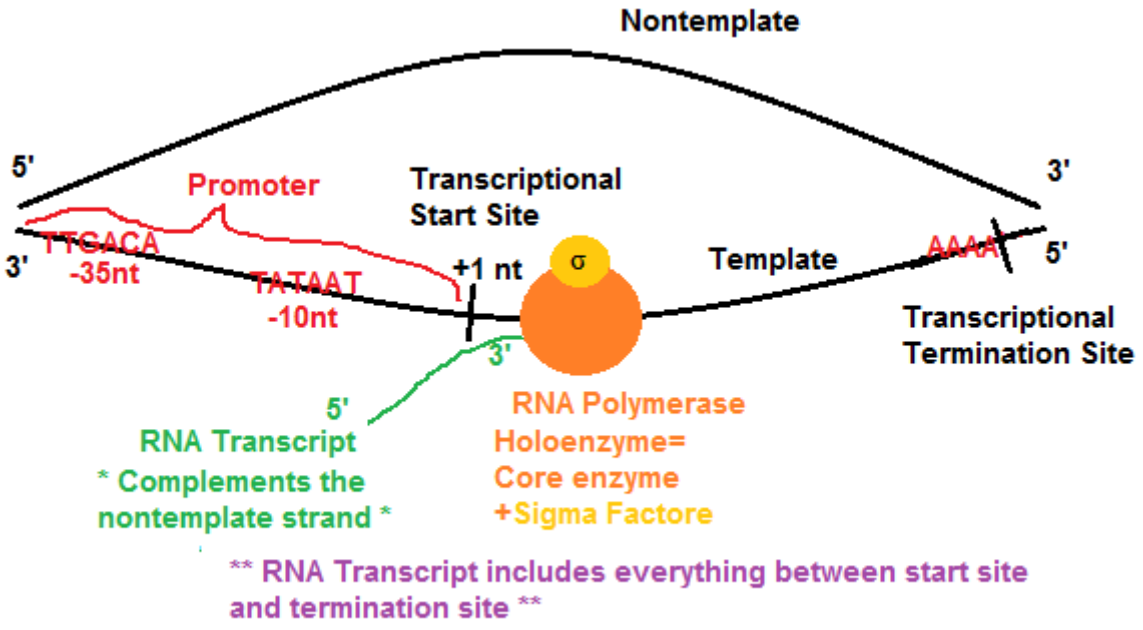
Organism	Consensus Sequence	How many nucleotides upstream?
Prokaryotes	TATAAT (TATA Box)	-10 bp
	TTGACA	-35 bp
Eukaryotes	TATAAA (TATA Box)	-25 bp
	TFIIB Recognition Element (Cs&Gs)	-35 bp
	Initiator Element	+1 bp
	Downstream Core Promoter Element	+30 bp

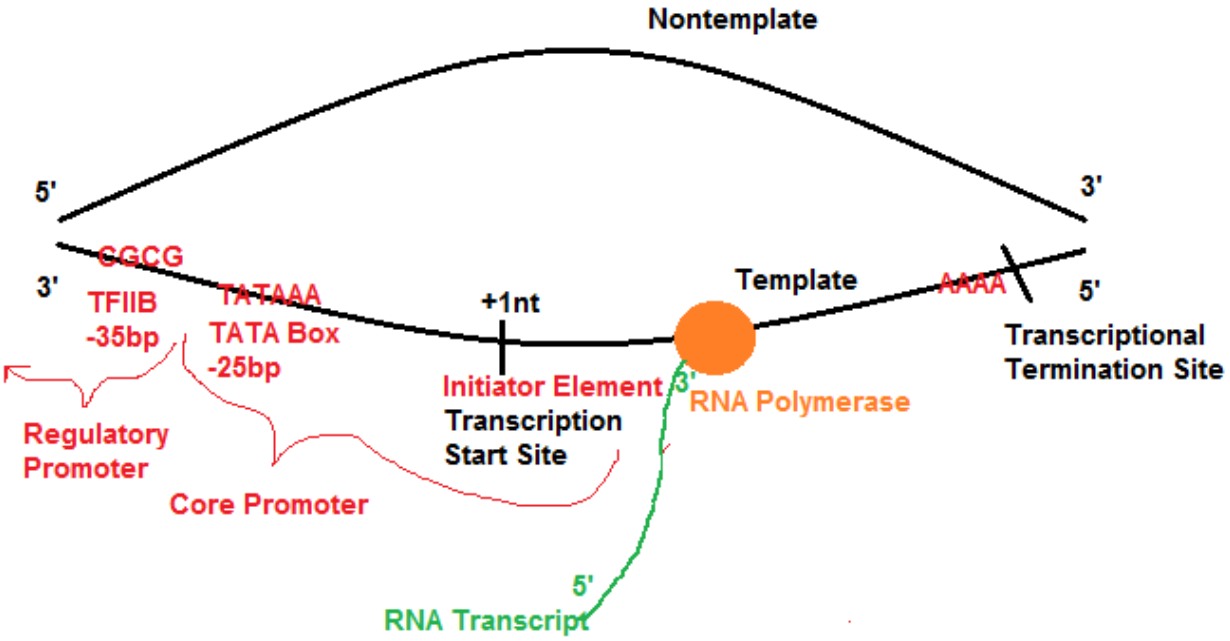
4. Answer the following concerning transcription in prokaryotes and eukaryotes.
   a. In which direction does RNA polymerase transcribe a region of DNA?
   5'→3'
   b. Is it possible for multiple RNA polymerases to transcribe a segment of DNA at the same time?
   Yes!
   c. Do eukaryotes have polycistronic mRNA? What are the advantages of having polycistronic mRNA? No. Make multiple proteins quicker
   d. What would happen if the sigma factor was nonfunctional in a bacterial cell?
   RNA wouldn't be transcribed.

5. How do eukaryotes and prokaryotes terminate transcription?

	Termination Method
Prokaryotes	• Rho-independent terminators- Transcription terminates when inverted repeats form a hairpin followed by a string of uracils. • Rho-dependent terminators- After hairpin forms Rho unwinds the DNA-RNA hybrid and terminates transcription.
Eukaryotes	RNA Poly I- Rho 'like' factor RNA Poly III-String of Uracils with no hairpin loop. RNA Poly II- termination continues well past termination point and Rat1 exonuclease eats up remaining RNA.

6. Draw the diagram of a gene undergoing transcription. Label the template and nontemplate strand, the promoter region, the transcriptional start site, and the transcriptional termination site. Which of these regions are included in the RNA transcript? Which of these regions are omitted from the RNA transcript?




Nontemplate
5'
3'
CGCG
3'
TFIIB
-35bp
TATAAA
TATA Box
-25bp
+1nt
Template
AAAA
5'
Transcriptional
Termination Site
Initiator Element
Transcription
Start Site
3'
RNA Polymerase
Regulatory
Promoter
Core Promoter
5'
RNA Transcript