

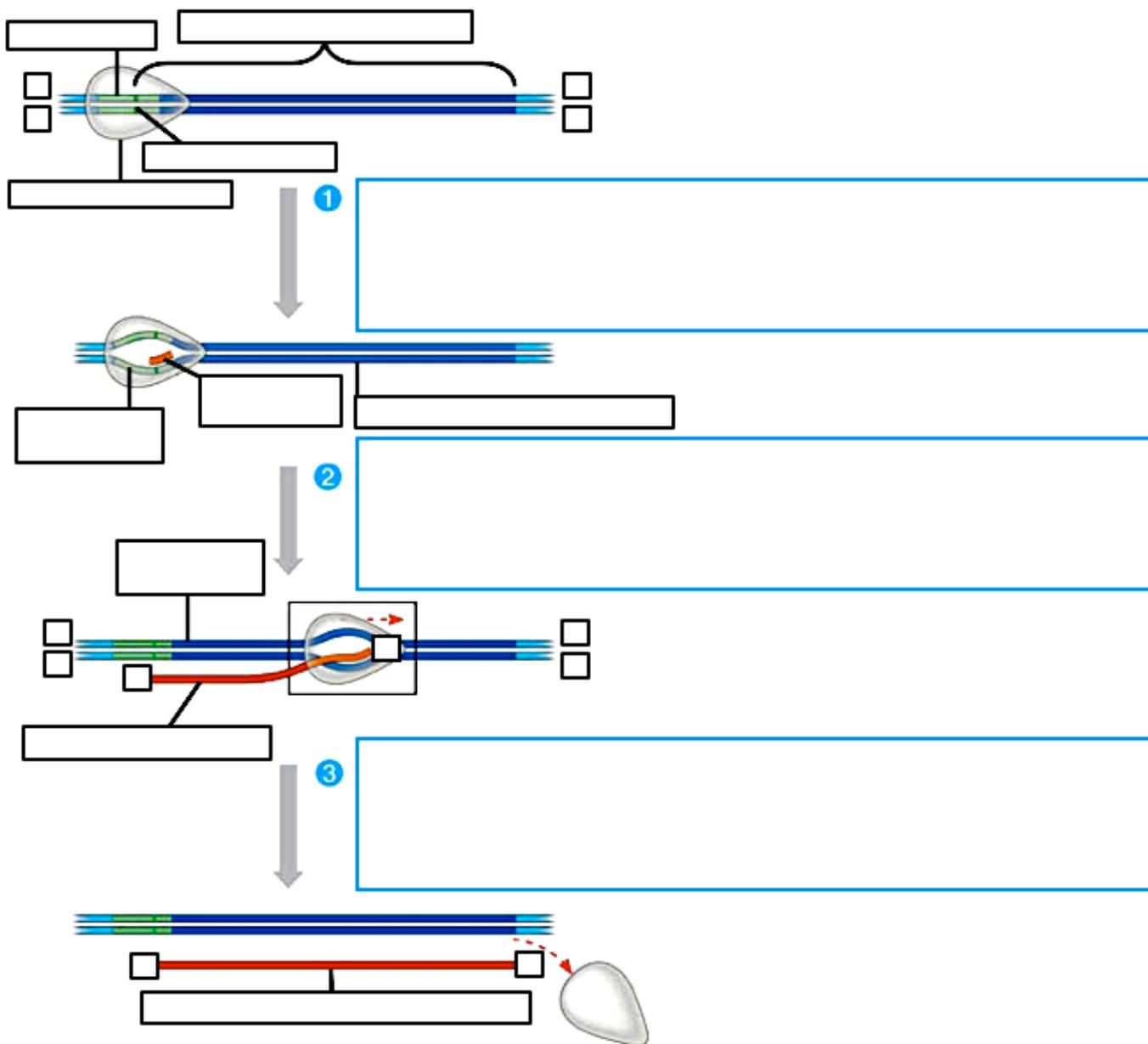
- **PHYSICALLY PRINT OUT** this PDF and **HANDWRITE** (with a black or blue pen) your answers directly on this PDF. Typed or digitally-written work is **not** accepted. Do **not** answer questions on separate paper.
 - **Importantly, study guides are NOT GROUP PROJECTS!!!** You, and you alone, are to answer the questions as you **read** your assigned textbook. You are **not** to share answers with other students. You are **not** to copy any answers from any other source, including the internet.
 - **Get in the habit of writing LEGIBLY, neatly, and in a medium-sized font.** AP essay readers and I will skip grading anything that cannot be easily read so start perfecting your handwriting, and don't write so large you can't add all the relevant details and key elaborations in the space provided.
 - **SCAN** physical documents in color and with good resolution. Then, upload your final work as **PDFs** to Archie. Avoid uploading dark, shaded, washed-out, sideways, or upside-down scans of homework. Keep completed physical study guides organized in your biology binder to use as future study and review tools.
 - **READ FOR UNDERSTANDING** and not merely to complete an assignment. **First**, read a section quickly to get an overview of the topic covered. Then, read it a **second** time slowly, paraphrasing each paragraph **out loud** and analyzing every figure. Finally, read it a **third** time as you answer the study guide questions if assigned and start building your memory. Try to write answers out in your own words, when possible, and try to purposefully and accurately use all new terminology introduced.
1. Which **enzyme** uses the DNA template strand to transcribe a new mRNA strand?
 2. Recall that during the cell cycle's S phase of Interphase, DNA Polymerase adds new nucleotides to the growing daughter DNA strand being assembled complimentary to a DNA template strand. In a similar manner, RNA Polymerases build RNA polymers complimentary to DNA template strands. Both **DNA and RNA Polymerase enzymes assemble new polynucleotides in the 5' → 3' direction**. Which enzyme, DNA polymerase or RNA polymerase does **NOT require a short polynucleotide primer to begin synthesis of a complimentary strand using a DNA template**?
 3. Recall that **genes** are sequences in the DNA that encode the instructions that a cell uses to make **RNA molecules and polypeptides/proteins**.
 - a. What is the **promoter** of a gene?
 - b. Terminator DNA sequences are found in **prokaryotic (but not eukaryotic) genes**. What is this **terminator**?
 - c. What is the **transcription unit** of a gene?
 4. What are meant by the terms **downstream** and **upstream** with reference to the sections of a gene?
Downstream =

Upstream =
 5. Would we say that the promoter is upstream or downstream of the transcription unit of a gene? (*Check your answers by going to the Ch.17.2 Concept Check Question #1 in Appendix A of your textbook*)
 6. a. Where is the **Transcription Start Point** located in a gene?

b. What is the **Transcription Start Point** used for?

c. Is the **Transcription Start Point upstream or downstream of the transcription unit**?

7. **Study Figure 17.8** well. Once you have memorized it, test your knowledge by trying to label the diagram below, illustrating **the three stages of transcription**, from memory, checking yourself, thereafter, for accuracy. To the right of the figure, name the three stages of transcript and briefly describe each stage. Be clear in your language and use the terminology you are learning accurately. **Note that only ONE of the two DNA strands are used as a template in DNA transcription to make an RNA transcript (copy), unlike in DNA replication, where BOTH DNA strands function as templates to make daughter DNA strands with.**

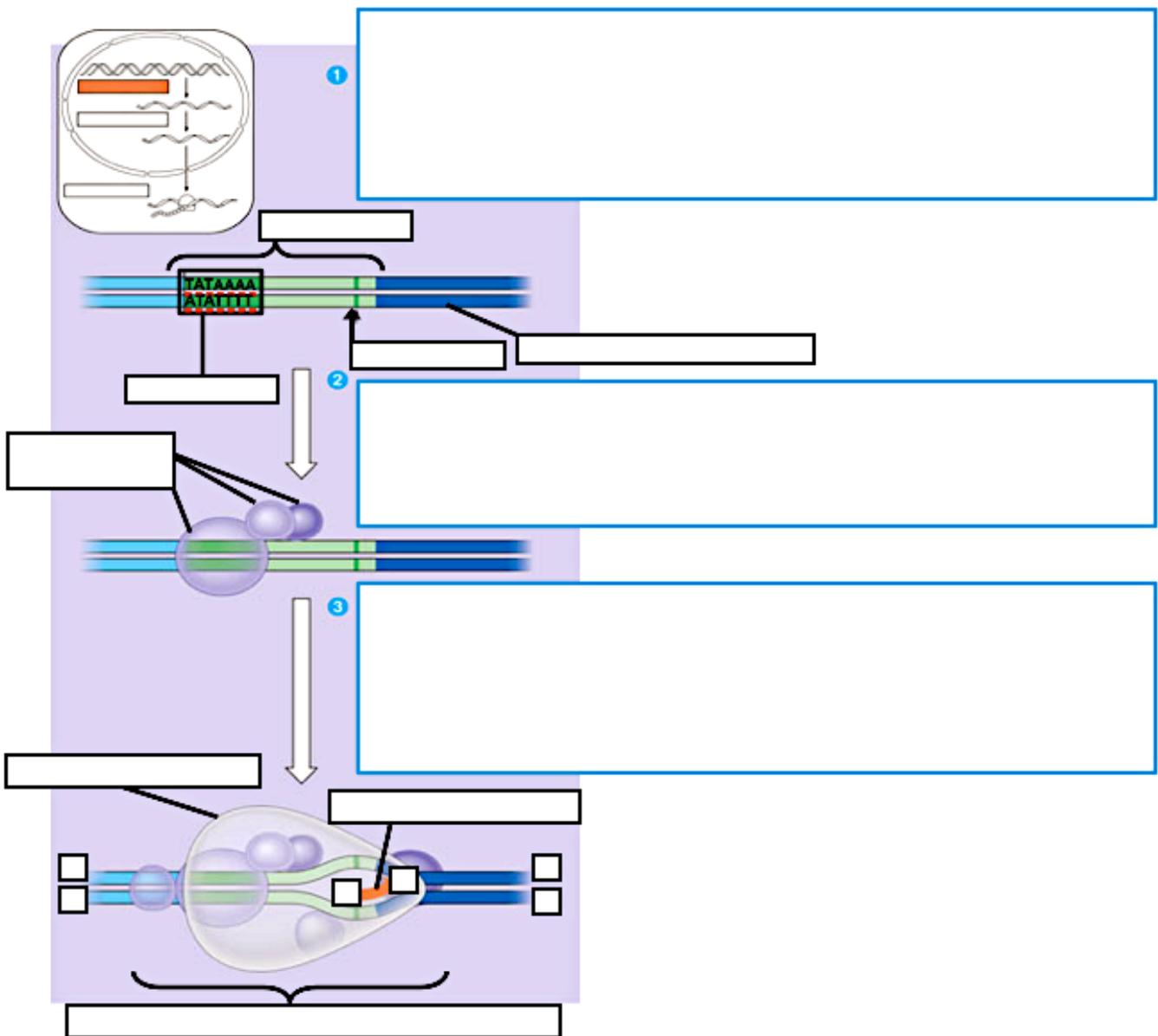


8. What is the difference between **the binding of RNA polymerase to the promoter in prokaryotes** like bacteria versus **eukaryotes like humans**? Be sure to also describe **what transcription factors are and make it clear which type of cell uses them** in the space provided on the following page.

Description of how binding of RNA Polymerase takes place in Prokaryotes =

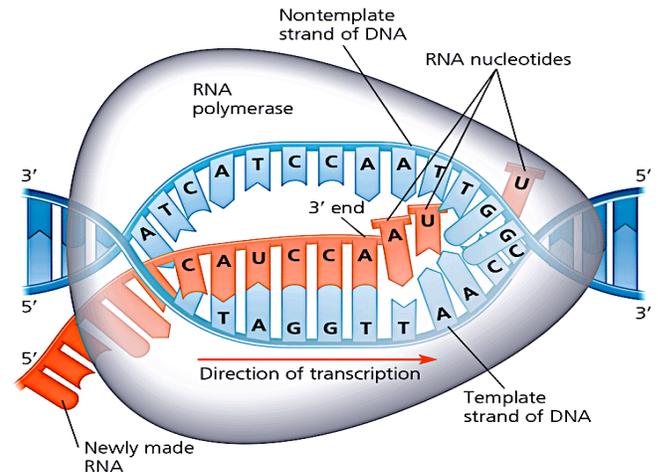
Description of how binding of RNA Polymerase takes place in Eukaryotes =

9. Now, **study Figure 17.9** well. Once you have memorized it all, test your knowledge by trying to label the diagram below, demonstrating initiation of transcription at a Eukaryotic promoter, from memory, checking yourself, thereafter, for accuracy. Also label the 5' and 3' ends of the DNA and mRNA. To the right of the figure, explain the three stages of initiation that are shown. Again, work on clarity in your language and using the terminology you are learning accurately. **Note that RNA must be built antiparallel to the template and in the 5' to 3' direction!**



10. a. Based on what you memorized above, what is the **TATA box** found in eukaryotic promoters?

- b. What is the function of the **TATA box** again in **eukaryotic promoters** during the initiation of transcription?
11. a. In eukaryotes specifically, **transcription factors MUST** bind to the promoter **for efficient transcription** of the DNA to occur. What do these **transcription factors** (specific proteins) do?
- b. What comprises an assembled **Eukaryotic transcription initiation complex**?
12. Suppose X-rays caused a sequence change (a DNA mutation) in the TATA box of a particular gene's promoter. How would that affect initiation and finally the transcription of the gene? **Why?** (*Check your answers by going to the Ch. 17.2 Concept Check Question #3 in Appendix A of your textbook*)
13. Study Figure 17.10, which shows transcription elongation. Recall that during **DNA replication**, helicase was needed to unwind the DNA (*to break the hydrogen bonds holding the two DNA strands in the double helix together*) so **DNA Polymerase** could build the daughter **DNA** strands. During **DNA transcription**, **RNA Polymerase** builds the **RNA transcript**, but **what unwinds the DNA so that RNA Polymerase can transcribe the DNA** template strand of a gene?



14. Contrast the **termination of transcription** in prokaryotes and eukaryotes.

Mechanism for Prokaryotic DNA Transcription Termination =

Mechanism for Eukaryotic DNA Transcription Termination =

