WLHS / AP Bio / Monson

Name_____
Date_____Per_____

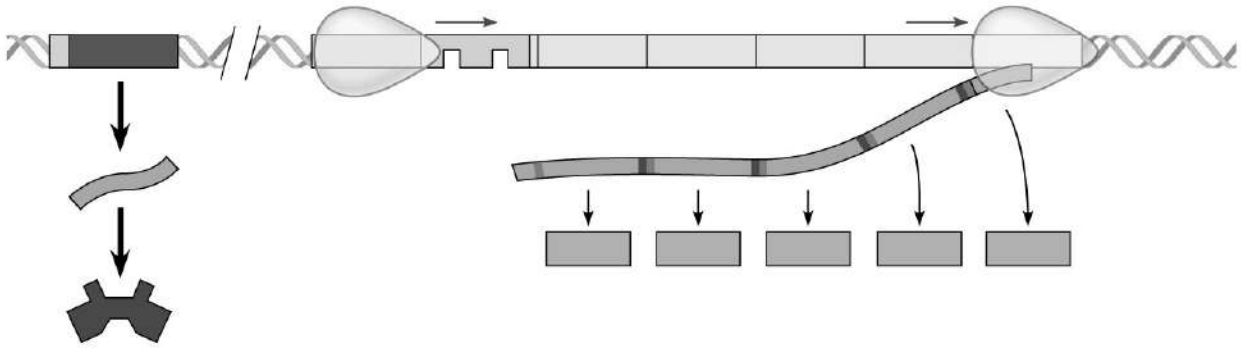
CHAPTER 18 STUDY QUESTIONS, part 1 – Regulation of Gene Expression: Prokaryotes vs. Eukaryotes (p. 351-366)

1) What are the two levels within which metabolic control can occur in bacteria?

2) What is the advantage of feedback inhibition? In what kinds of pathways is this mechanism typically found?

3) What is the **key advantage** of grouping genes of related function (e.g. the genes encoding all of the enzymes in the tryptophan synthesis pathway) into **one transcription unit**?

4) Label each component / product of the ***trp* operon** shown below - (see fig. 18.3a)
(environmental / cellular conditions: tryptophan absent, repressor inactive, operon on).



5) How does a **repressor** work? What kind of gene encodes a repressor protein?

6) How is the trp repressor protein an allosteric protein?

7) Briefly, what is the key difference between a repressible operon and an inducible operon?

8) Why is the ***trp* operon** considered **REPRESSIBLE**?

9) Why is the ***lac* operon** considered **INDUCIBLE**?

10) Why are repressible enzymes generally associated with anabolic pathways and how is this an advantage to the organism?

11) Why are inducible enzymes generally associated with catabolic pathways and how is this an advantage to the organism?

12) How does positive gene regulation work?

13) Explain why it is said that the ***lac* operon** "has both an on-off switch and a volume control."

14) In general, what is the effect of histone acetylation and DNA methylation on gene expression?

15) What is meant by alternative RNA splicing? What is the significance of alternative RNA splicing?

16) Summarize how miRNAs and siRNAs interact with and affect mRNA.

17) What is the evolutionary significance of small non-coding RNAs (ncRNAs)? (HINT: see "Evolution" section on page 366)

18) Label the figure below showing the stages of gene expression that can be regulated in eukaryotic cells. (HINT: see fig. 18.6 on page 356)